



**Transport Improvements Around the
Basin Reserve**

Preliminary Assessment of Option X



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1 Executive Summary

This assessment had identified a number of significant reasons why the option is not a viable alternative to Option A and B. These include:

Significant Road Safety Concerns – The current Option X proposal for Sussex Street is a significant safety concern. The safety risk results from the proposed cross section which is inadequate for flows of this magnitude. Specific concerns include:

1. Narrow lane widths for busses, general traffic lanes and footpath facilities.
2. No median to prevent right turns across three lanes of traffic.
3. Limited clearance from adjacent properties (1.5m from lane edge line to property), meaning that:
 - a. vehicles exiting property will need to encroach in to the traffic lane to see approaching traffic,
 - b. vehicles turning into property from the near lane will need to slow down considerably before being able to exit the carriageway safely. This creates a hazard for following vehicles and potentially pedestrians.

The cross section will need to incorporate wider lanes, a shoulder or parking, a footpath that at least matches the existing, and a physical median to provide separation between opposing flows and to prevent right turns across the traffic flows. To accentuate these safety risks the single northbound lane is predicted to have up to 1900 vehicles per hour using it during the peak periods, which is up to 25% more than 2009 peak flows in the Mt Victoria Tunnel. To provide an acceptable outcome the footprint will need to be widened requiring additional private property purchase.

Walking and Cycling Outcomes– The Option X proposals as they have currently been presented cannot be considered an improvement on the existing provision for pedestrians and cyclists. Option A and B offer more potential for improved walking and cycling outcomes.

Significant Increased Cost – Option X as presented by the Architectural Centre is likely to have an expected cost in the order of \$130M - \$145M, however, if all of the safety concerns raised are addressed, this will introduce significant additional cost. To resolve some of the outstanding design concerns is likely to increase this cost further. This is considerably more than the \$75M and \$90M expected costs of Options A and B. The difference is due to the significant cost associated with constructing a tunnel under Memorial Park. The government has previously decided that funding was not available for the Memorial Park tunnel and it was for this reason that Option F was no longer considered. Option X may be thought of in the same light.

Reduced Transport Benefits – Option X has been modelled with required changes to Tory/Tasman Streets to prevent rat-running. The model suggests that with those changes the transport benefits are 10-15% lower than those achieved by Options A and B. Option X has reduced benefits because there are increased flows through the Memorial Park tunnel and on Taranaki Street resulting in increased delays at the intersection of the two flows.

It should also be noted that Option X does offer the potential for the following outcomes:

- Improved amenity in Memorial Park.
- Less traffic in the Dufferin/Rugby Street corner providing additional green spaces
- Additional grade-separated pedestrian/cycling connections to the Basin Reserve.
- Less visual impacts on the views south down Kent/Cambridge Terrace as a bridge is not required.

The proposal does however raise some new questions around the appropriateness of this alternative Urban Design that need to be considered further.

There are a number of ways in which Option X has been presented that do not accurately depict the outcome of the scheme. These have been highlighted in Figure ES.1.

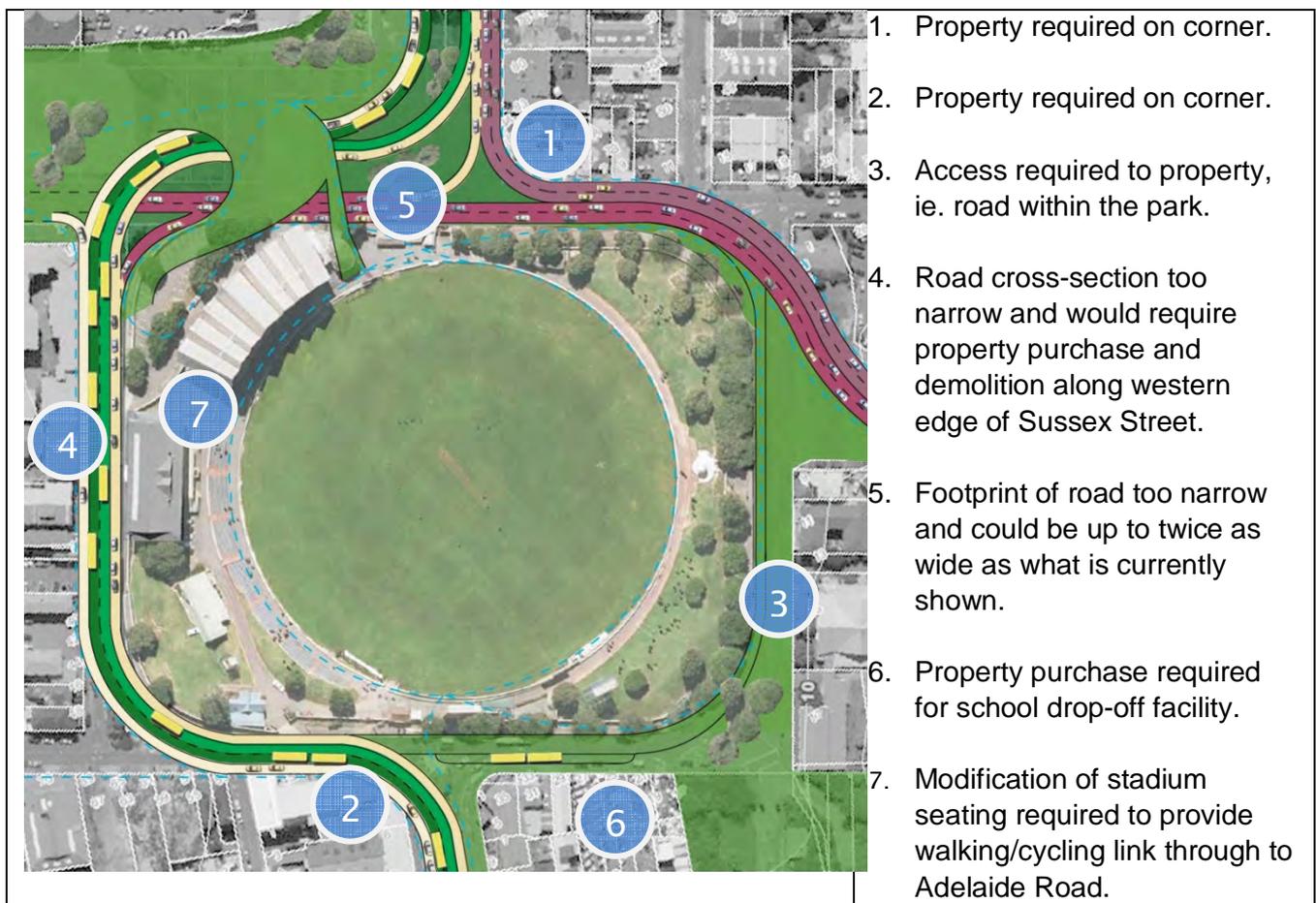


Figure ES.1. Presentation of Option X. (source Architectural Centre)

If the government decided to fund a Buckle Street tunnel then Option X could be considered further along with Option F or Option A and B linking to a tunnel. As this money is not currently available then Option X is not a viable alternative to Option A or B.

2 Introduction

Opus International Consultants Ltd (Opus) have been asked by the NZ Transport Agency (NZTA) to undertake a preliminary assessment of the proposals developed by the Architectural Centre. The Architectural Centre have named their proposal Option X.

Option X is a combination of several ideas previously considered and discounted by the project team. It has been the subject of some local press and NZTA have received a number of written submissions in support of the scheme. NZTA and Opus met with the Architectural Centre team on several occasions through the engagement period to gain a shared understanding of Option X and some of the challenges and opportunities it presents.

This report presents a short technical assessment of the Option X scheme. Wider consideration of the submission made by the Architectural Centre will form part of the Submissions Summary Report.

3 Traffic Assessment

This section documents the traffic performance of Option X relative to Option A. The following assumptions have been made for the purposes of this and other aspects of the transport assessments:

- Option A and B are the same from a transportation perspective; and
- Option A includes a pedestrian / cycle path on the northern side of the bridge.

A suite of transportation models are used to forecast the effects of infrastructure changes in the Wellington Region. A brief summary of each is presented below:

- Wellington Strategic Transport Model (WTSM) – multimodal model used to forecast trip-maker mode choice response to changes. Also to forecast passenger transport numbers on particular corridors and traffic and traffic route choice at a strategic level. This model is key as besides mode split it sets the trip generation and trip distribution which are carried through to SATURN.
- Wellington Traffic Model (SATURN software) – traffic network model covering the Wellington Urban Area. Provides the ability to model link capacity and the constraints associated with different types of intersection. Used to forecast the route choice and travel time implications of proposals as well as the overall traffic efficiency.
- Wellington S-Paramics Model – micro-simulation model of the inner-city traffic network. Provides the ability to simulate driver's behaviour and is predominantly used as a design tool. Best forecasting the formation and lengths of queues.

In general terms the models are listed in order of ascending detail. WTSM is the least detailed. For expediency, the Wellington SATURN model has been used to test Option X as this provides a good indication of overall network effects. It is not appropriate for forecasting queue lengths.

The assessment presented in this paper assumes that no additional traffic capacity is provided in either the Mount Victoria or Terrace Tunnels. This assumption holds true for the assessment of all of the options considered here (A, B, F or X).

3.1 Comparison to Option F

Earlier versions of this report also included a comparison of Option X against Option F. To enable a quick comparison between Option X and the NZTA options we used the existing SATURN traffic model. The model of Option A used for this comparison closely represents the current proposal. Option F has been developed further as part of the War Memorial Tunnel Scoping Report.

The key development was the inclusion of a ramp from Sussex Street in to the tunnel and widening of the tunnel to three lanes to accommodate the additional traffic. The earlier Option F scenario retained traffic from Sussex Street on Buckle Street, allowing for them to travel in front of the War Memorial to access Taranaki Street. Modelling indicated that this was in the order of 20,000

vehicles per day (predicted in 2016, refer to Page 46 of the Feasible Options Report). If the expense of providing a War Memorial Tunnel was to be considered then to achieve the expected outcomes it was deemed necessary to also underground the Sussex Street traffic.

The Option F models previously referred to have therefore been superseded.

The comparison of options F and X have therefore been removed from this version of the report.

3.2 Traffic Distribution

The following images are outputs from the Wellington SATURN model that show the differences in traffic volumes between alternative Options (green is an increase and blue is a decrease).

Figure 3.1 shows the difference in traffic flows between Option A and Option X. In numerical terms the diagram represents Option X flows minus Option A flows. When flows in each scenario (Option X and A) are equal the difference is zero. In these diagrams green highlights where Option X flows are greater than Option A. Blue indicates where Option X flows are lower than Option A. The difference plots for the PM peak hour show a similar pattern to that in the AM peak.

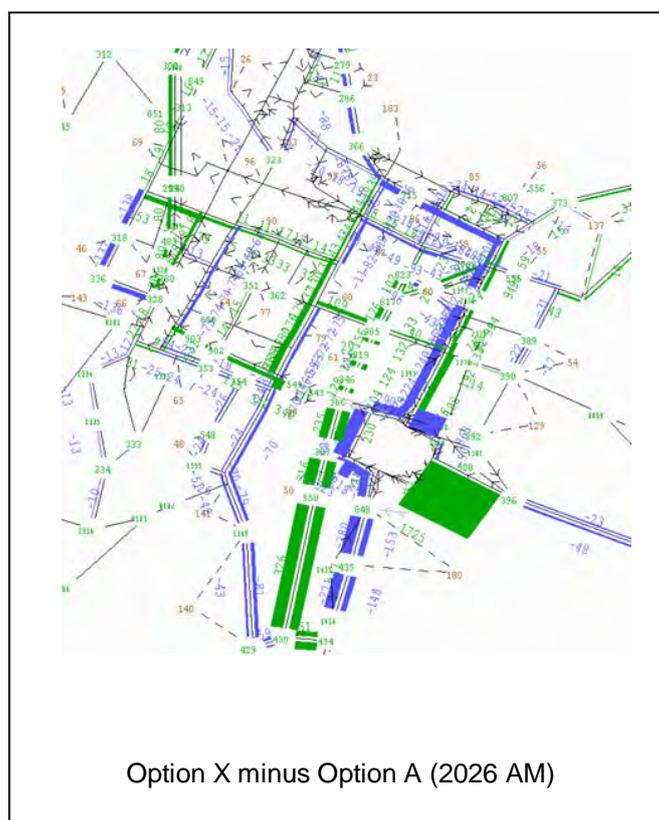


Figure 3.1. Option X comparison to Option A.¹

¹ Small traffic flow reductions are expected from Mount Victoria westbound. The apparent increase shown in Figure 3.1 is a result of differences in the way the approach to the Basin is coded.

Option X has lower traffic flows on both Wallace Street and Adelaide Road with significant increases on Tasman Street. There is also an increase in vehicles using Taranaki Street north of Buckle Street which corresponds to a reduction in vehicles using Cambridge Terrace (Option A).

These differences are due to the removal of the intersection of Tory / Tasman / Buckle Street in Option X. In Option X, westbound SH1 (towards the Terrace Tunnel) would pass below Tasman / Tory Street. Removal of this intersection reduces the delay motorists would experience on the Tory / Tasman Street route, making it a more attractive way to drive to or from the central city. This would result in an increase in traffic flow on Tasman Street. This increase would be contrary to the wishes of Wellington City Council and the Architectural Centre who would like Tory / Tasman Street to be prioritised for pedestrians and cyclists.

A variation on Option X has been modelled which blocks Tasman Street at Buckle Street to stop the increase in vehicles on Tasman Street (Option Xb). The figure below shows the difference between Option Xb and Option F and between Option Xb and Option A.



Figure 3.2. Option Xb comparison to Option A.²

Blocking movements along Tasman Street increases traffic flows on the parallel routes. The plot above naturally shows that Option Xb would have lower flows on Tasman / Tory Street than Option A. They show that Option Xb would have higher flows on Wallace Street than Option A.

² Small traffic flow reductions are expected from Mount Victoria westbound. The apparent increase shown in Figure 3.2 is a result of differences in the way the approach to the Basin is coded.

The differences in 2026 forecast traffic flows to and from Newtown and south Wellington are summarised in the table below. The table shows the forecast annual average daily traffic (AADT) flow for the three parallel routes south of Buckle Street and the Basin Reserve. The Wellington City Council district plan classifies these roads as follows:

- Adelaide Road - Principal Arterial
- Wallace Street – Distributor
- Tasman Street - Local Access

For comparison, the 2009 AADTs from the calibrated SATURN model are also included in the table. The figures represent the sum of the daily two-way flows on each street. This data is presented graphically in the chart overleaf.

Two-way Demand Flow	2009	2026			
	Do Min	Do Min	Opt A	Opt X	Opt Xb
Wallace Street / Taranaki Street	14,700	17,614	13,565	11,763	17,996
Tasman Street	5,800	5,901	6,115	17,347	2,270
Adelaide Road	31,800	38,081	41,492	32,826	42,447
Sum	52,300	61,596	61,172	61,936	62,713

Table 3.1. Option X and Xb comparison to Option A.

The table and chart show that for Option X, the forecast AADT on Tasman Street is almost three times as much as forecast for the do-minimum, Option A and Option F scenarios. It shows that the AADT on Tasman Street is forecast to be almost eight times lower for Option Xb (with Tasman Street Blocked), than for Option X. The table also shows that the AADTs on Wallace Street and Adelaide Road are approximately 50% and 30% higher in Option Xb (with Tasman Street Blocked) when compared with Option X.

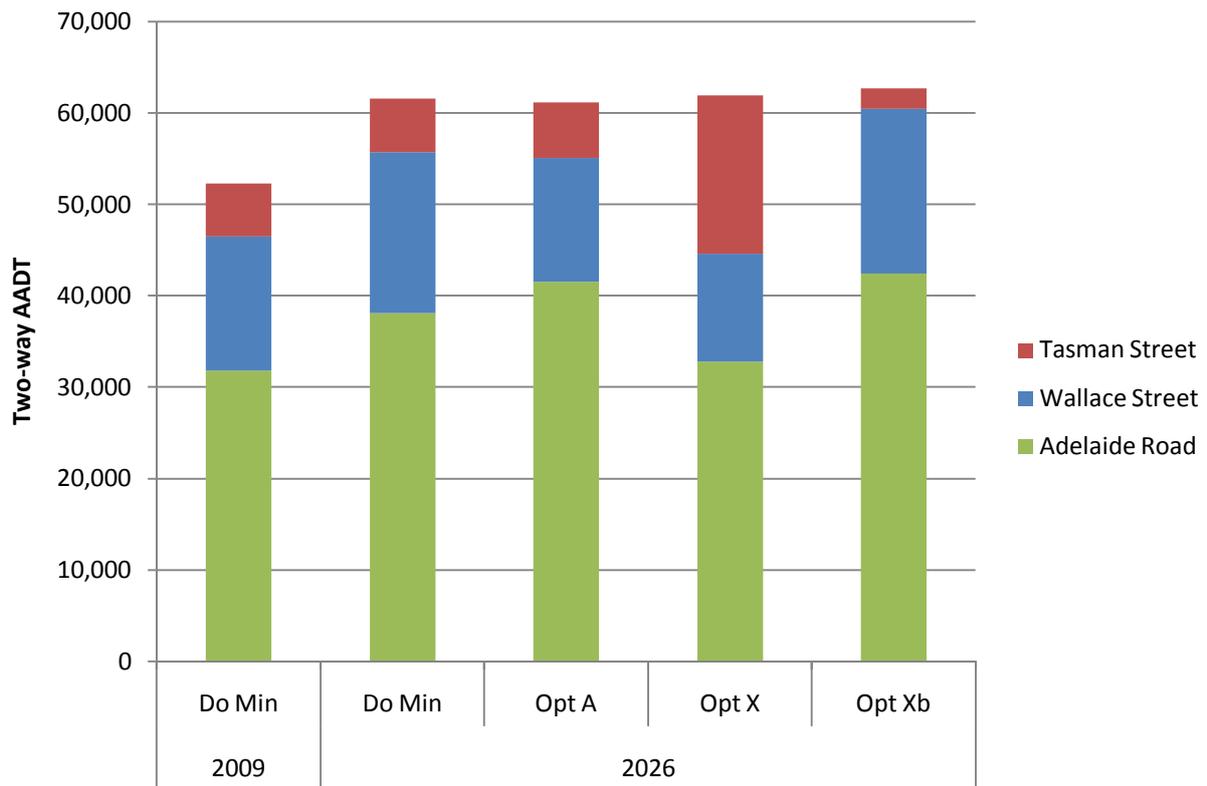


Figure 3.3. North/South flows in vicinity of project area.

The AADT forecast for Adelaide Road is similar for Option A, and Xb. This indicates that the traffic effect of grade separation is the same whether SH1 westbound passes over or under the Adelaide Road to Kent-Cambridge link.

In Option Xb, the traffic flow between Tasman and Tory Street is prevented. The chart shows that the traffic effect of banning these movements is to shift motorists onto Wallace Street rather than Adelaide Road. This is likely to be because in Options A, and Xb, Adelaide Road is operating close to or above its capacity.

3.3 Traffic Link Demand Flows

Figure 3.4 shows hourly traffic link flows (in passenger car units) around the Basin Reserve for Option Xb for the 2026 forecast year.

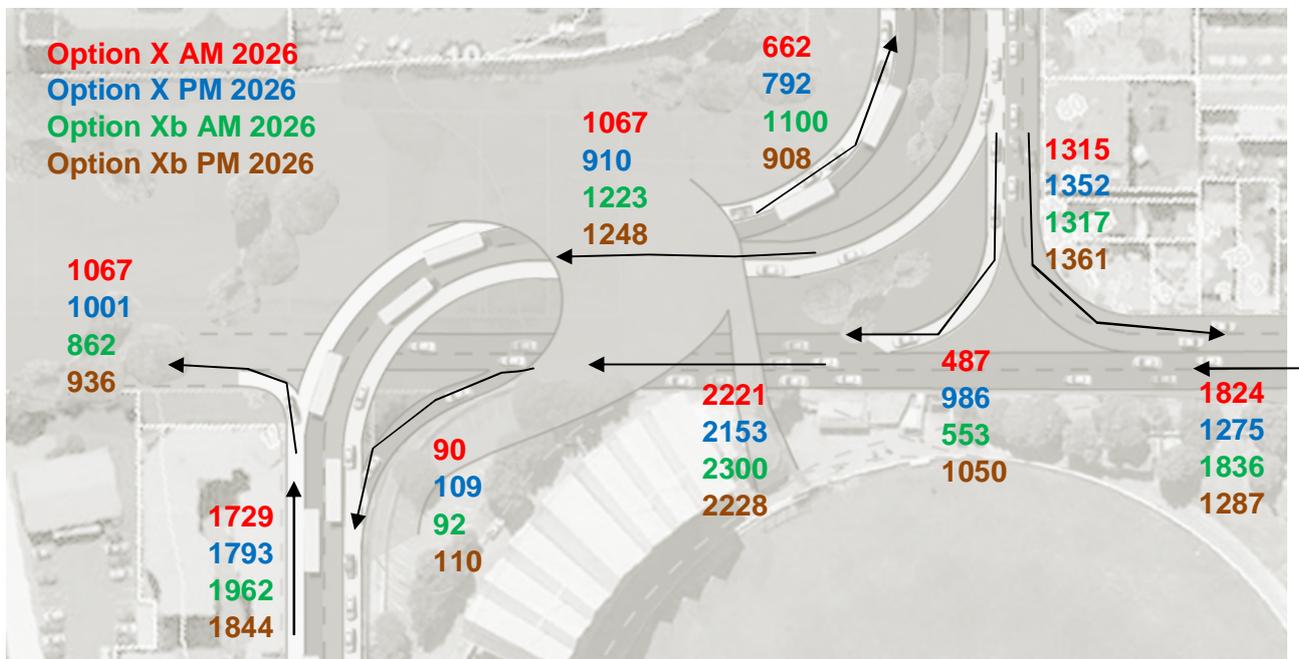


Figure 3.4. Option X traffic link flows in the north-west corner of the Basin Reserve.

The figure shows that:

- most of the traffic on SH1 westbound from the Mount Victoria Tunnel continues ahead into the Buckle Street Tunnel³
- flows forecast from SH1 westbound to Sussex Street and Adelaide Road southbound are low

Some of the flows shown on this diagram are at the upper limits of what is possible. One lane of a straight section of road more than 3.5m wide would normally be expected to accommodate flows of up to 1800 passenger car units per hour. A road alignment with tight horizontal curves and vertical level differences, as for Sussex Street, would accommodate a lower traffic flow. Further more detailed modelling work, perhaps using the S-Paramics should more accurately assess the implications of this road alignment on the actual traffic flows.

The traffic flows on Sussex Street, before the road splits between motorists heading towards SH1 westbound and Cambridge Terrace northbound is around 1900 passenger car units. This indicates that the route would be very congested. In reality it is likely that some of this traffic would be diverted onto Wallace Street, we can see this is already happening.

³ There is no option to turn from SH1 westbound towards Cambridge Terrace northbound

3.4 Traffic Benefits

The table below shows the forecast traffic benefits for the different options. The methodology for calculating these figures is noted within the Feasible Options Report. These benefits are cost savings (e.g. travel time cost saving). Bus Passenger travel times savings and crash cost savings for Option A have been calculated at \$0.9M and \$7.8M respectively. These cost savings are likely to be of a similar order for Option Xb and have therefore been excluded from this table.

Option	Opt A	Opt Xb
Uncongested Travel Time Benefits	\$39.1	\$34.6
Congested Travel Time Benefits	\$5.0	\$4.6
Vehicle Operating Benefits	\$9.6	\$8.5
Carbon Dioxide Benefits	\$0.4	\$0.3
Tangible Benefits (millions)	\$54.1	\$48.0

Table 3.2. Traffic Benefits summary. Option Xb comparison to Option A.

Option Xb, with Tasman Street banned, has 10-15% lower transportation benefits less than for Option A.

Option Xb has reduced benefits because there are increased flows through the Memorial Park tunnel and on Taranaki Street resulting in increased delays at the intersection of the two flows.

Option X, with increased traffic on Tasman and Tory Street, has higher transport benefits than Option A (20% higher) or Xb (35% higher) due to the free-run for vehicles along this local road route.

3.5 Accessibility

Option X changes the way in which land around the Basin reserve would be accessed. Later sections present the changes to pedestrian and cyclist routes through and around the Basin Reserve. This section explains how motorised access would be changed by Option X.

St Marks School & Wellington College

Option X includes a “green lane” school access area at the south-eastern corner of the Basin Reserve. Option X does not include circulating traffic lanes for through traffic around this part of the Basin Reserve. Currently, and in Options A & F, circulating lanes are provided and motorists driving to the schools approach from the north via Dufferin Street.

In Option X, the green lane would function purely as an access or service road. No connections from SH1 westbound are proposed. Option X provides for left-in and left-out only traffic

movements at the intersection between Adelaide Road and Rugby Street. To leave the schools / government house precinct, motorists would travel via a new one-way road between Rugby Street and Alfred Street. The intersection between Adelaide Road and Alfred Street would be signal controlled. For the transport modelling undertaken this intersection was modelled as a one-way out with both a left and right turn permitted.

The arrangements allow for all traffic movements except for motorists approaching from the south via Adelaide Road. The Option X proposal does not permit right turns across southbound traffic into Rugby Street. Motorists wishing to drive from Adelaide Road to the schools, to government house or to businesses in Alfred Street would need to perform a u-turn in Cambridge - Kent Terraces. Subsequent to this analysis the Architecture Centre has since indicated that they would expect this intersection to provide for all movements in to and out of Alfred Street, this may have an effect on the efficiency of the scheme.

The Wellington Traffic Model does not have sufficient detail to assess the operational performance of the one-way access roads proposed as part of Option X. The "green lane" would however need to provide for school buses, parent drop-off and parking prior to the afternoon pick-up. A one-way system is likely to be feasible and operate well as long as queues on Alfred Street from the Adelaide Road intersection are not excessive and do not interfere with the pick-up / drop-off arrangements for private motorists or bus drivers.

Future Progressive Supermarket on corner of Rugby / Tasman Streets

The intersection between Rugby Street and Tasman Street currently provides only for left-in and left-out movements. Options A and X maintain a left-in / left-out only arrangement at this intersection.

In Option A motorists approaching from Kent Terrace may drive around the Basin Reserve (on its eastern side) and turn left into Rugby Street to access the supermarket (to be built on the corner of Rugby and Tasman Streets). In Option X, there is no provision for motorists to drive from Kent Terrace to the supermarket without a substantial detour.

4 Pedestrian – Cyclist Assessment

This section presents the likely impact of Option X on pedestrian and cyclist journeys. In the NZTA Feasible Options Report an assessment of pedestrian connectivity was presented. The figure below shows the main route through and around the Basin Reserve that are currently used. This section presents the differences between Options A, F and X with regard to these pedestrian and cyclists routes.

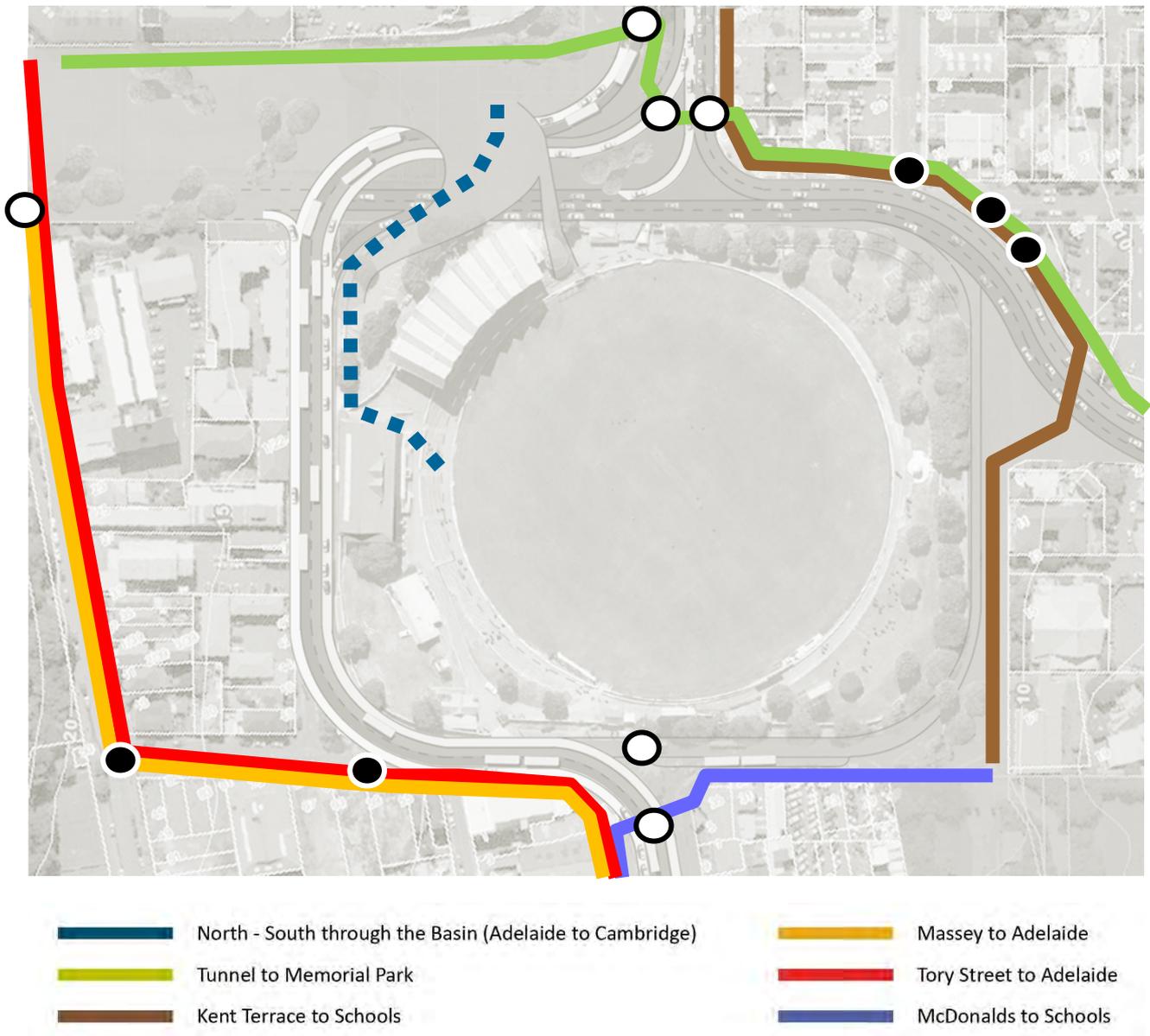


Figure 4.1. Pedestrian-Cyclist Routes Assessed.

The effect of the options on each of the key routes is discussed in more detail below.

4.1 Route 1 – North-south through the Basin Reserve

For Option A or F pedestrians or cyclists travelling from Adelaide Road to the Basin Reserve would follow a very similar route to that used with the current road layout. There would, however, be fewer traffic lanes to cross on Rugby Street. In Option X, part of Rugby Street would be a “green lane” access way. This should be very easy to cross except at the start and end of the school day.

With no signal control at the Adelaide Road / Rugby Street intersection in Option X, pedestrians crossing Adelaide Road close to the Basin would choose a facility at Alfred Street instead. This would have little impact for pedestrians walking through the Basin Reserve, but would be challenging for cyclists travelling north-south between Kent/Cambridge and Adelaide Road. Unless a wide, shared path were provided on the eastern side of Adelaide Road (requiring land acquisition & building demolition), cyclists would need to dismount and walk between Alfred Street and the Basin Reserve. Either scenario would disadvantage cyclists. This could be resolved by shifting this intersection from Alfred Street to Rugby Street. Shifting this intersection is unlikely to have an effect on the traffic benefits for the scheme.

On the northern side of the Basin Reserve, Option X makes no provision for at-grade crossing of SH1. Instead a green bridge is provided which passes over the SH1 traffic lanes and over the local road traffic lanes. The level difference between the Basin Reserve cricket ground and the top of the green bridge is approximately 11m. This is a significant climb up and then down for pedestrians and cyclists. The current route, and that proposed in Option A is virtually flat. Informal feedback through the engagement process suggested that a cycling route through Hataitai may be preferable rather than having to undertake the climb up Wellington Road to the corner with Ruahine St and back down. This is despite this being a more convoluted route.

A ramp via the car-park west of the RA Vance Stand is proposed as a more cycle friendly route through the Basin Reserve. This is shown as a dashed blue line in the figure above. The gradient of this route would need to be 8% which is the maximum grade for cyclists and wheel chair users⁴. The proposed route between the car park and Adelaide Road is unclear. The current footpath around the Basin Reserve on Sussex Street is narrow and not wide enough for a shared cycle-pedestrian path. Unless property along Sussex Street is purchased there are no opportunities to widen this path. The current proposals for Sussex Street are to narrow the footpath so it has been assumed that the route would come down through the stand to the path circulating the Basin Reserve.

The gradient between the top of the green bridge and the existing pedestrian crossing on Cambridge Terrace is approximately an 11m drop.⁵ To reach the maximum allowable gradient for pedestrians and cyclists the ramp would have to extend at least 160m⁶ to the north of the existing pedestrian crossing on Cambridge Terrace.

⁴ Table 14.11 NZTA Pedestrian planning and design guide.

⁵ 20-30 horizontal metres / 7 vertical metres (6 metres clearance + 1 metre of structure). This assumes that the traffic lanes at the eastern edge of the green bridge are at the same level as Cambridge Terrace.

⁶ 100 horizontal metres are required for a 7m vertical drop. This is based on a 7m rise (1m deck, 6m clearance) and rest areas 1.5m long every 9m (Table 14.10 NZTA Pedestrian planning and design guide).

4.2 Route 2 – Mt Victoria Tunnel to Memorial Park and the City

In Option X, the route between Mt Victoria Tunnel and Memorial Park (and the City) is similar to the existing situation. Option A is also similar to the current situation if a pedestrian cyclist path is not provided on the bridge.

The key difference is that Option X requires pedestrians and cyclists to cross three separate carriageways, rather than two as at present and in Option A and F. The slip lanes proposed as part of Option X mean that pedestrians and or cyclists would need to stop, to cross the road more than at present. Moving the at-grade crossings further to the north would mean that two separate carriageways are crossed but would introduce a longer deviation for pedestrians and cyclists travelling between Hataitai and Buckle Street.

Providing a pedestrian-cycle path on the bridge in Option A will mean that people travelling this route will avoid the eight metre drop down from the Mount Victoria Tunnel to Kent / Cambridge and the climb up to the National War memorial. They will also avoid waiting to cross any of the roads below.

4.3 Route 3 – Kent Terrace to the schools

In Option X, pedestrians and cyclists travelling between Kent Terrace and the schools would use a pedestrian over bridge across Paterson Street. The soffit of the bridge would be at least 6m above the traffic lanes. To reach this height and provide appropriate access for cyclists and wheelchairs the grade would be no more than 8% which equates to ramps approximately 100m long. Ramps 100m long will have a significant impact on the surrounding urban landscape either as continuous ramps or as a zigzag structure.

The horizontal distance is also likely to increase as pedestrians travel further to access the pedestrian ramps. Pedestrian guard rails could be considered to channel people towards the pedestrian bridge and to prevent those seeking the shortest and quickest route from jay-walking across SH1. Option A offers virtually flat routes with at-grade signal controlled crossing facilities to allow pedestrians and cyclists to easily walk between Kent Terrace and the schools.

4.4 Route 4 – McDonalds to the Schools

There is very little change in the route between McDonalds and the schools except that Option X could create a deviation for pedestrians or cyclists travelling east-west along Rugby Street if the signalised intersection was retained at Alfred Street as proposed by the Architectural Centre. Retention of the signalised intersection at Rugby Street would improve the directness of the route but the delays involved in negotiating an intersection here have not been assessed. Option A introduces almost no change for pedestrians or cyclists using this route.

5 Passenger Transport Assessment

The purpose of this section is to assess the impact on Passenger Transport of Option X when compared with Option A.

Routes

The table below highlights the key differences between Option X and Option A.

Aspect	Option A	Option X
Corridor	Separate north and south bound corridors.	Single legible corridor. Only one set of supports for the overhead trolley-bus wires would be required.
Bus Priority measures	Required at three locations to allow buses to move into correct lanes outside project area (transition from centre to kerbside lane).	Required at four locations to allow buses to move into correct lanes outside project area.
Southbound Route	Two pedestrian crossings in project area one signalised intersection in project area. Level grade.	One pedestrian crossing and one signalised intersection in project area. Steeper gradients.
Northbound Route	Two pedestrian crossings in project area.	One pedestrian crossing and one signalised intersection in project area.

Table 5.1. Passenger Transport Comparison of Option A and X.

The table shows that there are only minor differences between Option A and Option X. Option X provides a single legible corridor allowing for the consolidation of infrastructure and removes a signalised crossing (southbound), but introduces steeper grades and removes a signalised crossing (southbound).

School Buses

Option A seeks to separate the school buses from the school drop-off traffic, this detail has not been provided for Option X, however it is assumed that a similar arrangement would be provided in eastern Rugby Street.

Option A included shifting the bus-stop on Adelaide Road (southbound) round onto Rugby Street to provide a safer stopping area and better access for the school children using general bus services.

Option X requires school children to cross a road if they use the bus services. Option X also makes it more difficult for school bus services using the bus lanes to access the drop-off area as they have to cross a traffic lane.

6 Traffic Assessment Summary

This section summarises the key outcomes of the previous three sections.

6.1 Traffic

Option X shows good traffic benefits relative to Option A, however, this comes at the expense of a threefold increase of traffic on Tasman Street which is contrary to Wellington City Council's desires. Banning of Tasman Street access at Buckle Street (Option Xb) removes the traffic from Tasman Street, but also reduces the traffic benefits significantly such that they are 10 – 15% lower than those forecast for Option A.

Option Xb has reduced benefits because there are increased flows through the Memorial Park tunnel and on Taranaki Street resulting in increased delays at the intersection of the two flows.

6.2 Pedestrians and Cyclists

In places, the proposal provides complete separation from motorised traffic in the form of pedestrian over bridges. The separation would benefit those that are fit and able. Option X provides for bridges across SH1 both in the north-western corner of the Basin Reserve and in front of St Josephs Church. Both bridges will require pedestrians or cyclists to walk up, approximately 11m above road level and then descend back down after crossing over state highway. The pedestrian-cyclist bridges would need approach ramps of approximately 160m to achieve appropriate gradients. These increase the distance pedestrians or cyclists would need to travel to cross the road and could bring a visual impact.

The current proposals for Option X include some significant challenges for cyclists and less mobile pedestrians. Steps are provided from the Basin Reserve cricket ground to a bridge over SH1. This is the most direct route for journeys between Adelaide Road and Kent/Cambridge Terraces. Pedestrians and cyclists that were not willing or able to climb these stairs would not be able to cross SH1 at-grade. Instead they would need to walk around the western side of the Basin Reserve.

Option X would also require people travelling between the Mount Victoria tunnel and Buckle Street to navigate several at-grade crossings of Kent / Cambridge crossing. If a direct route is provided closer to the northern side of the Basin Reserve, pedestrians would need to cross three separate carriageways and would not be able to cross using the most convenient route. The crossing point could be located further to the north, providing at-grade crossings of only two carriageways but this would involve a longer detour. In either respect Option X would provide a lower level of service along this route than at present or for Option A. Given the latent demand for walking from Hataitai to the city this element of the proposal needs to be addressed.

The proposals as they have currently been presented cannot be considered an improvement on the existing provision for pedestrians and cyclists except for more able pedestrians that travel to and from Adelaide Road.

6.3 Passenger Transport

Both Option A and Option X would have similar impacts on bus operation in the short to medium term. In the longer term, both options allow for a higher quality passenger transport system to potentially run along the median down both Kent/Cambridge Terrace and Adelaide Road.

7 Road Safety and Geometric Considerations

There are a considerable number of geometric and safety issues related to the proposed Option X design. Some of these can be addressed by further development of the concept, others are likely to have significant cost implications.

7.1 Sussex Street Cross-section:

The current width between kerbs in Sussex Street is about 11.8m, made up of approximately 2.2m wide parking bays, and three 3.2m wide lanes. These widths are currently less than the WCC Code of Practice requirements for Arterial and Principal Roads of 3.5m traffic lanes and 2.5m parking (allowing for some limited cycle space). We understand that WCC's preferred minimum is for 3.3m lanes, although they accept some further reduction at intersections. Option X proposes 4 lanes of traffic on Sussex Street, with 2 lanes in each direction, one lane in each direction being dedicated for passenger transport (initially bus lanes).

The proposal is for the cross section of Sussex Street to be four 3.2m traffic lanes with 1.5m footpaths on either side. We believe that this arrangement is unacceptable because of capacity and safety issues.

On this important route, some separation in the form of a painted or physical median would be preferred between the opposing lanes. Without this separation there is an increased safety risk especially where vehicles make decisions to turn across a large number of traffic lanes. This risk increases with high traffic volumes, low horizontal and vertical alignment standards and narrow lane widths. Providing a median would require further width within the road corridor. As an example of an acceptable arrangement Figure 7.1 illustrates the cross section proposed by WCC for Adelaide Road. It includes two lanes in each direction (one in each direction for passenger transport), and a central median.

To increase these lanes to an acceptable width would require reducing the footpath widths further or encroaching on property.

The footpath width proposed for Sussex Street as part of Option X is 1.5m. This is the WCC minimum standard for Arterial and Principal Roads of 1.5m. according to the standards the preferred footpath width is 2.5m. Narrow footpath widths will require drivers exiting properties to partially drive in to the traffic lane before having adequate visibility to check that there is a gap for them to exit. Narrow footpath widths can also create hazards for vehicles turning in to property.

Motorists can currently turn left into and left out of properties on Sussex Street. There is currently a 3m footway and 2.2m parking lane between the property access and the nearest parking lane. This gives motorists just over 5.2m in which to make their turn. Removing the parking lane and narrowing the footway on the west side will mean that motorists will need to make their turn more sharply (in the width of 1.5m). Generally a turning circle for a car is 6m. To complete this manoeuvre may require a car to swing into the adjacent lane or slow down significantly to make a tighter turn. Both of these options are significant safety risks.

On the east side of Sussex Street any narrowing of the footpath is likely to require modification of the canopy marking the entrance to the Old Grandstand which is set back only 0.75m from the existing kerb face and edge of the traffic lane.



Figure 7.1. WCC concept for Adelaide Road. (source WCC)

Right turns in to Sussex Street properties and in to Rugby Street are another major problem. If these movements were allowed motorists would need to be provided with a turning bay or painted median to stop clear of the following through traffic. Even with a right turn bay drivers will still need to turn across the adjacent southbound bus lane, the northbound bus lane and the northbound traffic lane. If accessing properties they will need to ensure the footpath is clear. This is dangerous as it requires drivers to pick a gap in 3 lanes of traffic, in an area where traffic volumes are high and sight distances are restricted. This is further complicated by the need to look behind to cross the adjacent southbound bus lane and then ahead to the 2 northbound lanes to pick up gaps in traffic. On safety grounds right turns in to these accesses would need to be banned and a physical median installed to prevent these turns. Both options require additional width for a median. If right turns are banned some provision for u-turns would need to be made in Adelaide Road to access the properties on the western side and u-turns would need to occur on Cambridge/Kent Terrace to travel to Adelaide Road.

These safety concerns do not eventuate with options A and B as motorists can use the Basin Reserve to make U-turns and property access is not compromised.

The construction of a supermarket is about to begin close to the Rugby/Tasman Street intersection and access to this site is likely to be compromised by the Option X proposals.

7.2 Horizontal Alignment

The radius of many of the horizontal curves, which have been proposed as 40m are less than the absolute minimum standard of 50m⁷ (for a 50km/hr design speed). By taking more space/property minimum radii can be achieved. However that in turn has a flow-on effect on the road footprint and the profile of the pedestrian access proposed from Memorial Park to the Basin Reserve.

Curve widening would be required on these corners to allow for the turning path of larger vehicles (eg. buses and trucks). This would increase the footprint in these areas.

The latest plans provided by the Architectural Centre have improved the geometry of the left hand slip lane from Buckle Street to Sussex Street but this has introduced some very tight reverse curves near the northern Basin Reserve entrance. Resolving this problem would involve additional property purchase and for SH1 to be moved further north. The slip lane from Kent Terrace on to the State Highway will need to include an additional merge lane to go some way to resolve safety concerns of vehicles merging from the right hand side where the driver has reduced visibility due to being separated from the adjacent traffic lanes they are joining. This arrangement introduces a number of safety concerns even in a 50kph environment.

The State Highway lanes as shown make no allowance for shoulders or verges to construct barriers, batters/walls, fences, noise screens, etc., although it is acknowledged this is only a concept layout. Additional width than is shown on the Option X plan is required. Most of these points are highlighted in Figure 7.2.

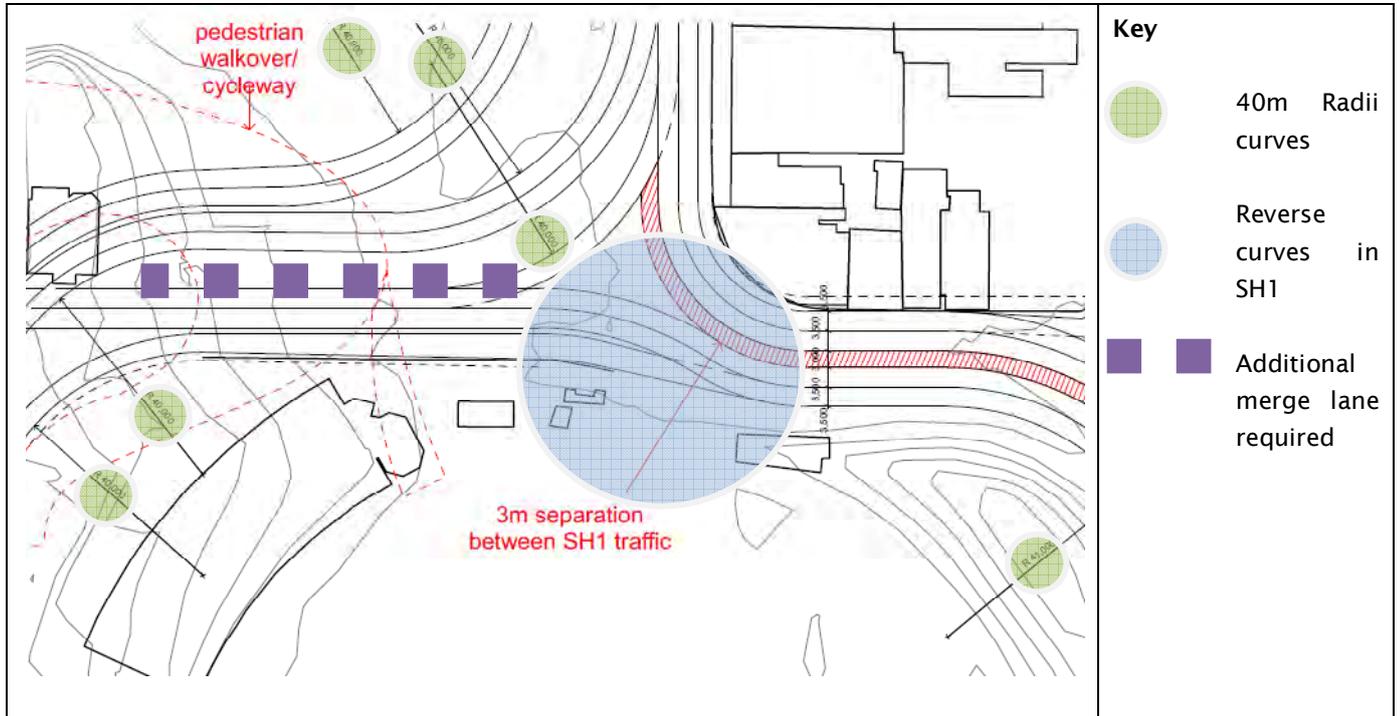


Figure 7.2. Option X proposal for Northern side of Basin Reserve. (source Architectural Centre)

⁷ Absolute minimum defined in, Austroads Urban Road Design. Guide to the Geometric Design of major Urban Roads

The narrow lanes around the Basin Reserve will require additional widening on the horizontal curves to cater for the tracking of heavy vehicles and buses to avoid intrusion in to the adjacent lanes. This could be accommodated but would require more road pavement than is currently shown on the drawings for Option X.

The latest drawing for Option X shows a curve with a very tight radius (less than 40m) on the corner of Adelaide Road and Rugby Street. A larger radius curve is needed. This would require widening in to adjacent property adding additional cost and effects to the project.

7.3 Memorial Park to Basin Reserve Pedestrian Link

There is currently about 7m in level difference between Sussex Street and Cambridge Terrace. The proposed layout requires provision for 3 different levels:

- State Highway lanes
- Street/Cambridge Terrace
- Pedestrian structure

Allowing for the depth of structures and a SH1 clearance of 6m then the grade of the Sussex Street to Cambridge Terrace connection is somewhere between 4% and 7% which meets WCC requirements for a city Principal Road.

With Sussex Street on this grade it does mean that the pedestrian walkway will need to be lifted to a height of approximately 4m above the existing level of Sussex Street to give clearance to Sussex Street below. This is also necessary to provide adequate clearance over the proposed slip lane from Buckle Street up on to Sussex Street.

The pedestrian ramp from the bridge structure into the Basin Reserve (pitch level) would therefore need to drop a height of 11-12m. The Architectural Centre proposal suggests that there would be a stepped access down to the east side of the R.A Vance stand and a ramped access behind the stand. The ramp would require a maximum grade of 1 in 12 and would therefore need to be up to twice as long as shown on the Option X concept plan.

7.4 Access to School Drop Off Area (Dufferin/Rugby)

The details of how Government House, the two schools and businesses in the southeast quadrant (Rugby/Dufferin corner) are accessed. with Option "X" is unclear. The latest information supplied is that the proposed access will be from the Basin Reserve/Adelaide Road corner as a left turn only with no traffic signals. This will require the buses accessing the school drop off area to move from the bus lane into the inside traffic lane, otherwise straight ahead movements from the bus lane will cut across the traffic in the southbound lane. This makes no provision for Adelaide Road traffic wishing to turn right to access this southeast quadrant. This traffic will need to undertake a u-turn, preferably on Cambridge/Kent Terrace, before heading southbound, although this is a significant detour. It may also be difficult to prevent drivers doing dangerous u-turns in Rugby or Sussex Street, unless a physical median is provided.

A sketch supplied by the Architectural Centre shows a new drop off area developed for the schools on private property area off Rugby Street. The latest information supplied shows that the exit from this drop off area is via a new access on to Adelaide Road using a modified Alfred Street, with signal control at the Alfred Street/Adelaide Road intersection. Other aspects of this assessment have considered that it may be more appropriate to shift this signalised intersection to the intersection of Adelaide Road and Rugby Street.

7.5 Road Safety Summary

There are a considerable number of safety issues related to the Option X layout. A number of these relate to narrow lanes, and turning in and out of accesses on Sussex Street. These issues do not arise with Options A and B.

The lane widths proposed on Sussex Street, are below minimum widths and not acceptable for a main arterial route carrying significant traffic volumes. In addition the horizontal and vertical deficiencies at Sussex St/Buckle St/Cambridge Terrace are major concerns.

The Option X layout is likely to be flagged with a significant number of “serious” and “significant” issues in an independent safety audit because of the geometric, and access issues. Many of these issues are unlikely to be resolved within this proposed footprint and would require additional property to be purchased adding additional cost and providing a different overall outcome.

8 Urban Design Considerations

The following is a brief discussion of the urban design aspects of Option X that would need to be considered when comparing the outcomes to those from Options A and B. There are different views on the benefits of Option X and this section rather than providing an urban design, visual or landscape assessment, instead provides a summary of the aspects that would need to be considered further. A number of the statements provided have been based on feedback received from the Architectural Centre or information provided on Option X.

It appears that Option X has been developed to provide a solution to three perceived 'problems' relating to Options A and B. These appear to include :

1. Use of an elevated structure for vehicular traffic across the Kent/ Cambridge corridor and/or the proximity of traffic 'crossover' adjacent to Ellice Street corner/ Mt Victoria.
2. Extent of road/ street around the Basin Reserve generally (as opposed to open space not incorporating street)
3. Extent of road/ street continuing through Buckle street/ Memorial park zone (as opposed to open space not incorporating street).

It appears that the key features of Option X aim to provide 'improvement' relative to the 'problems' raised with A and B above. These are:

1. Attempt to shift the main zone of 'cross-over' between traffic directions and modes to the North-west of the Basin, rather than the North-east (Ellice/Kent Corner).
2. Attempt to direct all traffic movements around the west side of the basin- removing any traffic circulation around the east side of Basin- with the idea that this would be better as open 'park' space.
3. Attempt to direct all traffic underground through the Buckle street/ Memorial Park zone- removing any traffic circulation from the surface with the idea that this zone would be better with no or minimal vehicular traffic as an open 'park space'.

Assuming the proposed Option X was physically achievable and feasible in transportation terms, as shown in the Architectural Centre submission, then the following sections discuss the potential outcomes of the three key features of Option X identified above.

8.1 SH Bridge replaced with Local Road and Pedestrian Bridge

Generally the elevated structure is shifted from one location to another. The urban design benefits and disadvantages associated with this option are summarised in the table below;

Urban Design Element	Possible Benefit of Option X	Possible Disadvantage of Option X
Physical connection between Basin Reserve and Kent/Cambridge corridor	Provided via the green bridge for pedestrians and cyclists between the Basin and the Memorial Park.	Disconnection of direct route between Basin and Kent/ Cambridge corridor, due to at-grade street arrangement. Disconnection between Memorial Park and Kent/ Cambridge Terrace.
Views up and down Kent/Cambridge Terrace.	Removal of elevated structure removes effect of Option A or B from the view to or from the Basin Reserve.	
Basin Reserve Northern Entrance		Compromise historical northern entry to the Basin Reserve both physically and visually, due to at-grade street arrangement.
Pedestrian/Cyclist Connectivity	Option X provides a direct connectivity link between the Basin Reserve and the west side of Cambridge Terrace via an elevated pedestrian and cycle overbridge.	Prioritise ground for SH/arterial vehicle traffic, elevated structure for peds/ cyclists. Option X provides a separation of pedestrians and vehicular traffic by putting the traffic under and lifting the pedestrians up and over. Pedestrians currently have a relatively easy route north south at grade through the Basin Reserve. Option X requires pedestrians to climb up and down a significant amount to pass over the traffic. An up and over movement is a less direct route than is available currently or what is offered by Options A and B.
Green Bridge	Direct connection between the Basin Reserve and Memorial Park via an elevated pedestrian and cycle overbridge.	Significant area of elevated edge/ undercroft associated with elevated bridge as perceived from Kent/Cambridge level. Risk of under-utilised, dis-functional, potentially unsafe public space on proposed bridge due to isolation from edge activity with no mixed use occupation 24/7, and lack of capture of day to day ped/ cycle circulation through inaccessibility.
Existing Ground Topography		Potential intervention to valley-ridge-valley topography of Memorial Park.
Historic Basin Reserve Context	Green bridge is largely hidden from view from the Basin by the Vance Stand.	Potential for significant compromise to legibility and setting of the historic Basin Reserve spatial structure and buildings due to proximity and relationship of new bridge.

Table 8.1. Urban Design Considerations, Bridges.

8.2 Provision of Dufferin Street Park

The removal of a through street from the east side of the Basin Reserve will provide increased opportunity for a greener landscape in this area-and will result in different urban design outcomes as outlined below;

Urban Design Element	Possible Benefits of Option X	Possible Disadvantage of Option X
Connectivity with the community in the south eastern Basin Reserve.	Potential for a park-like front door for the schools/Government house as well as providing additional amenity for the area.	<p>Isolation and disconnection for existing or potential new inhabitants of the east basin- including schools, church, Government House, residential and commercial built edge adjacent.</p> <p>Compromise to functionality, accessibility and legibility of critical social and capital city functions (Schools/ Government House).</p> <p>Risk of under-utilised, dis-functional, potentially unsafe public space in this zone due to reduced/ unviable edge activity with mixed use occupation 24/7.</p> <p>Compromise to perceived and physical integration of Basin to city, removing and/or compromising the outer residential and commercial edge of the Basin Square.</p>

Table 8.2. Urban Design Considerations, Dufferin Street.

8.3 Memorial Park Tunnel

A tunnel under Buckle Street has been reviewed and assessed separately by the Basin Reserve team and this is captured in the War Memorial Tunnel Report. While some benefits have been identified previously (see below), benefits/disadvantages that remain (in principle) include:

Urban Design Element	Possible Benefits of Option X	Possible Disadvantage of Option X
Memorial Park	<p>The removal a SH1 through traffic from Buckle Street will improve the connectivity for Pedestrian/Cyclists.</p> <p>The tunnel will provide improved amenity for park users, reducing severance and make the park sufficiently quiet to allow park users to talk, reflect and meditate.</p>	<p>Removal of significant part of population (vehicle- borne) from interfacing with and experiencing the park.</p> <p>Risk of isolated, under-utilised, dysfunctional, potentially unsafe public space through park zone due to lack of access and mixed activity 24/7.</p>

Table 8.3. Urban Design Considerations, Memorial Park Tunnel.

9 Other Considerations

Presentation of Option X

There are a number of ways in which Option X has been presented that do not accurately depict the outcome of the scheme. These have been highlighted in Figure 9.1.

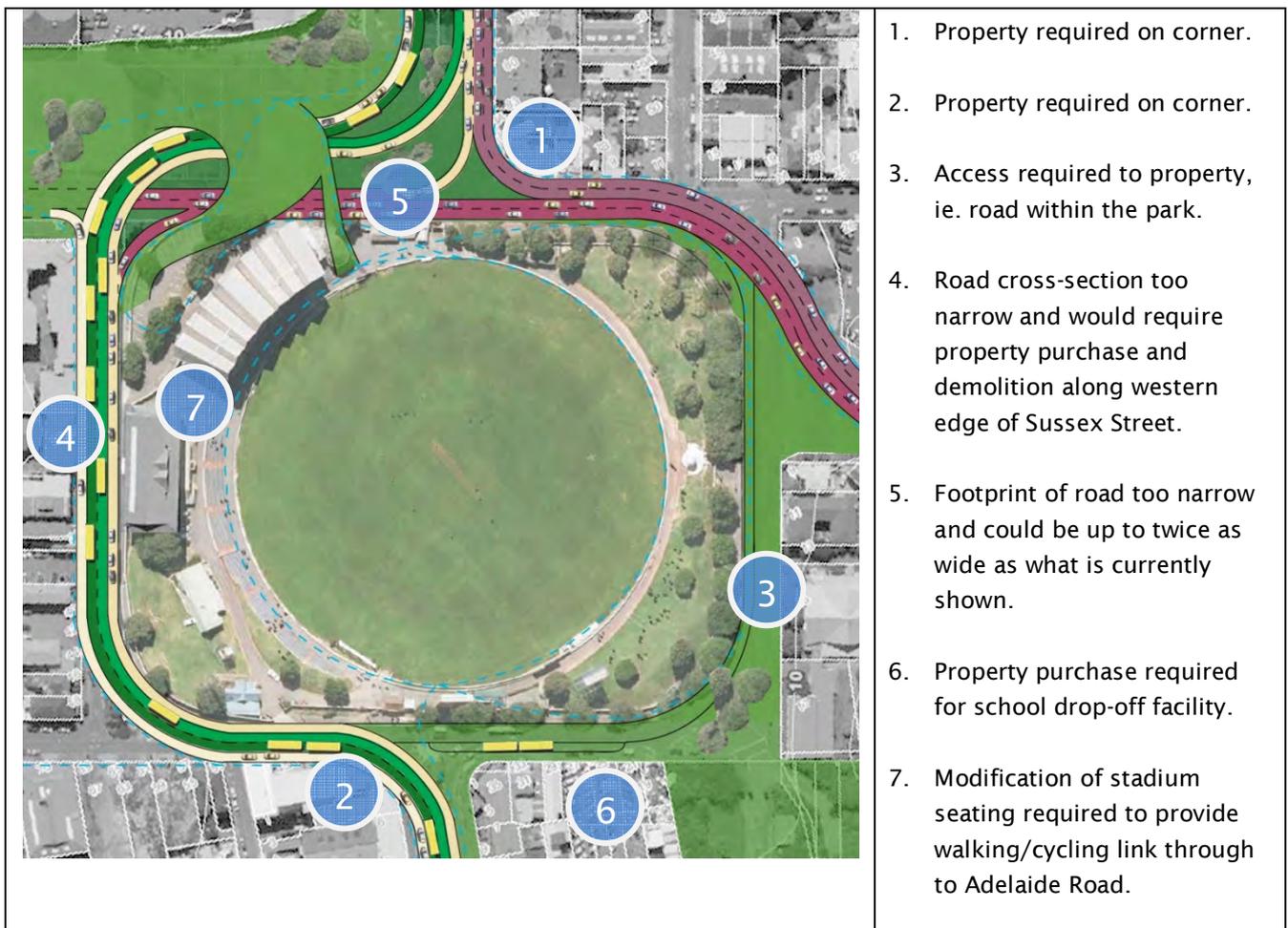


Figure 9.1. Presentation of Option X. (source Architectural Centre)

9.1 Effects on the Basin Reserve

The drawings shown in the submission by the Architectural Centre seem to indicate an attempt by them to retain the buildings on the corner of Kent and Cambridge Terrace. To achieve this they appear to have had an impact on the Basin Reserve itself. They have made a decision on the relative priorities of these buildings/spaces and their heritage/amenity value. Other experts (heritage, urban design, architectural) are likely to have different views on the relative priorities of these structures and spaces. It is expected that further development of the concept would lead to property being taken on the corner of Kent Terrace and Ellice Street.

9.2 Access to R.A Vance Stand and effects on Carpark

It is expected that the Memorial Park to Basin Reserve overbridge structure would significantly impact on access and parking behind the R.A Vance stand. Option X will make access in to this area extremely difficult, if not impossible. Discussions have not been held with the Basin Reserve Trust regarding the potential loss of this parking space behind the RA Vance stand.

10 Cost Estimate

The Architectural Centre have asked Rider Levett Bucknall to provide a cost estimate for Option X. This is included as Appendix 2 of this report. For a high level estimate the approach taken by Rider Levett Bucknall is appropriate. They have used the estimates prepared for Basin Reserve Options (specifically D) and the War Memorial Tunnel and combined the estimates to obtain an Expected Cost. This approach gives a figure that can be used to compare against the estimates provided in the Feasible Options Report.

The estimate prepared by Rider Levett Bucknall proposes an expected estimate of \$130m. We expect this is at the lower end of the actual cost of Option X.

There are number of items that we have considered further:

10.1 Dufferin Street Pedestrian Bridge

This is listed as additional work in the estimate report. It is therefore not included in the estimate. The cost proposed for this structure is \$220,000 and we expect a cost of \$1M would be more appropriate for a basic design structure (ie. not a green bridge or something of significant width). If this structure was not included as part of the project it would introduce additional delays to State Highway traffic that would further reduce the transport benefits. It would also influence the outcomes from the scheme for pedestrians and cyclists. Form discussions with the Architectural Centre this bridge is an integral part of their scheme so should therefore be included in the estimate.

10.2 Length of Memorial Park Tunnel

The proposed length of the Option X tunnel is 287m. This is illustrated in Figure 10.1.

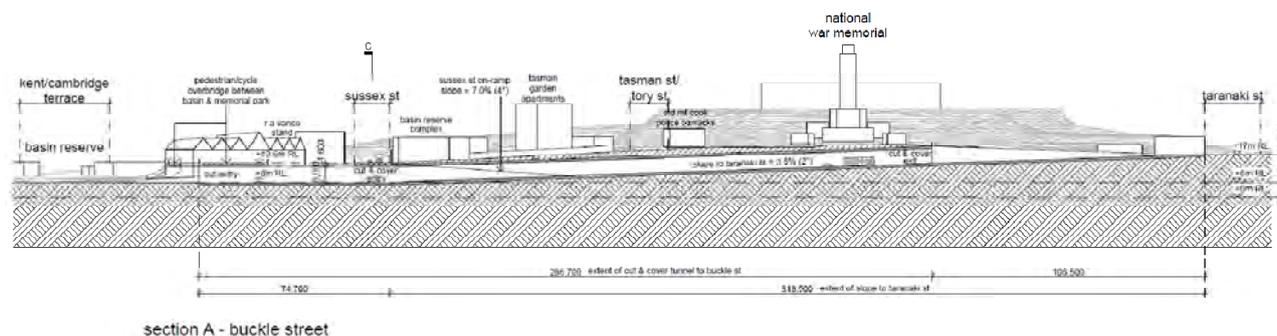


Figure 10.1. Option X tunnel long section. (source Architectural Centre)

Memorial Park Tunnel cost estimates have been based on a tunnel length of 210-240m. As the Memorial Park Tunnel estimate of \$75M has been used to in the estimate of Option X then any additional tunnel length should be included in the estimate.

The first 50-60m of the Option X tunnel will not have a roof but will still require construction and excavation of a trench structure. If we were to cost 50-80m of additional tunnel length then this could potentially add \$7-11M to the cost of this option.

10.3 School Drop Off Area

It is unclear from the information provided as to whether the proposed school drop off area is part of the Option X scheme. An image of this proposal is included on the website but in the Architectural Centre submission it is listed as a supplementary project.

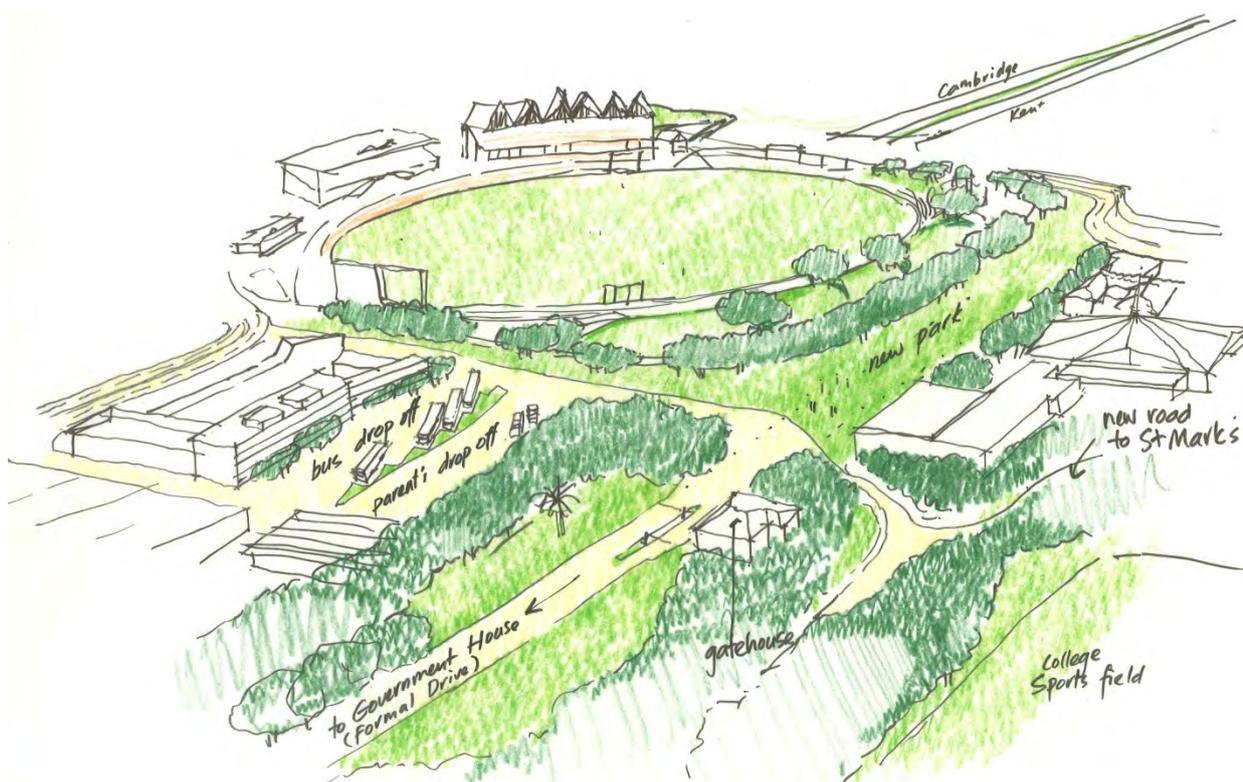


Figure 10.2 Arch Centre concept for possible school drop-off area. (source Architectural Centre)

If this facility is not provided then the intersection of Adelaide Road/Rugby Street will need to provide full turning movements which is not the basis on which the traffic assessment has been developed. It would also be necessary to include additional road space in the Rugby/Dufferin area for drop-off and turning facilities, this is not shown on the plan for Option X.

A quick estimate has the cost of this drop-off area is \$3M. The majority of this cost is made up of the property cost associated with this area. The estimate work undertaken by Rider Levett Bucknall does not include this cost.

This idea is something that was raised by the project team but discounted on cost grounds. A geometric assessment of whether adequate space is available to provide a safe and efficient drop off facility has not been undertaken. Implementing this idea as part of any Basin Reserve transport solution would enable additional green space to be included on the Rugby/Dufferin corner of the Basin.

10.4 Memorial Park to Basin Pedestrian Bridge

This is a difficult structure to price at an early stage of its development. It is also difficult to price the land required within the Basin Reserve to create such a structure, or even identify if using land within the Basin Reserve is in fact an option without further stakeholder engagement. At this stage we expect that the \$15M identified in the Option X cost is appropriate given the potential complexity of design and construction.

Estimate Summary

The expected cost of Option X has been estimated by the Architectural Centre as \$130M.

We believe it may be necessary to add additional cost for some features as follows:

Rider Levett Bucknall Expected Estimate	\$130M
Cost for Dufferin St Pedestrian Bridge	\$1M
Additional tunnel length	\$7M
School Drop-off area	\$3M
Allowance for design, P&G and risk for additional items	\$4M
Alternative Option X Expected Estimate (as presented without providing technically acceptable solution)	\$145M

It therefore seems likely that the Expected Cost for Option X, as presented by the Architectural Centre, may sit in the range of \$130M - \$145M.

If all the technical issues raised in this report were to be resolved the cost may potentially be greater than Option F (\$160M), as additional property would need to be brought along Sussex Street.

11 Conclusions

Some summaries have been provided through this document. This assessment had identified a number of significant reasons why the option is not a viable alternative to Option A and B. These include:

Significant Road Safety Concerns – The current Option X proposal for Sussex Street is a significant safety concern. The safety risk results from the proposed cross section which is inadequate for flows of this magnitude. Specific concerns include:

4. Narrow lane widths for busses, general traffic lanes and footpath facilities.
5. No median to prevent right turns across three lanes of traffic.
6. Limited clearance from adjacent properties (1.5m from lane edge line to property), meaning that:
 - a. vehicles exiting property will need to encroach in to the traffic lane to see approaching traffic,
 - b. vehicles turning into property from the near lane will need to slow down considerably before being able to exit the carriageway safely. This creates a hazard for following vehicles and potentially pedestrians.

The cross section will need to incorporate wider lanes, a shoulder or parking, a footpath that at least matches the existing, and a physical median to provide separation between opposing flows and to prevent right turns across the traffic flows. To accentuate these safety risks the single northbound lane is predicted to have up to 1900 vehicles per hour using it during the peak periods, which is up to 25% more than 2009 peak flows in the Mt Victoria Tunnel. To provide an acceptable outcome the footprint will need to be widened requiring additional private property purchase.

Walking and Cycling Outcomes– The Option X proposals as they have currently been presented cannot be considered an improvement on the existing provision for pedestrians and cyclists. Option A and B offer more potential for improved walking and cycling outcomes.

Significant Increased Cost – Option X as presented by the Architectural Centre is likely to have an expected cost in the order of \$130M - \$145M, however, if all of the safety concerns raised are addressed, this will introduce significant additional cost. To resolve some of the outstanding design concerns is likely to increase this cost further. This is considerably more than the \$75M and \$90M expected costs of Options A and B. The difference is due to the significant cost associated with constructing a tunnel under Memorial Park. The government has previously decided that funding was not available for the Memorial Park tunnel and it was for this reason that Option F was no longer considered. Option X may be thought of in the same light.

Reduced Transport Benefits – Option X has been modelled with required changes to Tory/Tasman Streets to prevent rat-running. The model suggests that with those changes the transport benefits are 10-15% lower than those achieved by Options A and B. Option X has reduced benefits because there are increased flows through the Memorial Park tunnel and on Taranaki Street resulting in increased delays at the intersection of the two flows.

It should also be noted that Option X does offer the potential for the following outcomes:

- Improved amenity in Memorial Park.
- Less traffic in the Dufferin/Rugby Street corner providing additional green spaces
- Additional grade-separated pedestrian/cycling connections to the Basin Reserve.
- Less visual impacts on the views south down Kent/Cambridge Terrace as a bridge is not required.

The proposal does however raise some new questions around the appropriateness of this alternative Urban Design that need to be considered further.

If the government decided to fund a Buckle Street tunnel then Option X could be considered further along with Option F or Option A and B linking to a tunnel. As this money is not currently available then Option X is not a viable alternative to Option A or B.

Appendix 1 – Architectural Centre Submission (August 2011)

26 August 2011



the architectural centre inc.
PO Box 24178 Wellington

Re: The inner-city transport network: Cobham Drive to Buckle Street Transport projects: Public engagement.

This submission is from the Wellington Architectural Centre, a group which represents both professional and non-professionals interested in architecture and design, and in the promotion of good design in Wellington. Thank you for this opportunity to give feedback on this proposal. Any members directly employed on this project by NZTA, and hence having a conflict of interest, have not been involved in the writing of this submission.

General Comments

The Architectural Centre believes that the proposed projects need to properly integrate wider issues, namely: other traffic modes, connecting green spaces, connecting civic/nationally significant spaces, improving urban design, providing pleasurable walking and cycling, and actively contributing to making Wellington a better place. The proposals also need to adhere to the *Ngauranga to Wellington Airport Corridor Plan*, the *Adelaide Road Framework*, the *WCC Urban Development Strategy*, including the Growth Spine, the *Wellington Public Transport Spine Study* and the *Capital City Initiative* and *Wellington 2040*. We do not believe that in their current form the proposals adequately support these established initiatives.

The documentation of the proposals need to indicate how they anticipate issues which will impact on future transportation, for example:

- (a) better broadband, and how this might impact on work locations (e.g. people working from home; flexible work hours; distance schooling etc.)
- (b) the needs of an ageing population (needing better public transport infrastructure)
- (c) the provision of safer routes for school children
- (d) research on recreational transport needs (it is comparatively easy to understand commuter traffic patterns)
- (e) alternative ways to moderate/ameliorate/flatten traffic peaks (e.g. commuter traffic and weekend sports peaks) by, for example, congestion charging, encouraging car pooling and glide time (through discussions with Wellington's major employers and weekend sports organisers).

We consider that evaluating the feasibility of projects only in terms of traditionally defined transport benefits is inefficient and does not adequately acknowledge that transport is part of wider social, culture, civic, well-being, sustainable and economic issues, as well as providing opportunities to upgrade precinct infrastructure. We strongly urge the NZTA to alter its evaluation model to enable a fuller understanding of costs and benefits due to redesigning urban and suburban areas to ensure that the best use of our tax money is achieved. In saying this we are not denying that many of these aspects are difficult to quantify, but rather than if this is not attempted these wider, and important, issues/ramifications of projects may never be taken into account.

We disagree with the assertion that the NZTA proposals are multi-modal. The proposals overwhelmingly prioritise private and commercial traffic over other modes of transport (e.g. public transport, cycle and pedestrian transport). We also do not support the variation in speed zones across this area. We believe that a speed limit of 50km/h is appropriate for all roads in the project, and suggest that appropriate road design is implemented to ensure this constant speed throughout the area. We believe that

having different speed limits on Ruahine St, the Mount Victoria tunnels and Buckle St will be confusing to motorists and reduce the effectiveness of traffic flows.

Buckle St/Basin proposals

We are surprised and disappointed that there is no statement from the Ministry of Culture and Heritage regarding an integrated understanding of how State Highway 1 will support the design of a Memorial Park, which reflects such a park's national significance. We disagree that a tunnel would have "to extend between Paterson and Taranaki Streets to be viable" (p. 5) in terms of traffic resolution, and provide an alternative tunnel option in our design of Option X. We believe that the flyover will negatively impact on the urban design qualities of this part of the city. We are disappointed that this proposal includes the "option of adding a pedestrian and cycle facility" to the SH1 overpass (p. 5) as such a "clip-on" attitude to non-car traffic betrays the reality that this is a single-mode response to a more complex transport problem.

In relation to the Buckle St/Basin precinct, we support:

- a) a cut and cover trench under Buckle St to ensure that Memorial Park is free of state highway traffic
- b) the sensitive re-siting of the John Swan-designed Compassion crèche. The original context of this building was adjacent to other buildings and on a hard street edge. Re-siting this building will entail retaining its current orientation, building up the land to ensure similar ground gradients, and supporting it by appropriately scaled buildings on its western side and a play area on its south and east sides. We believe that an active park in the Memorial Park extension (between Tory St and Sussex St) can be designed to provide an appropriate setting for the Compassion crèche.
- c) the earthquake strengthening of the NZTA-owned buildings on the corner of Kent Terrace and Ellice Street. These buildings are some of the few that reflect the street geometry of the Basin, and convey an appropriate streetscape and scale. Given the poor quality of architecture in the precinct (e.g. Sussex St) they are a positive contribution to the built environment. Their only negative point is the fact that NZTA have let them become run-down. Discussions with the NZHPT indicate that these buildings could be easily and productively be earthquake strengthened, allowing for flexible use of their interiors, and we strongly encourage that this occur.
- d) the anticipation of light rail in the redesign of the Basin Reserve. As part of this we strongly support the installation of track sub-base for light rail on all parts of the Basin Reserve roads which might in the future be required to support light rail to ensure no dedicated public transport are required to be interrupted with the future introduction of light rail.

In relation to the Buckle St/Basin precinct, we do not support

- a) a three-lane state highway cutting through Memorial Park, whether or not it is aligned to the existing Buckle Street or moved 10m north, closer to Mt Cook primary school.
- b) any deal with the Basin Reserve Trustees to build a \$11million grandstand when that money could be put toward ensuring better outcomes for the built environment, which can be enjoyed by a wider range of citizens and visitors to the city.
- c) an elevated highway/flyover, which severs Wellington's urban fabric and local communities for the sake of shaving a minute or two of the journey times of state highway traffic.

Option X

We consider that there is an opportunity to make the Basin a better urban space, and to better protect local school children from the dangerous traffic that currently speeds around the Basin Reserve. Consequently we do not support the NZTA proposal for an overpass, nor the lack of integrated thinking that underpins the design. We submit the design for Option X (see attached) and encourage you to consider this proposal carefully. Additional information can be found at www.architecture.org.nz/basin. We acknowledge that this is a conceptual, rather than a developed design, and would welcome any opportunity to work further with you on this.

The second Mt Victoria Tunnel

In relation to the second Mt Victoria Tunnel, we support

- a) the building of a second Mount Victoria tunnel adjacent to but under the level of the current tunnel to avoid the destruction of Paterson St.
- b) the design of the second Mount Victoria tunnel such that it ensures at least current road access to schools, especially Wellington East Girls College.
- c) provision of cycle and pedestrian facilities in both Mt Victoria tunnels to ensure easier access to the Basin Reserve from the southern side of the tunnels.
- d) grade, acoustic and air ventilation separation between cycling/pedestrian facilities and car traffic in both Mt Victoria tunnels to provide psychological comfort to users.
- e) the separation of car and pedestrian/cycle routes by locating these on separate levels (with pedestrians/cyclists raised between 500mm-1m) with a visual connection between them.

In relation to the second Mt Victoria Tunnel, we do not support

- a) the demolition of historic buildings on Patterson St, particularly Waring Taylor House (7 Paterson St) and Ettrick Cottage (19-21 Paterson St (NZHPT Reg no. 3662))

Ruahine/Wellington St proposals

In relation to the Ruahine/Wellington St precinct, we support

- a) a maximum of four lanes (two lanes each way) on Ruahine St and the use of dynamic tidal flow lanes to maximise the lane efficiency, rather than increasing the road beyond 4 lanes (max).
- b) at least two generous and well-designed cycle/pedestrian bridges across Ruahine St.
- c) fixing the Wellington Rd/Ruahine St intersection, as this intersection is very dangerous, by the building of a small under or overpass to ensure traffic separation at the Wellington Rd and Ruahine St intersection.



Fig 1. Possible scheme for Wellington/Ruahine Rds intersection.

- d) the retention or relocation of Badminton Hall, close to its current location. This is an important recreational facility which needs to be kept.

In relation to the Ruahine/Wellington St precinct, we do not support

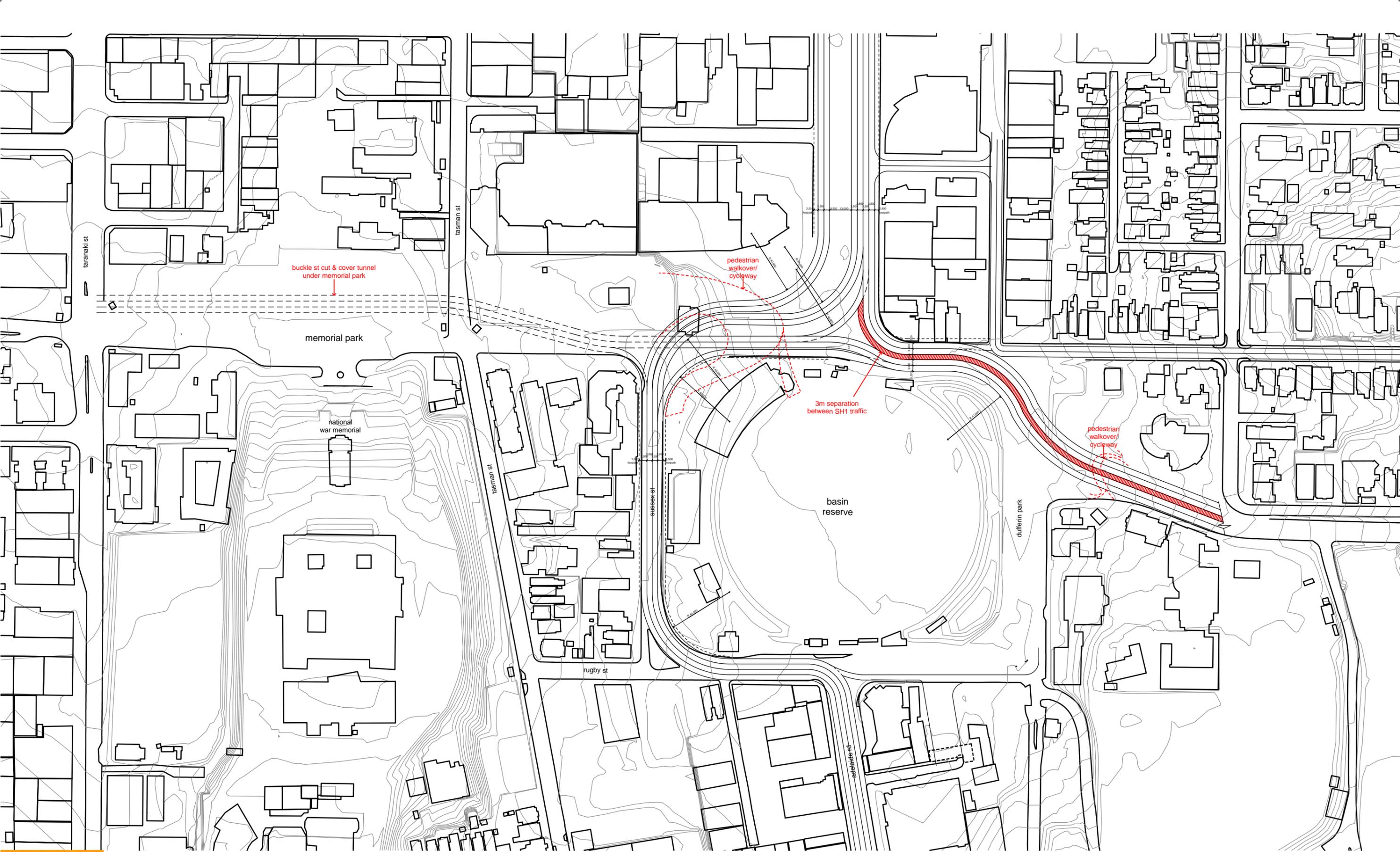
- a) the encroachment of road building on Town Belt (i.e. proposals for Ruahine St) beyond the current road designation
- b) the demolition of people's homes along Ruahine St and Wellington Rd and we consider this social dislocation as completely unnecessary to comply with the four-lanes consistent with the *Ngauranga to Wellington Airport Corridor Plan*. The large scale demolition of this suburb will also destroy historically significant buildings such as Jim Beard's innovative concrete apartment buildings (e.g. cnr Wellington Rd and Kilbirnie Cres, 1959; and 47 Wellington Rd, 1960)
- c) a six metre cycle/pedestrian lane alongside Ruahine Street, when it is really to be a road (described as a "service lane" (p. 12)) not designed for pedestrians or cyclists.

We hope that our comments have been productive, and we thank you again for the opportunity to make a submission on the proposals for the RoNZ project. Thank you for this opportunity to comment on this proposed plan. If you have any questions please do not hesitate to contact me.

Yours sincerely

Christine McCarthy
President
Architectural Centre
arch@architecture.org.nz

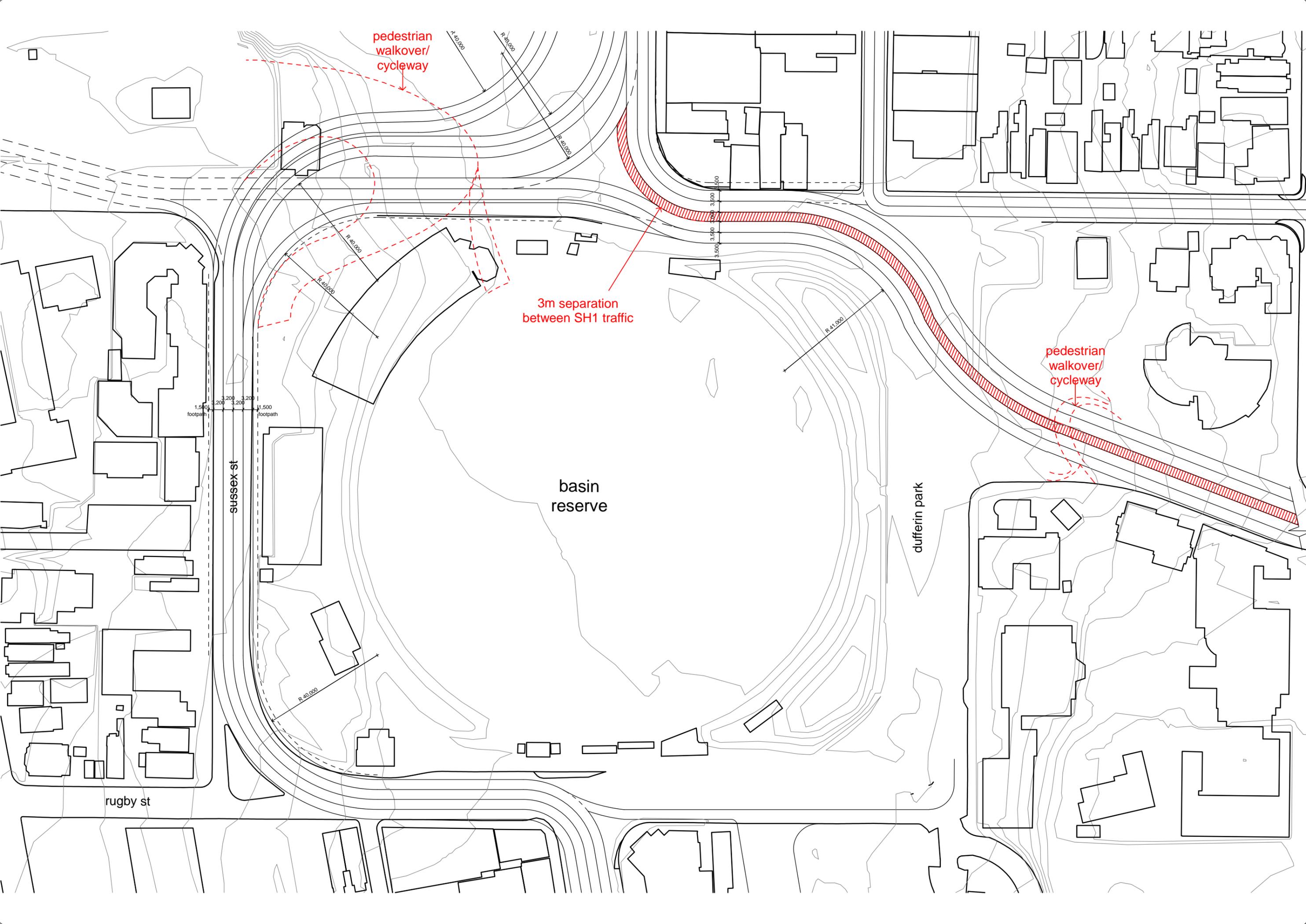
Option X Attachments: plan & sections; technical specifications; supplementary projects.



Basin Reserve - Option X (for NZTA Submission)

scale: 1 : 2,000 @ A3 25.08.11

note: site contours approximate only - based on WCC web map information



pedestrian
walkover/
cycleway

3m separation
between SH1 traffic

pedestrian
walkover/
cycleway

sussex st

basin
reserve

dufferin park

rugby st

1,500
footpath

R 40,000

R 40,000

R 40,000

R 40,000

R 40,000

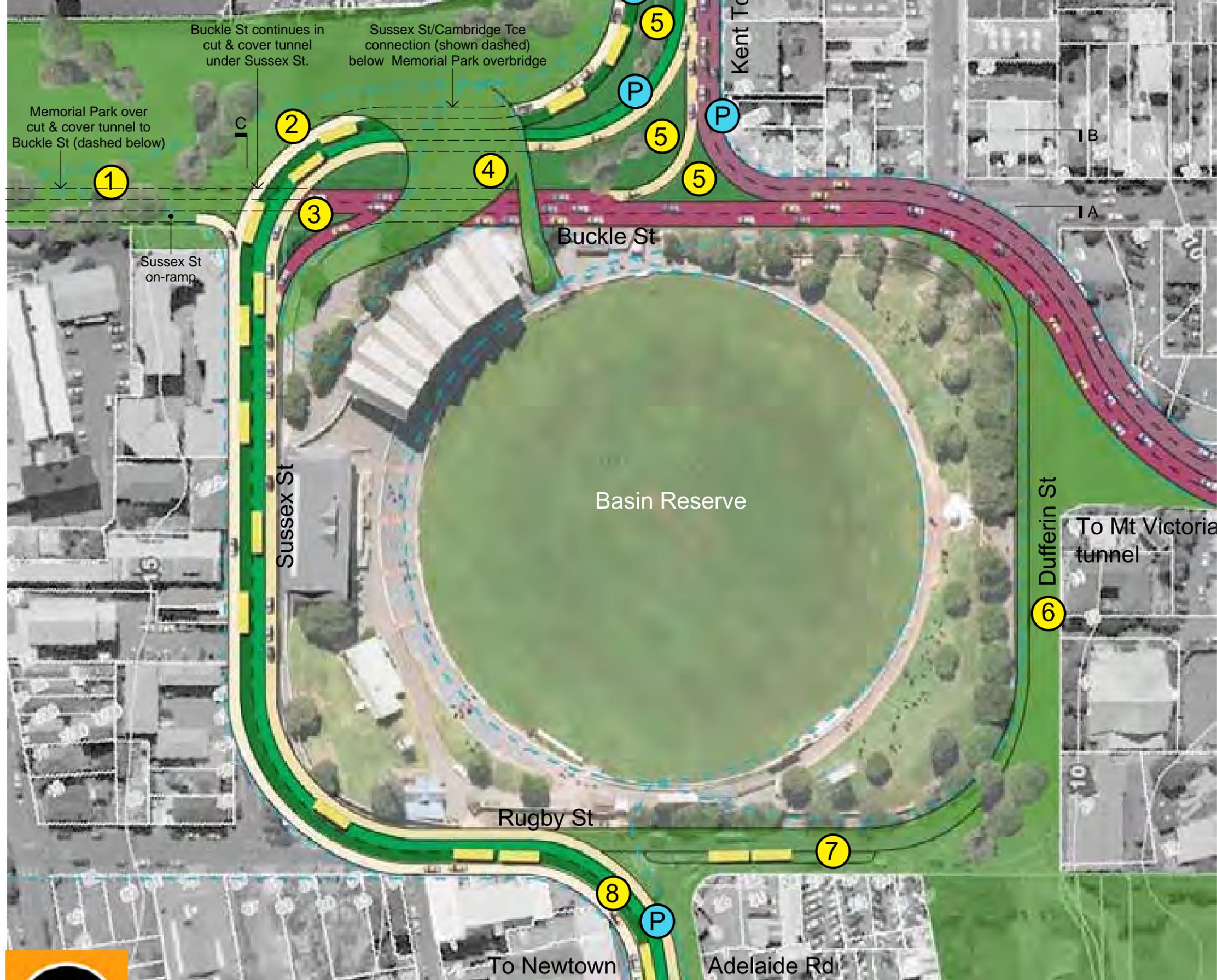
R 40,000

R 41,000

3,500

3,500

3,500



Option X: More Park, No Flyover
 a conceptual design by the Architectural Centre

Westbound traffic will be on grade until it enters a cut and cover tunnel at Sussex Street.

A landscaped overbridge provides safe access for pedestrians and cyclists into the Basin Reserve.

Dedicated public transport lanes occupy the central north/south lanes and are separate from cycle routes.

The south-east corner (near Government House) achieves a connection of green space between Government House and the Basin Reserve and provides driveway access to schools and Government House (as well as facilities for school buses) from Adelaide Rd.

A cycle pedestrian route (Dufferin St South) completes the historic Basin geometry.

key features

- ① Memorial Park extension. Rather than an "English" park, the aim is for this part of the park to be activity focussed, with recreational facilities (e.g. basket ball courts) and a range of structures (e.g. seating, wind and sun shelters). Small businesses and cafes linking to Tory St form the edge of the park, and a driveway (access from Tory St) provides low level vehicle access (e.g. Tour buses) to the Carillon and the Tomb of the Unknown Warrior.
- ② Former Home of Compassion creche likely to be relocated. Discussion to be had with NZHPT to see if it is possible to retain the building on site, or, if it is to be relocated, the best options regarding this.
- ③ Cut & cover tunnel entry portal. This large infrastructure will need careful design.
- ④ A landscaped overbridge connecting the Memorial Park extension with the Basin Reserve, access for pedestrian and cyclists.
- ⑤ Pocket Parks. These break up the impact of the roads, providing options for pedestrian crossings.
- ⑥ Dufferin Street South. The geometry of the former street is retained but reserved as a pedestrian and cycle pathway.
- ⑦ Improved drop-off area for school students, and tour buses to Government House and Reserve.
- ⑧ Dedicated public transport lanes (bus or light rail).
- P Possible pedestrian crossings

- Cycle path
- SH1
- Dedicated public transport lanes
- Local streets

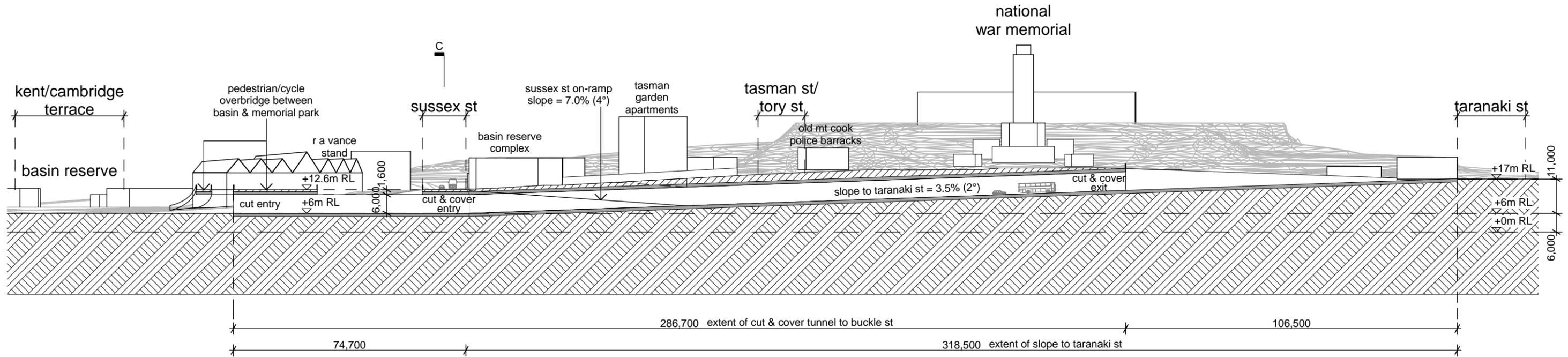


Basin Reserve - Option X (for QS cost estimate)

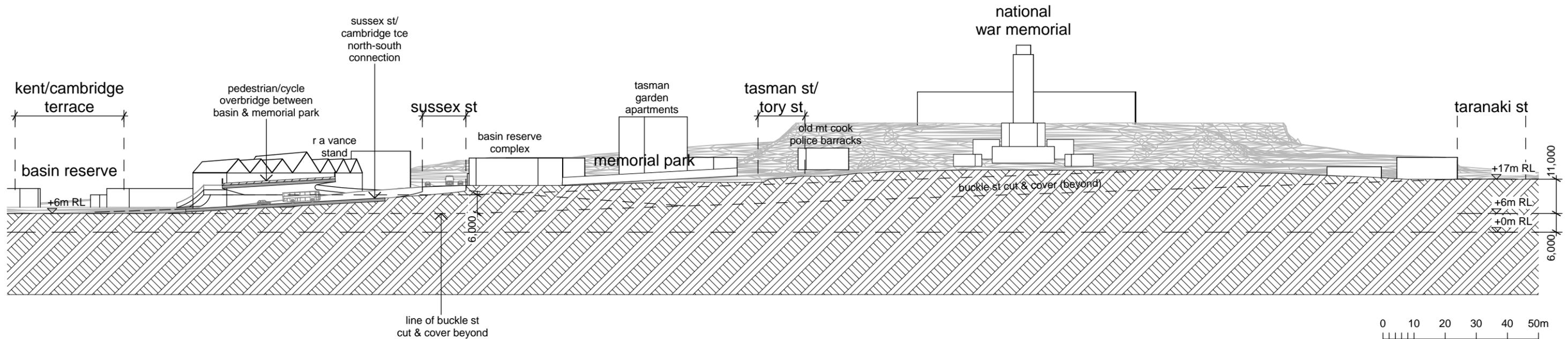
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note: site contours approximate only - based on WCC web map information





section A - buckle street



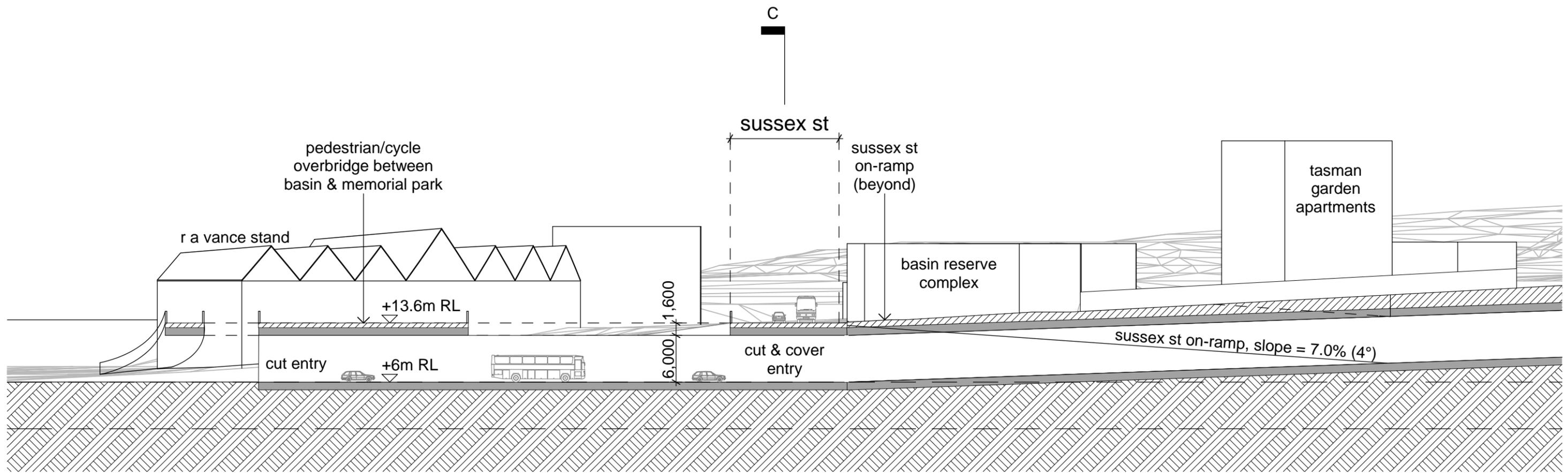
section B - sussex street connection to cambridge terrace



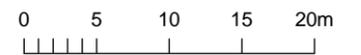
Basin Reserve - Option X (for QS cost estimate)

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note: site contours approximate only - based on WCC web map information



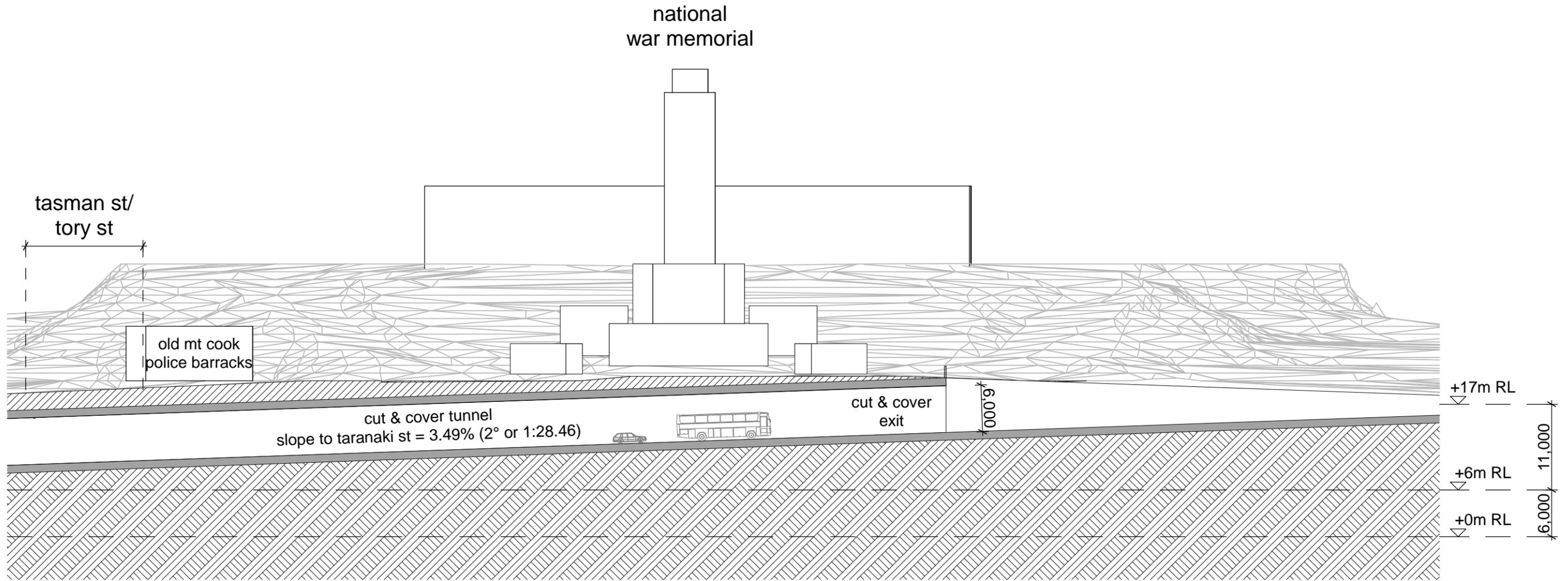
section A - buckle street, part-section 1
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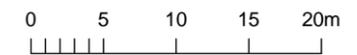
Basin Reserve - Option X (for QS cost estimate)

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note: site contours approximate only - based on WCC web map information



section A - buckle street, part-section 2
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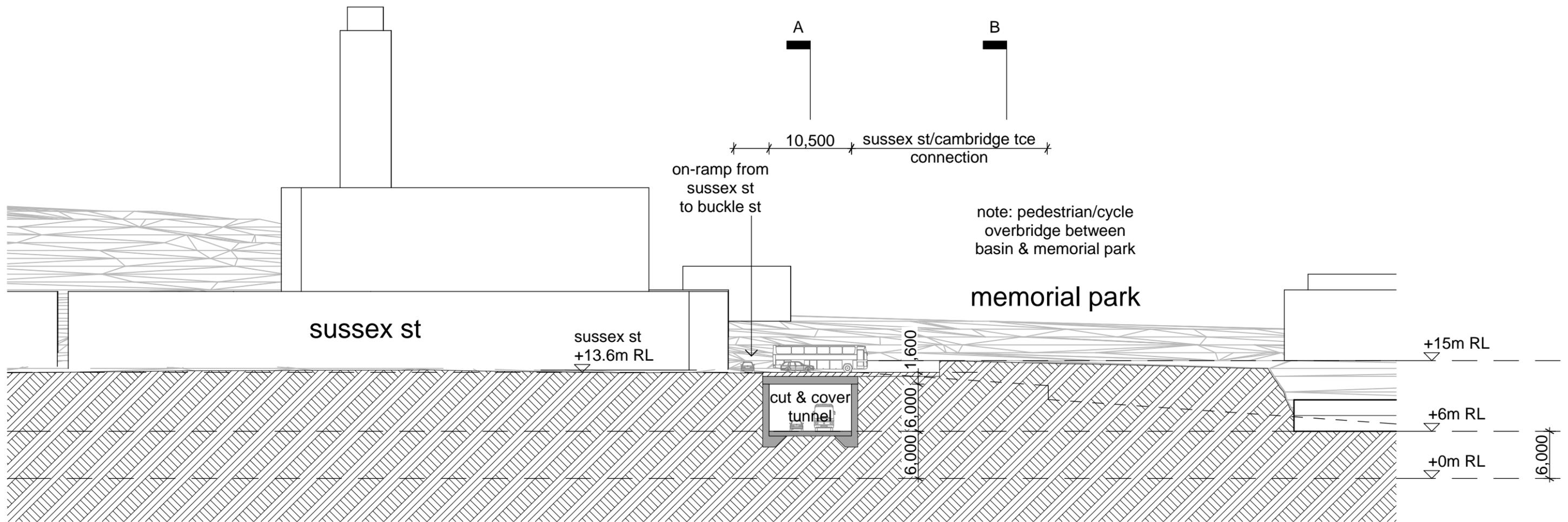


Basin Reserve - Option X (for QS cost estimate)

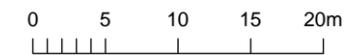
scale: 1:500 @ A3 26.07.11

note: site contours approximate only - based on WCC web map information

national war memorial



section C - sussex street
scale: 1:500 @ A3



Basin Reserve - Option X (for QS cost estimate)

scale: 1:500 @ A3 26.07.11

note: site contours approximate only - based on WCC web map information

Specifications

Tunnel

Cut and cover trench approx 290m long, from Sussex St to Taranaki Street, gradient of 3.49% (1:28.46 or 2°). Exposed height of trench wall, minimum 6m high extending to 8m high for central 100m length. In plan this will curve from basin alignment to approx 15m north to avoid services as much as possible. Tunnel to encompass two full lanes wide and hard shoulders each side. Refer to Section C.

Assume 14m deep trench, minimum 11m wide clear width. Allow 100m of trench to be faced with shotcrete retaining walls to rock (over rock-anchors @ 2m centres). Remainder of trench to be composed of 900mm diameter secant pile wall with 300mm pre-cast concrete lining panels. Pre- Cast concrete roof beams over 290m length of trench total of 1m deep allowing minimum 1m of soil and planting over. 600mm deep concrete floor to tunnel on engineered raft foundations or piles where necessary. Trench continues (open top) for further 100m, walls reducing from 6m high to 0m. Refer to Section A.

Services

Ventilation: Fan ventilation to tunnel via twin plenums either side of tunnel, exiting to 2 tunnel exhausts vertically extending up into park.

Sprinklers: Tunnel to be fully sprinkled along enclosed length

Road Lighting: The only new road lighting would be in the tunnel (Sussex to Taranaki Streets) and in the area north of the Basin. Allow mercury discharge lighting each side every 3m.

Green overbridge

Bridge structure. Ground level from 15m approx above sea level in Sussex St area will form a green plaza which bridges over the local N/S road and then SH 1, linking to the Basin as depicted in plan. Earth berms to shotcrete retaining walls at east end of tunnel, particularly at green overbridge supports.

Pedestrian Bridge (cnr Dufferin and Buckle St) from Ellice Street into Basin Reserve. Allow 3m wide timber/steel structure 20 overall length.

Roads

Highway specification asphalt finish over concrete sub-base and electronic catseyes to centrelines. 3.5m lane widths. The road geometries are based on "Physical Design Considerations" *NZTA Wellington Northern Corridor: Scoping Report* (January 2010) §16, p. 117 (<http://www.nzta.govt.nz/projects/basin-reserve/docs/basin-reserve-scoping-report-16-physical-design-considerations.pdf>):

SH1 road: traffic lanes 3.5m wide, minimum curve radius 40m, gradient Buckle-Taranaki cut & cover tunnel 3.5% (2°).

Local roads: traffic lanes 3.2m wide, minimum curve radius 40m, gradient Buckle-Sussex 7% (4°) and gradient Cambridge-Sussex 6% (3.5°); an exception is the corner of Adelaide Rd and Rugby St where we have privileged the retention of the corner buildings and have a tighter radius.

Landscaping

The south-east quadrant will require landscaping. A low traffic road and bus parks/turning space is required in this quadrant (Rugby St east). Allow to remove existing redundant roads and reform with soft landscaping. Memorial Park landscape has two distinct characteristics.

- a) Memorial Park East (Tory St to the Basin Reserve): is an active park, including recreational spaces such as basketball courts, etc. A low-level service lane is required on the north side anticipating small scale businesses/cafes forming the edge of the park.
- b) Memorial Park West (Tory St to Taranaki St): is a reflective park, primarily soft-landscape, some shared traffic space (pedestrian, cycle, car) from Tory St is provided to accommodate access of tourist buses and minor access to Massey University. Any car parks would be on the east side near Tory St. There is no through access to Taranaki St or to the Basin network from the park. All traffic accesses this park from Tory St.

Supplementary projects

These are three projects which we think will further enhance traffic movements around the area

1) Access from Mt Victoria, left turn from SH1 onto Ellice St, right turn from Ellice on to Hania and access from Hania St to Kent Tce via existing car-yard. No access from Ellice St onto SH1 permitted.



2) Access to schools and Government House via Rugby St East driveway and Dufferin Park. Existing car-yard to be drop-off space for schools, access through to Alfred St.



3) Additional access to proposed supermarket off Adelaide Rd, through existing MacDonalds thoroughway.



Appendix 2 – Rider Levett Bucknall Cost Estimate (August 2011)

15 August 2011

President
The Architecture Centre Inc.
PO Box 24178
WELLINGTON

Attention: Christine McCarthy

Dear Christine

BASIN RESERVE ROADING IMPROVEMENTS : OPTION X FEASIBILITY REVIEW

NZTA have selected two schemes (Options A & B), relating to traffic improvements around the Basin Reserve, for further public consultation as part of the overall Wellington Northern Corridor project.

Rider Levett Bucknall have been commissioned by The Architecture Centre Inc. to review and provide cost estimate feedback on a further scheme (Option X), developed by themselves, independent of the NZTA proposals.

All figures stated in this report are GST exclusive.

Information used for Review

We have referred to and reviewed the following information:

- All relevant publication information provided on the NZTA website relating to the Basin Reserve section of the overall Northern Corridor Project.
- All relevant information on The Architecture Centre Inc. website relating to this project.
- Option X Scheme design information provided to us by The Architecture Centre.

Comparative NZTA Options

The comparative NZTA Options are as follows:

Option D – All roading on grade	\$40 - \$50m
Option F – 400m Tunnel under Memorial Park	\$160 - \$220m
Option A – flyover option	\$75 - \$100m
Option B – alternative flyover option	\$90 - \$120m

The Option costs above are based on the Base Estimate values plus Contingency allowances, but exclude the 95th percentile risk allocations noted within the NZTA Feasibility Estimates.

It is clear, from the proposed design, that the cost of Option X fits between Option D & F as noted above.

Option X – Estimate Methodology

In order to maintain a high degree of comparative analysis with the current NZTA Options, we have aligned our cost assumptions on those already provided for within the NZTA estimates.

As outlined in your scoping document to us, it is clear that NZTA Options D & F are the closest to the Option X proposal and we have taken the various components from these estimates in order to piece together an Option X comparison.

We have not attempted to price out any of the excluded items as noted in the NZTA reports as this would not provide the comparative analysis required.

We have taken the scope of Option X to include the following main aspects:

1. Cut and Cover tunnel between Sussex and Taranaki St
2. On grade roads throughout
3. Pedestrian overbridges at Sussex/Buckle St intersection

No allowance has been made for the development of War Memorial Park, Mt Victoria tunnels or roading generally beyond the Basin Reserve precinct.

We have included an estimate for the development of War Memorial Park as an option.

Option X – Estimate of Cost

Option X is generally NZTA Option D with adjustments for the short tunnel under Memorial Park and green pedestrian overbridges.

Option D base estimate -	\$40m
Tunnel between Sussex and Taranaki St	\$75m
Green pedestrian overbridges	\$15m
Comparative Estimate – Option X	\$130m base estimate
Contingency allowance	\$35m
Comparative Option X cost is therefore :	\$130 - \$165m

This estimate is inclusive of the Creche relocation to a suitable location in the same vicinity.

RLB

Additional Works Estimates

Additional cost for War Memorial Park (East/West) upgrade : \$20 - \$30m

*Scope assessed is from Sussex St to Taranaki St and full width of existing corridor
32,000m²*

Additional cost for 20m pedestrian footbridge : \$220,000

Additional cost to extend road tunnel under Taranaki St : \$75 - \$100m

Summary

The Option X proposal will potentially cost between \$10-\$40m more than the Option B proposal currently put forward by NZTA for public consultation.

Option X provides considerably more amenity value for War Memorial Park and does away with the flyover between Sussex St and the Mt Victoria tunnel access. Better pedestrian connection to the Basin Reserve is also achieved.

All estimated allowances for Option X have been extrapolated from figures already included within the various NZTA Option Estimates published on their website. RLB have not attempted to build-up estimated totals from first principles at this stage.

Yours faithfully



Grant Watkins

Director

Rider Levett Bucknall

grant.watkins@nz.rlb.com

Appendix 3 – Option X Submission Form (August 2011)



Let us know what you think

The New Zealand Transport Authority is proposing very significant changes to SH1 around the Basin Reserve, referred to as Option A and Option B. Information about these options can be found at: <http://www.nzta.govt.nz/projects/basin-reserve>. If approved, these changes will have a very high impact and an enduring effect on the Wellington city.

The Architectural Centre is proposing an alternative — **Option X**. Information about this option can be found at: <http://architecture.org.nz/basin>. Option X aims to provide all the traffic-flow benefits of Option A and B, plus important improvements that will benefit all areas immediately around the Basin Reserve and the city as a whole.

Your feedback on how this part of the city develops is important for the future of Wellington. If you support Option X, please let NZTA know by sending them this submission form.

I support Option X because:

- Option X increases park and recreational space in the inner city
- Option X honours and respects the Memorial Park
- Option X ensures safe and convenient access to all adjacent schools
- Option X makes walking, running and cycling safer and more enjoyable
- Option X provides dedicated public transport routes
- Option X transforms Basin Reserve into a real destination, not an island
- Option X embraces sites of national significance
- Option X intends to create a well designed environment for future growth of Wellington

Please let us know if there are any other reasons why you choose to support Option X:

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Please return this FreePost from by Friday 26 August 2011.

Name (please PRINT clearly).....

Organisation (if applicable)

Postal address

Email

FOLD HERE

FreePost Authority Number 225938



Cobham Drive to Buckle Street transport improvements
PO Box 10042
The Terrace
Wellington 6143

FOLD HERE

FOLD AND TAPE OPEN SIDES LEAVING SPACE FOR A LETTER OPENER / NO GLUE OR STAPLES PLEASE

Appendix 4 – Traffic Model Assumptions

TO File
COPY
FROM Roger Burra
DATE 7 September 2011
FILE
SUBJECT Option X SATURN Modelling Specification



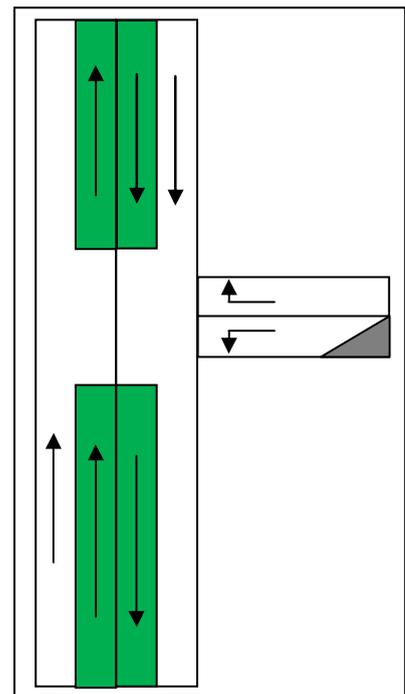
The Architectural Centre has clarified the following issues in relation to Option X. This file note records the assumptions made in consultation with the Architectural Centre when modelling Option X in the Wellington City Traffic Model (SATURN). The clarifications covered in the next few pages relate to:

- (a) the intersections associated with the St. Marks / Wellington College / Government House one-way access road
- (b) permitted traffic movements at the Rugby / Sussex Street Intersection
- (c) configuration of the SH1 Westbound approach to Taranaki Street
- (d) Provision of a signal controlled pedestrian crossing on Tory Street close to Mount Cook School

Assumptions

Intersections Associated with the School Precinct One-Way Access Road

- Entrance to schools precinct one-way service road is at the current Adelaide Road / Rugby Street intersection
- Entrance to schools precinct one-way service road is left in only from Sussex Street southbound
- Exit from schools precinct one-way service road is via Alfred Street (exit only)
- The intersection between Alfred Street and Adelaide Road is signal controlled with all movements from Alfred Street (figure right schematically shows the intersection layout)



Rugby / Sussex Street Intersection

- left in left out only

SH1 Westbound approach to Taranaki Street Intersection

- Existing Lane Configuration (see image below)

Signal Controlled Crossing on Tory Street

- Signal Controlled Crossing across Tasman Street is provided



