flow
TRANSPORTATION SPECIALISTS

PROJECT	**AWHC: NETWORK PLAN WALKING AND CYCLING**
TO	**MATTHEW RICHARDS, TOM MORTON**
FROM	MAIRI JOYCE
REVIEWED BY	ANGIE CRAFER
DATE	5 AUGUST 2010
SUBJECT	**BRIDGE LANE LAYOUT**

INTRODUCTION

Flow Transportation Specialists (Flow) has been commissioned by NZTA to complete the walking and cycling component of the AWHC Network Plan. The scope of this project is to investigate the required connections to a future walking and cycling facility on the existing Auckland Harbour Bridge (AHB) and/or new crossing, if it is a bridge, to be installed in conjunction with the completion of the Additional Waitemata Harbour Crossing (AWHC).

Whilst this scope does not include designing the proposed facility on the AHB itself we consider this to be very relevant to the success of the proposed facility, including the on and off bridge components. We have previously provided advice recommending the need for allocating two lanes on the existing AHB to walking and cycling leaving a total of five lanes for traffic. This recommendation is based on separate facilities for commuter/training cyclists and pedestrians/recreational cyclists (due to safety reasons regarding differences in speed), with around 4 m for each facility. The details of our recommendations are outlined in our previous Technical Note dated 16 July 2010.

Further to our previous advice, it has become apparent that there may be a need to provide six traffic lanes on the existing bridge as opposed to five, leaving only one lane available for walking and cycling. We note that this "need" has been determined based on the potential downstream capacity of CBD off ramps, rather than the ability of the receiving city streets to accommodate this traffic, and further that whilst there are five peak period lanes currently provided, these also accommodate buses, which in the future, will have their own dedicated lanes (freeing up capacity in the other lanes). Accordingly, the proposal is to actually provide seven peak hour vehicle (car, freight and bus) lanes compared to the current five in the peak direction.

This Technical Note outlines the consequences of providing only one lane for the walking and cycling facility and suggests that it will not be possible to provide safe facilities for both cyclists and pedestrians by

using one lane on the existing bridge. We also make recommendations as to what improvements would be necessary to accommodate both cyclists and pedestrians.

CROSS SECTION OPTIONS USING ONE LANE ONLY

Design Requirements

Based on the information included in the report prepared for the Waitemata Harbour Crossing Implementation Executive in 2008[36] the existing AHB clip-on is 9.15 m wide between the external barriers. Various options to re-allocate this space to provide cycling and walking facilities as part of the existing bridge only were considered as part of this report. In summary the report concludes the following:

- A cycle facility of less than 2.5 m wide is not recommended due to the potential for adverse safety impacts and a cycle facility of over 2.9 m is desirable
- A pedestrian facility of 2.5 m or greater is acceptable
- A traffic lane width of 3.3 m is acceptable for lanes carrying buses
- A shoulder width (or clearance) of 0.3 m is acceptable

The findings of the 2008 report were the subject of a Safety Audit[37] which also discusses the acceptable range of space reallocation on the bridge clip-ons. In summary the Safety Audit concludes:

- A cycle facility should be provided at a width of no less than 3 m (including clearances)
- The pedestrian path should be provided at a width of no less than 2.3 m
- A standard traffic lane of 3.1 m is acceptable
- However one traffic lane in each direction should be a minimum of 3.4 m to allow for heavy vehicles use on the Clip-On. This is due to the narrow widths of the central lanes on the existing bridge which the Safety Audit regards as unsuitable for heavy vehicles.
- A clearance of 0.6 m is desirable from the barrier but a clearance of 0.3 m is acceptable on the condition that the adjacent lane width is 3.4 m

It is noted that these previous investigations assumed that the pedestrian and cycling facility would be segregated, with the pedestrian facility on the eastern clip on and the cycling facility on the western clip-on. If the facilities are provided adjacent to each other, then we recommend the following:

- Both facilities should be provided on the eastern side as this will be more attractive to pedestrians.
- The facilities must be physically separated (eg flexi guide delineators, or raised footpath) to ensure safety for cyclists and pedestrians.

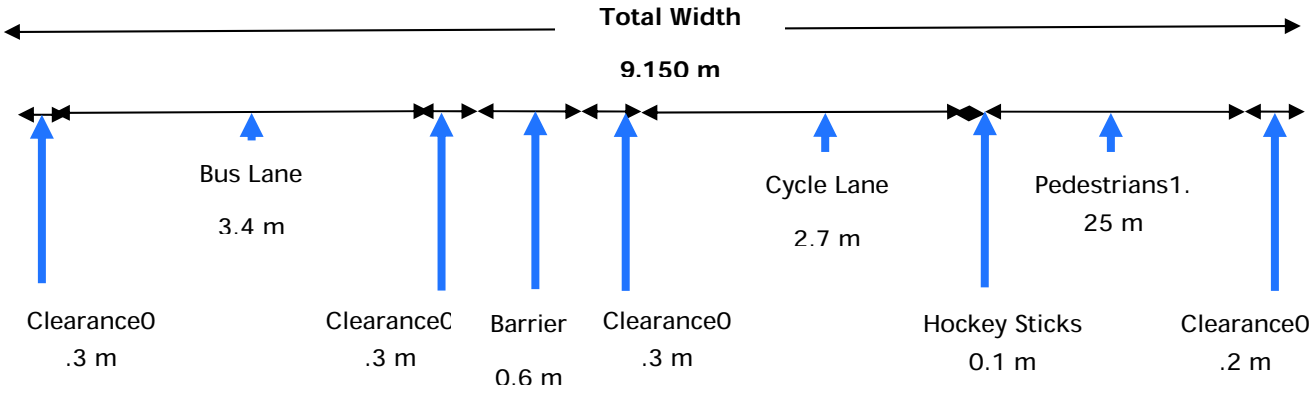
[36] Auckland Waitemata Harbour Cyclist and Pedestrian Access Study, Maounsell Ltd, 2008

[37] Auckland Harbor Bridge Road Safety Review, Traffix Group, October 2008

Option 1: Shared Facility Without Extension

Based on an available cross section of 9.15 m and the information above, the achievable widths for each facility are shown in Figure 1. It is noted that to minimise clearances we have used assumed the flexi guide delineators, colloquially known as "hockey sticks", as a form of separation although we note this may not be the most aesthetic design choice.

Figure 1: Option 1



The results show that providing the required space for the traffic lane, clearances and cycle lane leaves only 1.25 m for the pedestrian footpath. As outlined in our previous Technical Note, Austroads Part 13[38] states that the absolute minimum width of a footpath is 1.5 m and the desirable minimum width is 1.8 m, although this is generally for roads in urban streets where a grassed berm is also provided. Further guidance is provided for locations with high pedestrian volumes and/or along busy roads where the width is recommended as being 2.4 m or greater. It is also noted that the Safety Audit recommends a minimum width of 2.3 m.

It is our opinion that providing a pedestrian facility of 1.25 m in width would be unacceptable from safety, attractiveness and congestion perspectives. Pedestrians are likely to step into the adjacent cycle lane to pass each other, and those with prams would not be able to pass one another. Due to the grade of the AHB and the likely speeds of commuter cyclists we consider this will result in unacceptable risk to pedestrians and cyclists using the facility.

POSSIBLE SOLUTIONS

Option 2: Adjacent Facilities With Extension

The report prepared for the Waitemata Harbour Crossing Implementation Executive in 2008[36] states that structurally the clip-on can support an extension of up to 1.2 m. Whilst this would require structural work to

[38] Guide to Traffic Engineering Practice, Part 13, Pedestrians, Austroads 1995

accommodate the changes in the wheel tracking, this would most likely be required anyway with the option put forward by the design team, detailed above.

The additional 1.2 m would increase the width of the clip-on between the barriers to 10.35 m and would allow a pedestrian footpath of 2.45 m, plus a 0.2 m clearance. All other widths would remain as shown in Figure 1.

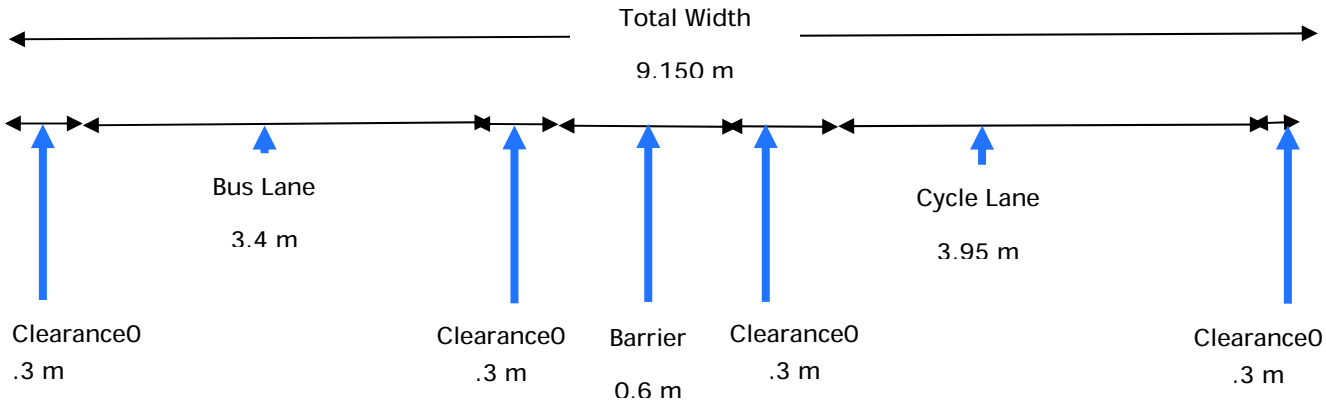
As a result, the existing clip-on with a 1.2 m extension will allow for the absolute minimum acceptable widths for the traffic lane and cycle and pedestrian facilities.

Option 3: Separated Facilities With Extension

An alternative option is to provide separate facilities with the cycling facility on the western clip-on and the pedestrian facility on a widened eastern clip-on.

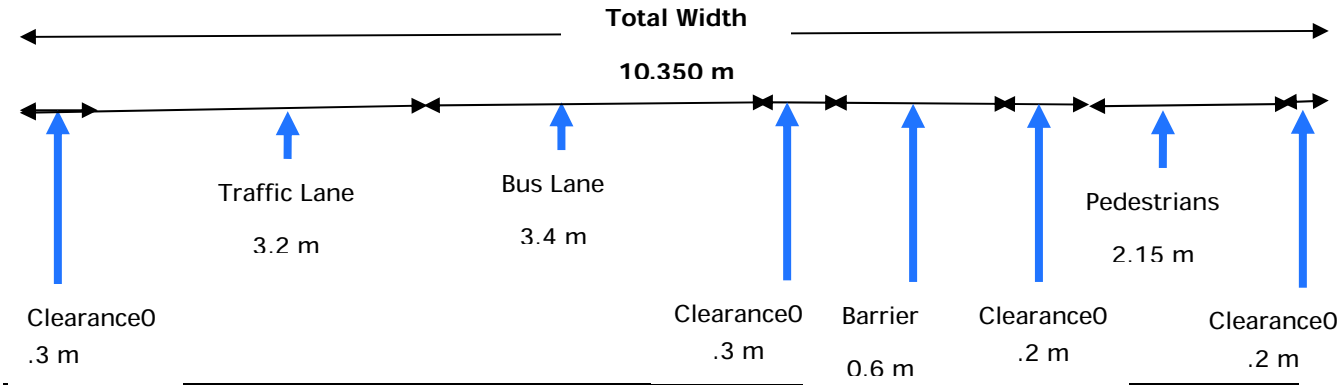
The cycling facility would be provided on the western clip-on utilising what was proposed in Figure 1 for walking and cycling. This would allow for a two way cycling facility of 3.95 m plus clearances as shown in Figure 2 below.

Figure 2: Option 3 Western Clip on Cycling Facility



The pedestrian facility would be provided on the eastern clip-on by reducing the width of the existing traffic lanes and extending the clip-on by 1.2 m. This would allow for a pedestrian facility of 2.55 m including clearances. The proposed cross section is shown in Figure 3.

Figure 3: Option 3 Pedestrian facility



DISCUSSION

Our investigation has shown that it is possible to provide cycling and walking facilities on the AHB using one lane only, provided that the eastern clip-on is widened by 1.2 m.

Option 1 has been discounted as being unsafe showing that the 1.2 m extension is required.

Option 2 results in facilities being designed to minimal standards only. It is our opinion that the minimum design standards should not be used for this facility for the following reasons:

- As stated in our previous Technical Note, it is our opinion that the walking and cycling facility across the AHB should provide a quality facility for commuters and recreational users within the Auckland region. In addition to this we believe that the facility also has the potential to be a major national (and potentially international) tourist facility (akin to the Sydney Harbour Bridge in Australia and the San Francisco Golden Gate Bridge in the USA). It is noted that any compromise with regard to the design of the proposed facility will impact on this vision.
- The standard of the facility will have an impact on the number of people using it. A higher standard will result in a higher usage.
- The proposed cross section outlined above includes cyclists and pedestrians being separated by flexi guide deliniators only. We consider that providing cycling and walking facilities on separate sides of the bridge will result in a safer solution, particularly given the grade of the AHB and the potential for a significant difference in commuter/training cycling speeds and pedestrian/recreational cycle speeds. We note that this was also the preferred recommendation of the 2008 report prepared for the Waitemata Harbour Crossing Implementation Executive.
- The provision of a cycling facility on the eastern side of the bridge results in some difficulty when considering links to other facilities on the North Shore. The results of previous studies[39] indicate that a cycleway along the western side of the motorway is more feasible than the eastern side. If the "on bridge" facility is provided on the eastern side then additional infrastructure for pedestrians and cyclists will be needed to cross to get to the western side. This will result in the need to use the existing underpass (which may not be desirable) or some kind of over ground structure which may be expensive.

Option 3 results in the provision of a high standard cycling facility and an average quality pedestrian facility. It also allows for the facilities to be separated, providing a safer solution. We therefore consider this is the preferred option if the width of only one traffic lane is made available for active travel modes.

[39] NO1: Northern Motorway Corridor Cycleway Project Feasibility Report, SKM, 2008 and Auckland Harbor Bridge to Akoranga Station Cyclists and Pedestrian Access project Feasibility Report, Maunsell, 2009

CONCLUSIONS AND RECOMMENDATIONS

The results of our investigations show that it is possible to achieve a cycling and walking facility on the existing AHB using one traffic lane only provided that one clip-on is widened by 1.2 m. A walking and cycling facility using one lane without the extension is not acceptable.

Reference: S:\NZTA\039\Report\TN2A100804.doc - mairi