I hereby give notice that an ordinary meeting of the Devonport-Takapuna Local Board Community Forum will be held on:

**Date:** Tuesday, 30 June 2020  
**Time:** 5.00pm  
**Meeting Room:** Devonport-Takapuna Local Board Office, 1 The Strand, Takapuna

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**Devonport-Takapuna Local Board Community Forum**

**OPEN AGENDA**

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**MEMBERSHIP**

Chairperson  
Aidan Bennett, QSM

Deputy Chairperson  
George Wood, CNZM

Members  
Trish Deans  
Ruth Jackson  
Jan O'Connor, QSM  
Toni van Tonder

(Quorum 3 members)

---

Rhiannon Foulstone-Guinness  
Democracy Advisor  

25 June 2020

Contact Telephone: 021 815 313  
Email: rhiannon.guinness@aucklandcouncil.govt.nz  
Website: www.aucklandcouncil.govt.nz

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**Note:** The reports contained within this agenda are for consideration and should not be construed as Council policy unless and until adopted. Should Members require further information relating to any reports, please contact the relevant manager, Chairperson or Deputy Chairperson.
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1 Welcome

Member Toni van Tonder will open the meeting with a karakia.

Whakataka te hau ki te uru
Cease o winds from the west
Whakataka te hau ki te tonga
Cease o winds from the south
Kia mākinakina ki uta
Bring calm breezes over the land
Kia mātaratara ki tai
Bring calm breezes over the sea
E hī ake ana te atakura
And let the red-tipped dawn come
He tio
With a touch of frost
He huka
A sharpened air
He hau hū
And promise of a glorious day
Tihei mauri ora!

2 Apologies

At the close of the agenda no apologies had been received.

3 Declaration of Interest

Members are reminded of the need to be vigilant to stand aside from decision making when a conflict arises between their role as a member and any private or other external interest they might have.

The Auckland Council Code of Conduct for Elected Members (the Code) requires elected members to fully acquaint themselves with, and strictly adhere to, the provisions of Auckland Council’s Conflicts of Interest Policy. The policy covers two classes of conflict of interest:

i. A financial conflict of interest, which is one where a decision or act of the local board could reasonably give rise to an expectation of financial gain or loss to an elected member

ii. A non-financial conflict interest, which does not have a direct personal financial component. It may arise, for example, from a personal relationship, or involvement with a non-profit organisation, or from conduct that indicates prejudice or predetermination.

The Office of the Auditor General has produced guidelines to help elected members understand the requirements of the Local Authority (Member’s Interest) Act 1968. The guidelines discuss both types of conflicts in more detail and provide elected members with practical examples and advice around when they may (or may not) have a conflict of interest.

Copies of both the Auckland Council Code of Conduct for Elected Members and the Office of the Auditor General guidelines are available for inspection by members upon request. Any questions relating to the Code.

4 Confirmation of Minutes

That the Devonport-Takapuna Local Board Community Forum:

a) confirm the ordinary minutes of its meeting, held on Tuesday, 25 February 2020, as true and correct.

5 Leave of Absence

At the close of the agenda no requests for leave of absence had been received.
6 Acknowledgements

At the close of the agenda no requests for acknowledgements had been received.

7 Petitions

At the close of the agenda no requests to present petitions had been received.

8 Deputations

Standing Order 7.7 provides for deputations. Those applying for deputations are required to give seven working days notice of subject matter and applications are approved by the Chairperson of the Devonport-Takapuna Local Board Community Forum. This means that details relating to deputations can be included in the published agenda. Total speaking time per deputation is ten minutes or as resolved by the meeting.

8.1 Eva Chen – Wellbeing Charitable Trust NZ

Te take mō te pūrongo
Purpose of the report
1. Eva Chen of Wellbeing Charitable Trust NZ will be in attendance to address the board in support of this item.

Ngā tūtohunga
Recommendation/s
That the Devonport-Takapuna Local Board Community Forum:
  a) receive the presentation from Eva Chen and thank her for her attendance.

8.2 Will McKenzie - Auckland Harbour Bridge Replacement

Te take mō te pūrongo
Purpose of the report
1. Will McKenzie will be in attendance to address the board in support of this item.

Ngā tūtohunga
Recommendation/s
That the Devonport-Takapuna Local Board Community Forum:
  a) receive the presentation from Will McKenzie and thank him for his attendance

Attachments
A Auckland Harbour Bridge Replacement ................................................................. 11
8.3 YOUnite

Te take mō te pūrongo
Purpose of the report
1. YOUnite will be in attendance to address the board in support of this item.

Ngā tūtohunga
Recommendation/s
That the Devonport-Takapuna Local Board Community Forum:

a) receive the presentation from YOUnite and thank them for their attendance.

9 Public Forum

A period of time (approximately 30 minutes) is set aside for members of the public to address the meeting on matters within its delegated authority. A maximum of 3 minutes per item is allowed, following which there may be questions from members.

At the close of the agenda no requests for public forum had been received.

10 Extraordinary Business

Section 46A(7) of the Local Government Official Information and Meetings Act 1987 (as amended) states:

“An item that is not on the agenda for a meeting may be dealt with at that meeting if-

(a) The local authority by resolution so decides; and

(b) The presiding member explains at the meeting, at a time when it is open to the public,-

(i) The reason why the item is not on the agenda; and

(ii) The reason why the discussion of the item cannot be delayed until a subsequent meeting.”

Section 46A(7A) of the Local Government Official Information and Meetings Act 1987 (as amended) states:

“Where an item is not on the agenda for a meeting,-

(a) That item may be discussed at that meeting if-

(i) That item is a minor matter relating to the general business of the local authority; and

(ii) the presiding member explains at the beginning of the meeting, at a time when it is open to the public, that the item will be discussed at the meeting; but

(b) no resolution, decision or recommendation may be made in respect of that item except to refer that item to a subsequent meeting of the local authority for further discussion.”
ATTACHMENTS

Item 8.2  Attachment A  Auckland Harbour Bridge Replacement  Page 11
Is JT’s super harbour crossing vision really a bridge too far?

Why did everyone think John Tamihere had flipped his lid when he proposed a new bridge over the Waitemata, to sit on the piers of the existing one? Extra capacity for crossing the harbour is not a new idea. It’s in the plans. Putting that extra capacity on the existing bridge isn’t a new idea, either. Nor is adding rail, cycling and walking, all of which feature in Tamihere’s proposal, along with two extra lanes for motor vehicles.

And a proposal to do all this at a fraction of the expected price of a new bridge or tunnels, shouldn’t that be welcome?

But the way JT’s bridge was received, you’d think he’d suggested a monorail. Actually, another mayoral candidate, Craig Lord, has proposed exactly that: a monorail network complete with harbour crossings, and that just got laughed at.

Monorails are the very definition of absurd transport plans, thanks to the Simpsons, but the reputation is undeserved because they work well in many parts of the world. But we’ll leave Lord’s idea for another day.

Tamihere didn’t quite get laughed at but there was some sniggering. Mayor Phil Goff called it “total fantasy stuff and fundamentally dishonest to promise”. He thinks it would cost at least $10 billion.

Tamihere himself says it would cost around $2 billion. He produced that figure by taking the square-metre cost ($NZ14,000) of a similar but much smaller bridge in Ohio, scaling it up to the size of his proposed bridge, adding 50 per cent to cover increased construction costs and then adding another 33 per cent for contingency.

Are the council candidates on the Shore excited? After all, there’s a longstanding desire among citizens north of the bridge for a new harbour crossing. The answer is no: the response to JT’s bridge has been almost non-existent. It’s hard to find anyone even talking about it.

A new harbour crossing is already included in the Auckland Transport Alignment Programme, the transport agreement between Government and council. But it’s on a 10-year horizon and Tamihere proposes to get it done in five.

Harbour crossings are in the hands of the NZ Transport Agency (NZTA). Transport ministers Phil Twyford and Julie Anne Genter received an NZTA briefing a year ago: at that stage, there were three options: road and rail tunnels, rail-only tunnels, and doing nothing. Most of the lobbying since then favours one or other of the first two.

NZTA is expected to announce its updated thinking very soon. Tamihere’s bridge is unlikely to be on its list.

Strangely, he himself may not be fussed. On the campaign trail he no longer mentions the bridge, except to answer when someone raises it. He describes it as “just an idea”.

He says he doesn’t have the resources to do a full analysis, so he doesn’t know how good the idea is. He wants to shake things up. Even if it turns out to be not great, it shows he’s a guy who has ideas.

That leaves his adviser Will McKenzie shaking his head. McKenzie has been working on this particular idea since 2014.

He says while they’ve presented the proposal to transport officials in Wellington and Auckland, they didn’t get anything more than blank stares.

BUT STILL, is it a good idea? On cost grounds alone, doesn’t it deserve serious attention?

As McKenzie explains, there’s great value in using the existing piers. Concrete is expensive but steel is cheap, which is the reverse of how it was in 1959 when the bridge was built. That’s why they made it smaller than it should have been.

There’s value in using the existing bridge, full stop. Far fewer environmental issues. Although, if we’re going to have a bridge at all, do we have to retain the ugliness of the original? Can’t we have something beautiful?

The idea is to build the new super-structure next to the existing one, then slide the old one off and the new one on. Not easy, but not so difficult either. The University of Auckland’s associate professor Charles Clifton, an expert in steel and composite steel/concrete construction, says it can be done.

McKenzie is quick to argue that it’s not an 18-lane bridge, as commonly thought. There are 10 lanes for motor vehicles, four for rail, and four more for cycling and walking.

“Put it this way,” he says, “how many lanes are there on Queen St? The answer is four. No one says it’s six lanes because of the footpath.”

The bridge has two decks, with cars below and everything else above. Why expose cyclists and walkers to the elements? Why have two walkways? Those cycling and walking lanes don’t seem thought through.

Why make the trains climb more steeply, to the higher level? McKenzie says these are tram-trains, capable of climbing a 6 degree incline, which is more than our current electric trains can manage. He says it’s not a problem. There’s also no problem for boats passing underneath.

But other problems remain. The pro-
posal won't expand vehicle capacity. The bridge has eight lanes now, but the dynamic lane ensures it always has five lanes for peak traffic, with three going the other way. Effectively, it's already a 10-lane bridge.

The biggest issue is probably this: what happens to traffic, especially rail traffic, when it comes off the bridge at Northcote and Westhaven? To the north, rail lines and a whole lot more infrastructure will be required. To the south, the tram-trains can't feed into Britomart and the CRL, because that's going to be at capacity anyway. So they'll also need a new network to join.

McKenzie says yes, that network will be on-road in the central city and will replace the existing proposals for tram racks, also known as light rail.

They don't exactly say it, but this, not the bridge itself, is the most important aspect of the whole proposal. It calls for the existing electric trains to be supplemented and eventually replaced with a new fleet of tram-trains. They'll be able to run on the existing rail tracks, and on tram tracks with the same gauge set directly into the road.

Cross-section of the harbour bridge with two decks: 10 lanes for traffic, 4 for tram-trains and 4 for cycling and walking, as proposed by Auckland mayoral candidate John Tamihere. Image supplied.

One much larger, fully integrated, rapid transit network, connecting the city centre to the north, south, east and west, and to Hamilton, Tauranga and Whangarei.

It's a game-changer, dispensing with the debate about light or heavy rail altogether. But it also brings its own problems. For example: trains have doors that open at platform height, tram doors open at road level. This proposal means building platforms on the streets.

And it reopens the whole question of what the city's slowly growing rapid transit network will look like and where it will go. That, effectively, means the bridge won't happen in a hurry. It can't be built if there's no agreement to extend its reach. The last thing the city can cope with is more trains or more cars just pouring unplanned into the centre, without infrastructure to accommodate them.

There's another issue about Tamihere's bridge, which is to do with the transport plan it forms a part of. On the campaign trail JT may not mention the bridge but he invariably says he's going to stop "the war on cars".

What does he mean? He says he supports cycle lanes, but the "sequencing" has to be right. That's code for cycling comes last, we need more roadways for cars now. He condemns traffic calming measures and proposals to lower speed limits. Spending on public transport, he makes clear, can't be at the expense of cars.

The bridge is a look-at-me. But the transport plan it's part of is primarily about roads. It's entirely uninformed by climate change, safety, community and health considerations. It also ignores the central insight in transport planning all over the world: the realisation that supplying more roads means creating more demand for them, and therefore more congestion.
Will McKenzie: Keeping Auckland congestion to acceptable levels

2 Oct, 2019 3:00pm  5 minutes to read  NZ Herald  By: Will McKenzie

Proposed Auckland Harbour Bridge Replacement Photo / supplied
COMMENT
Simon Wilson's article (Weekend Herald, September 28) brought welcome sanity to the ongoing conversation about transport in Auckland. Wilson made a number of points and posed a number of questions about John Tamihere's transport plan which I address.

When Tamihere proposed the bridge replacement many in the mainstream media thought, for whatever reason, that saying Tamihere had flipped his lid was a good story to tell their readers, viewers and listeners, many of whom believed it. That is why "everyone [thought] he had flipped his lid" when, of course, he hadn’t.

A reason for the bridge replacement proposal not in the article is the NZ Transport Agency predicts the current 50 tonne heavy vehicle weight limit on the clip-ons will be reduced to 35 tonnes around 2030; it may be reduced further in the 2030s. The restrictions would greatly hinder freight transport to all points north. Another reason is Auckland Transport has predicted the Northern Busway is on track to reach full capacity by the mid-2030s when bus use of the alignment will need to be replaced with rail; other estimates are rail will be required by the mid-2020.

The new harbour crossing included in the Auckland Transport Alignment Programme is on a 25-30 year horizon. From ATAP 2018 construction is not anticipated to commence until at least the late 2030s. A tunnel across the Waitemata with traffic lanes would require significant sea reclamation that may be impossible to get resource consent for in the 2030s.

Beauty is in the eye of the beholder. The view of some beholders is that the original Auckland Harbour Bridge was an attractive spider's web of steel that stretched across the Waitemata lightly touching its piers, and then the clip-ons turned it in to an ugly mongrel. A replacement of the same design as the original would be attractive to many and would respect the history of the bridge and the thousands of men and women who worked on it including the four men who died during its construction.

The reason why the vehicles are on the bottom level of the proposed replacement bridge is that it would be difficult to fit shared paths and rail lines underneath 10 lanes of traffic at the bridgeheads, however fitting them above 10 lanes of traffic at the bridgeheads would be relatively straightforward.

Other factors include that footpaths and cyclepaths are usually exposed to the elements including paths on bridges including NZTA's proposed clip-on shared path. Covered public spaces are problematic; the covered shared path on the south side of the Mangere motorway bridge is notoriously unsafe and under-used. The views from the current level / proposed level for trains, cyclists and pedestrians are spectacular and would be wasted on drivers who should be looking at the road.

Many bridges with walkways have one on each side. The two proposed shared paths are to allow views to the west and the east and to allow shared path access to the bridge from the east and the west which is particularly helpful at the south bridge head.

The plan deliberately does not increase peak traffic capacity across the Waitemata as there is no identified short, medium or long-term need for, or way to accommodate in the approaches, more general traffic lanes. The proposed tunnel would not increase the total number of general traffic lanes either. If Tamihere is elected Mayor and gains support from the Governing Body and government, the harbour bridge could be replaced by 2025.

Any commuter street-rail built in Auckland will require passenger platforms at least 300mm in height and at least 50m² in area to provide mobility access, at every stop. Such platforms are being built in the hundreds around Melbourne. Manchester has 900mm / bench height tram-train platforms which fit well in their streetscapes, Auckland would require 750mm / table height tram-train platforms which would fit well in our streetscapes.

Tram-trains to and from the north would travel on tracks laid on the Northern Busway alignment, which is the long-term plan for the alignment anyway. Tram-trains to and from the south, would go along Westhaven Drive, Beaumont Street, Jellicoe Street and Quay Street past Spark Arena to then join the main lines in the railyards just as trains did right up to the 1970s. Tram-trains would supplement, not replace, the existing fleet of trains that would continue to be used for many decades.

Wilson is right to identify the use of tram-trains as the “game-changer” in the plan. With new rail lines built in rail corridors currently not used for rail such as Avondale to the Airport and the Northern and Eastern Busways a large integrated rapid transit network could be built quickly and affordably that could accommodate 200 million, 300 million and more boardings per year, up from the current 100 million.

Such high levels of public transport use are necessary to address climate change, safety, health and community considerations. Combined with provision for active transport, a completed road network, possible congestion charging on motorways and major highways and replacing the harbour bridge, congestion would be kept to an acceptable level and Auckland would have a fit-for-purpose 21st century transport system sooner rather than later.

Will McKenzie is a policy advisor with the John Tamihere for Mayor campaign

Attachment A

Item 8.2
Auckland Harbour Bridge replacement.

There is a problem with the Auckland Harbour Bridge. The NZ Transport Agency estimates that by 2030 the current 50 tonne weight limit on trucks on the clip-ons will be reduced to only 35 tonnes; further reductions over the 2030s are likely. Auckland Transport estimates that the Northern Busway will be at full capacity by the mid 2030s, by some estimates the late 2020s. These two bottlenecks will strangle Auckland.

The AHB piers currently carry the original 1959 bridge and the two clip-ons added in 1969. NZTA proposes to add a third clip-on to the AHB piers, which would be a second clip-on on the eastern side for cyclists and pedestrians. This would mean four bridges sitting on and clinging to one set of piers.

Bridge replacement would see the three existing bridge structures, and the proposed fourth one, would be replaced with one fit for purpose bridge on the existing piers catering for road, rail, cycleways and walkways. Construction would cause minimal disruption to traffic and will be completed within 6 years.

The new bridge would feature 10 lanes for road traffic on the lower level and 4 rail tracks and 2 shared paths on the upper level. The bridge replacement process is:

- Build new bridge on temporary piers to the east of the existing bridge;
- Switch road traffic to the new bridge;
- Remove the old bridges from the existing piers;
- Slide the new bridge west, over 24 hours, to its final position on the existing piers;
- Allow traffic to flow on the 2 shared paths, 4 rail tracks and 10 lanes on the new bridge in its permanent position.

Full or partial bridge replacement has been carried out on a number of bridges in the United States including the Milton-Madison Bridge over the Ohio River which was built in 1929. It was replaced in 2014 at a cost of USD $103.7m. Bridge replacement will bring forward by decades rail connectivity and improved road provision to the North Shore, at a significantly reduced cost than other options.
## Auckland Harbour Bridge replacement.

<table>
<thead>
<tr>
<th>Bridge</th>
<th>Auckland Harbour Bridge</th>
<th>Milton-Madison Bridge</th>
</tr>
</thead>
<tbody>
<tr>
<td>Body of water</td>
<td>Waitemata Harbour Auckland</td>
<td>Ohio River Milton KY - Madison IN</td>
</tr>
<tr>
<td>Width of water</td>
<td>990 m</td>
<td>970 m</td>
</tr>
<tr>
<td>Main span</td>
<td>244 m</td>
<td>183 m</td>
</tr>
<tr>
<td>Height above water</td>
<td>43 m</td>
<td>22 m</td>
</tr>
<tr>
<td>Deck width</td>
<td>13 m</td>
<td>6 m</td>
</tr>
<tr>
<td>New deck width</td>
<td>35 m</td>
<td>13.7 m</td>
</tr>
</tbody>
</table>
Milton-Madison Bridge replacement.

1. Build new bridge on temporary piers adjacent to original bridge.

2. Switch traffic to new bridge in temporary location and remove old bridge.

3. Slide new bridge into its permanent position.


https://www.youtube.com/watch?v=nk2Mh78VdE
https://www.youtube.com/watch?v=X4f_1uC0iXc
Auckland Harbour Bridge replacement.

Three existing bridges: original central span with four lanes of traffic and two lane clip-ons.

Total capacity: 8 lanes.

One new bridge in place on temporary piers carrying 10 lanes on its lower level.

Connections between the temporary piers and the existing piers.
Auckland Harbour Bridge replacement.

New bridge in place on the original piers:

2 shared paths and 4 rail tracks on upper level. 10 lanes on lower level.
Auckland Harbour Bridge.
Centre 4 lanes built in 1959
Two x 2 lane clip-ons
added in 1969. 8 lanes.

Auckland Harbour Bridge.
replacement. 2025 completion.
2 shared paths, 4 rail tracks
and 10 lanes.

35 metres

Attachment A Item 8.2
Attachment A

Auckland Harbour Bridge replacement.

Original – 1959
Cost: £5 m

With clip-ons added in 1969

Replaced AHB 2025
Item 8.2

2019
Item 8.2

Possible Southern Bridge Landing
Rail plan

New Rail North Shore: 16km of new rail on the North Shore along the Northern Busway from Albany, connecting to the Auckland Harbour Bridge and CBD street rail.

New Rail: 33km of new rail in central, south and east Auckland including to Botany, Mt Roskill, Mangere and the Auckland Airport. New rail will be built mainly on land already reserved for new rail; disruption will be minimised. All new rail to be built to Kiwirail mainline standards except in some places e.g. the harbour bridge and Hillsborough to Onehunga will have an incline of 5% rather than 1%, and some turns in the CBD will be 30m radius rather than 100m.

Tram-trains with the same passenger capacity as existing trains would run on new rail on the North Shore, on existing rail up to the CBD edge and on new street rail through the CBD. Tram-trains can travel at 100 km/hr as Auckland’s suburban trains can, but unlike our trains, tram-trains can climb grades of 6%, and turn corners as tight as 30m in radius. Tram-trains have been running for up to 30 years, now in over 30 cities including; Karlsruhe, Paris, Salt Lake City and Manchester. Tram-trains will deliver the benefits of trains in the CBD, and the benefits of trains outside the CBD, at greatly reduced cost and disruption as only a 4 km section of expensive street rail is required. Ground level power supply, in use more than a dozen cities for up to 20 years, will be used from the approaches to the AHB through to Spark Arena so that above head wires will not be required.

Auckland Airport would be served by trains and tram-trains on three lines within 9 years. Commuters will be able to travel to Onehunga - Auckland Airport - Wiri and Britomart and from every railway station in Auckland without changing trains.
Tram-trains for Auckland

- Able to operate on street rail and on the main lines
- Same track gauge as trains: 3'6" / 1067 mm
- Same floor height as trains: 750 mm
- Same width as trains: 2.76 m
- Similar weight as trains: 1.7 t / m
- Same length & passenger capacity as trains: 72 m
- 25kV AC / 750 V DC / ground supply / diesel
- Commuter rail top speed 100 km/hr
- 12m long body sections to allow sharp turns
- "Track brakes" for quick emergency stopping
- Blinkers, brake lights & train signal reading equipment
Old Rail: 1953
Beaumont St, Jellicoe St, Quay St

Rail by 2028

Right: Quay St from the Ferry Building looking west in 1968

Far Right: Shunting locomotive on Quay St in front of 1 Queen St in 1971
Train and Tram-trains would provide a comprehensive rapid transit system for Auckland on 4 lines and up to 3 rail shuttles. It would be a true ‘turn up and go’ system. With only four lines all services would be high frequency.

Commuters would be able to travel to Britomart and Onehunga – Auckland Airport - Wiri from every railway station in Auckland without changing trains.
Harbour Bridge Replacement Q&A

Is there a problem with the Auckland Harbour Bridge?
Yes. The NZ Transport Agency estimates that by 2030 the current 50 tonne weight limit on trucks on the clip-ons will be reduced to only 35 tonnes; further reductions over the 2030s are likely. Auckland Transport also estimates that the Northern Busway will be at full capacity by the mid 2030s, by some estimates the late 2020s. These two bottlenecks will strangle Auckland. https://www.nzta.govt.nz/assets/projects/ahbc/docs/BRI-1270-ahbc-transport-modelling.pdf

What is the Council’s plan for to solve this problem?
Allow NZTA to do what it wants with key transport infrastructure in Auckland. NZTA’s plan is to add a 4th structure to the AHAB, a 5 wide metre 2nd clip on the east side for cyclists and pedestrians. The other part of the plan is to build a tunnel under the Waitemata Harbour to be opened in the mid to late 2040s.

What is wrong with these plans.
A solution in the 2030s or the 2040s is 10 to 20 years too late. The problem needs to be solved in the 2020s. Between 2030 and the mid to late 2040s Auckland’s freight system and public transport systems will be strangled by severe constrains on transport to the north.

What is the alternative?
Replace the 3 existing bridges carrying 8 lanes with one new 10 lane bridge within 6 years, by 2025. The replacement bridge will use the original design, be built on the original piers with 10 lanes on the lower deck within the steelwork and 4 rail lines and 2 shared paths on the upper (existing level) deck.

What is the main advantages the alternative Plan?
It provides a comprehensive solution by 2025 that will provide transport to the north for generations and does not prevent other transport connections being added in the future.

How?
Build the new bridge on temporary piers to the east of the existing bridge. Move traffic on to the new bridge. Remove the old bridge. Slide the new bridge onto the existing piers. Open new bridge on existing piers.

Is it really possible to replace the current Auckland Harbour Bridge (AHAB)?
Yes. The Milton-Madison Bridge between Ohio and Kentucky was built in 1929 as a 6 m wide bridge, just wide enough for 2 lanes, - the same length as the Auckland Harbour Bridge. It was replaced in 2014 by a new 13.7 m wide bridge with two lanes, two cycle / stopping lanes and a footpath. The method is scalable and our engineering advice (see end of Q&A) is that it is entirely possible, with conventional engineering techniques, to replace the current 4 lane central bridge, and the two 2 lane clip-ons (total width 35 metres) with one, 10 lane, 35 metre wide, bridge with a second level below the level of the current deck level.

Who says so?
University of Auckland Associate Professor Charles Clifton has been giving advice on the proposal since 2014. His opinion is that the plan is feasible. Dr Clifton is New Zealand’s leading expert on steel construction. Please see email from Dr Clifton at the end of this Q&A. Other bridge engineers agree with Dr Clifton but work for companies that do not make public comments on proposed major projects.

Would the new bridge have 18 lanes?
No. The new AHAB with have 10 lanes, 2 shared paths and 4 rail tracks.
What would the bridge replacement cost?
On advice from bridge engineers the costing is as follows:

- The Milton-Madison Bridge replacement project replaced a 6 metre wide, 1,000 metre long bridge deck with a 13.5 metre wide bridge deck over the Ohio River in the United States.
- The cost was US$103.7m in 2014; approx. NZ$ 200 million in 2019 dollars which is approximately NZ$14,000 per square metre (sqm) of bridge deck.
- The AHB replacement will create 70,000 sqm of deck @ $14,000 per sqm amounts to a total of $980 million.
- To that we have added 50%, $500 million, to allow for increases in costs over the time of the build and increased costs for the project being in New Zealand; total $1.5 billion.
- We have also added a 33% contingency, a further $500 million, bringing the total cost to not more than $2 billion.
- This is a conservative costing. Bridges are usually costed in New Zealand at around $5,000 per sqm of deck including the cost of foundations and piers.

Has a similar bridge been built recently in New Zealand, and how much did it cost?
Bridge 40 over Cannon Creek in the Transmission Gully Motorway build has some similarities to the proposed AHB replacement. "Standing 80m above the stream below, Bridge 20 is the largest structure in the entire Transmission Gully motorway project. The finished bridge will be four lanes wide, 226 metres long and 24.5 metres wide. A total of 44 steel girders, each 1.8m wide and 3m deep make up the framework of the bridge deck which is supported by two abutments and two piers."

"The challenging geographical features of the site, in particular the steep sides of the gorge and the need to span a large distance, mean that launching is the most effective process for installing the bridge deck structure. Launching is where a pre-assembled bridge frame, in the form of steel girders, is "launched" across an open space to land on the bridge piers. This bridge launch is being undertaken in four phases and will eventually see the bridge reach the abutment on the other side of the gorge."

This complicated build involved moving the bridge 200 metres lengthways rather than 40 metres sideways as is prosed for the AHB replacement. Because of its complications and difficult site Bridge 20 was completed in 2019 at a final cost of $45 million, in the order of NZ$10,000 per sqm including the cost of foundations which are typically half the cost of bridge construction.

Whilst the proposed AHB replacement will utilise the existing piers, the nature of bridge replacement means that the cost of one bridge replacement will cost NZ$14,000 per sqm of deck with a 50% allowance for cost increases and a further 33% contingency, is appropriate.

Is up to $2 billion to replace the AHB good value for money?
Yes. It is outstanding value for money. Something has to be done about the AHB, and done before 2030 so the decision has to be made now. Shared paths are needed now. Projections are that the clip-ons will have heavy trucks restrictions from 2030 and the Northern Busway will be at full capacity by 2030. The only plan in place is to consider building a tunnel in the 2040s for who knows what cost? The AHB replacement can be completed in six years for not more than $2 billion as part of the $28 billion Auckland Transport Alignment Program which the Mayor of Auckland has as much say in as anyone. It will be a good plan for money as any transport project in Auckland.

Surely it will disrupt road traffic.
There will be two major closures. The Newmarket Viaduct was replaced with traffic disruption, including closing SH1. There was disruption; the disruption was worth it.

How many major closures will there be?
Two major closures, for only 3 to 5 days over the Christmas New Year lull. The first closure will be to move the approaches to the new bridge in its temporary location. The second closure will be to move the bridge to its permanent location on the existing piers.

Have NZTA assessed the possibility of replacing the AHB bridge? NZTA have not considered replacing the AHB bridge. It is not in the long list of 180 options considered in a 2008 NZTA report.
The Milton-Madison example is only a four lane single level bridge. Is 10 lanes on two levels really possible?
These days’ even buildings can be moved if needed. For example the fragile Bird Cage pub was moved 40 metres, and then moved the same 40 metres back again. The fragile Cornish Pumphouse in Waihi was moved 300 metres. The new AHB bridge will not be fragile; it will be designed and built so that, once the original piers are ready for it, it can readily be moved the about 40 metres to its permanent location on the original piers.

Will the bridge replacement process be safe?
Bridge replacement is a common process and safe methods are well practised. Developments in computing and in sensors mean that every aspect of the bridge can be monitored in real time and adjusted as necessary.

Why not build a new bridge?
A new bridge would cost at least $4 billion at minimum and take a decade to build. A second harbour bridge would adversely affect the aesthetics of the Waitemata Harbour and of the existing bridge. Having two harbour bridges would create complicated road interchanges on either side of the bridge which would have adverse effects on the environment including the likely need for significant sea reclamation which is contrary to the Auckland Unitary Plan. Replacing the bridge will cost no more than $2 billion, can be completed in 6 years and will have negligible adverse effects.

Why not make the replacement look different to the 1959 original?
The 1959 original is a mid-century classic and an icon of Auckland. There is no need to change the appearance of the bridge. There is only the need to make the bridge fit for purpose for the 21st century and beyond.

Why not only replace the clip-ons?
Auckland needs one fit for purpose bridge that provides all the connectivity that is possible on the St Mary’s Bay to Northcote alignment. Replacing the clip-ons would provide less capacity, may cost more and take longer to build and would make it difficult, if not impossible, to include rail and would retain the current divided carriageways which are not as safe as undivided carriageways.

Why 4 rail lanes?
Futureproofing. Initially only two lines will be needed. However if there is a desire to provide street based services to Northcote and Birkenhead, they would be of such a frequency as to interfere with the very frequent tram-trains heading to and from Albany and beyond.

Will houses on Stokes Point have to be compulsorily acquired?
Some residential land will be required for the replacement project. NZTA avoids compulsory acquisition and is experienced in purchasing private properties that are required for national transport infrastructure projects. Once the project is complete any land acquired for the project may stay in public ownership.

Won’t the bridge replacement be unbearably disruptive for the residents of Northcote Point?
Everything would be done to minimise disruption.

Where will pedestrians and cyclists enter and exit the bridge on Northcote Point?
NZTA is currently consulting on this. One option to consider is if the area around the old Auckland Harbour Bridge Trust Board building and toll booths can be redeveloped to maximise public space and be the place where cyclists and pedestrian enter and exit the AHB on the North Shore.
How would rail, pedestrian and cycle ways connect to the ground on St Mary’s Bay and in Northcote?
Attractive on and off ramps will be designed for rail, cycle paths and footpaths. I am looking at the old toll both area as the main junction point on the Northcote side, and there are a number of options on the St Mary’s Bay side. The eastern and western cycle and pedestrian ways will likely connect to eastern and western sides of the bridge at both ends of the bridge.

How would the bridge replacement effect Skypath?
With two cycleways and two walkways on the upper level of the new bridge Skypath will not be needed and will not be built.

Would the new AHB bridge have the same sized footprint as the existing bridge in St Mary’s Bay and on Stokes Point?
Yes. The road approach to and egress from the AHB is already wide enough to accommodate 10 lanes of traffic, so the new bridge will not require wider approaches or egresses.

Would the motorways to the north and south of the bridge have to be widened?
No. At the moment there are 10 motorway lanes leading to the south side of the AHB and 10 lanes leading to the north of the AHB but only 8 lanes on the AHB itself necessitating the use of the movable median strip and tidal flow traffic control. With the new 10 lane bridge in place the SH1 to the south of the AHB, over the AHB and to the north of the AHB will all be 10 lanes.

Would any houses need to be demolished in St Mary’s Bay or land taken in St Mary’s Bay for the Bridge Replacement Policy?
No. No houses or land would be needed, so none would be taken.

Would it be difficult to get resource consent for such a large project?
Not very. Whilst it is a big project, because we are replacing like with like there will be minimal adverse effects on the environment apart from effects during the construction phase. Careful planning will be needed for the construction, but the planning will be done right, and that will make it relatively straightforward to get resource consent.

Is there a plan to build a tunnel?
There is a plan - if the money can be found at the time. Central government and Council’s current position on the tunnel is: “Current investigation work into an additional Waitemata Harbour Crossing needs to be completed to provide more certainty about the optimal timing, modal mix, configuration and operation of the crossing. Consistent with earlier ATAP work construction is not anticipated to commence until at least the late 2030s.” The estimate of the cost of the tunnel is $4 billion plus. With the very high rate of major infrastructure construction inflation by the late 2030s the currently proposed tunnel may be unaffordable.

Would replacing the bridge rule out a future tunnel?
If future generations decide to build a tunnel, having a fit for purpose AHB from 2025 won’t hinder any such plan. With a fit for purpose AHB in place possibilities such as a rail tunnel between the eastern CBD and Devonport can be explored.
From: Charles Clifton <c.clifton@auckland.ac.nz>  Sent: Thursday, 15 August 2019  
To: Will McKenzie <willmckenzie@hotmail.com>; Enrique del Rey Castillo <e.delrey@auckland.ac.nz>  Subject: RE: AHB Superstructure Replacement

Dear Will and Enrique,

This is an ambitious plan which is feasible in my opinion but will be a significant challenge. The temporary piers will need to be very stiff so that when the new bridge is slid across to the existing piers the load is distributed evenly and does not cause significant bending from eccentric transfer of force while the transfer is being done. It also needs to be temporary so it can be removed completely once the bridge is completed. Use of long screw piles onto a very stiff pier head girder that is linked rigidly into the existing piers would be an option.

I would make the bridge superstructure entirely from steel to keep the weight down for the transfer. Carbon fibre will be too expensive and the issue of fatigue performance and long term effect of UV and environmental exposure are too unknown to make it a viable option.

The bridge decks will need to be relatively thick reinforced concrete slabs sitting on the steel beams to transfer the vehicle wheel loads into the supporting structure without high localised load concentrations giving local fatigue issues, which is a major maintenance problem with the current clip-ons.

As you know I have been providing input on this proposal since 2014 and am happy to provide further thoughts if requested. In summary it is an interesting and challenging option which would attract significant international engineering attention.

Dr G Charles Clifton  
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Harbour Bridge Replacement Q&A

Has NZTA seen the proposal?  
The Minister of Transport, Phil Twyford, was provided with an outline of the proposal in November 2017. At the Minister's suggestion NZTA staff were met with during 2018 and briefed on the proposal.

Who would build it?  
The contract will be tendered on the international market and is likely to attract great interest from experienced engineering and construction firms.
21 June 2020

Submission on the COVID-19 Recovery (Fast-track Consenting) Bill

SUBMITTER DETAILS
FULL NAME: William Dacre McKenzie
ADDRESS FOR SERVICE: Level 4, 2 Chancery Street, Auckland
CONTACT: Will McKenzie
EMAIL: will@willmckenzie.co.nz

1. My thanks the Environment Select Committee for the opportunity to make a submission on the COVID-19 Recovery (Fast-track Consenting) Bill (the Bill).

2. I have a Bachelor Commerce majoring in Operations Research and a Bachelor of Laws. I practice resource management law.

3. In my submission I suggest additions (underlining) and deletions ( strikethrough) to text. Suggestions are in bold.

4. Purpose
The purpose of this Act is to urgently promote employment growth to support New Zealand’s recovery from the economic and social impacts of New Zealand’s COVID-19 response and to support the certainty of ongoing investment across New Zealand, while continuing to promote the sustainable management of natural and physical resources.

5. There were over 1,500 confirmed Covid-19 cases in New Zealand and 22 Covid-19 deaths over a three month period in which approximately 8,000 New Zealanders died from all causes. Covid-19 had minimal direct impact in New Zealand, however New Zealand’s response to the threat of the novel coronavirus had significant adverse economic and social impacts which are clearly identifiable and measurable. For example, Retail New Zealand has stated that retail sales in New Zealand fell 4% in March and fell 80% in April.

6. The fast-tracking, under the provisions of the Bill, of projects identified as “urgently promot(ing) employment growth” and “support(ing) the certainty of ongoing investment” may help achieve the purpose of the Bill by assisting New Zealand society’s short term recovery from coming to a near halt for 7 ½ weeks. Longer term adaptation to a possibly somewhat changed national and/or international conditions as a result of the pandemic are, I presume, not the focus of the Bill.
7. Sections 16 to 27 of the Bill outline a comprehensive process for the “referral” of projects including criteria against which the Minister is to assess whether the proposed project “will help to achieve the purpose of this Act.” Section 18 (3). However the “listed projects” appear to not have to meet any criteria and there appears no requirement to undertake any assessment of the “listed projects” against the criteria in, and the purpose of, the Bill.

8. I suggest that provision be included in the Bill for the 16 “listed projects” to be assessed by the process in sections 16 to 27 and for the Minister to make a decision to “refer” each “listed project” under section 26, or not.

9. This would not unduly delay the process as the details of the projects are know and reports under sections 16 to 27 of the Bill will likely be available for the Minister’s consideration immediately after the Act receives Royal Assent, allowing the Minister to make timely decisions on referral of listed projects.

10. For the listed projects not to be assessed in this manner may undermine public confidence in the Act and diminish the achievement of the purpose of the Act.

11. An example of a project that may undermine public confidence if fast-tracked without the Minister’s referral is the one third of a billion dollar Northern Pathway project which is a highly controversial proposal that has been the subject of long running contentious litigation and is reported to require the compulsory acquisition of numerous privately owned properties.

12. The New Zealand Transport agency has determined that the Harbour Bridge clip-ons will likely have to be weight restricted from 2030\(^1\) and may not be able to accommodate general traffic after 2040. If that transpires the two clip-on structures would likely become two bus lanes and two generous shared paths which, with the proposed Northern Pathway. The result would amount three shared paths from Westhaven to Northcote but only four general traffic lanes which would likely have to be heavily tolled to exclude most private traffic to allow freight vehicles to operate. NZTA has proposed a tunnel to be completed some

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\(^1\) Ministerial Briefing from NZTA dated 13 September 2018 considers 3 scenarios: https://www.nzta.govt.nz/assets/projects/awhe/docs/BRI-12790-awhe-transport-modelling.pdf?bclid=twAR3PEohGgaXMN2vEswsS08CaYPKm4dipMNQY6J7aOFJeD5ywkmUHy3SBU
time in the 2040s however indications are that it would be rail only. An updated NZTA proposal for crossing the Waitemata is expected sometime in 2020.

13. In this context it does not appear in New Zealand’s interests to push a third of a billion dollar proposal through a fast-track process, when the project does not address the primary problem of the deterioration of the clip-ons, solely on the basis that the project is including on a “list”.

14. Other jurisdictions, notably in the United States, have dealt with the situation of a critical bridge having a deteriorating and/or inadequate bridge structure sitting on absolutely sound foundations that can easily accommodate the replacement of the obsolete bridge structure with a fit for purpose replacement bridge structure, usually of identical appearance.

15. An example is the Milton-Madison Bridge between Ohio and Kentucky that was built in 1929 as a 6.0 m wide bridge, just wide enough for 2 lanes, and the same length as the Auckland Harbour Bridge, around 1,000 metres. It was replaced in 2014 on the same foundations by a new 13.7 m wide bridge with two lanes, two cycle / stopping lanes and a footpath at a cost of US$103.7 million.

16. The method is scalable and the engineering advice is that it is practicable, with conventional engineering techniques, to replace the current 4 lane central bridge, and the two 2 lane clip-ons (total width 35 metres) with one, 10 lane, 35 metre wide, bridge with space for rail lines and shared paths and for the completed structure to be near identical in appearance to the original bridge, on a fixed price contract for less than NZ$2 billion, around six times the cost of the proposed Northern Pathway bridge. The replacement process would maintain traffic flow other than a 7 to 14 day shutdown over two Christmas New Year periods.

17. I suggest that the public be able to comment on all listed and referred projects alongside comment by the entities listed in cl 17(6) of Schedule 6, although that would not lead to rights for the public to be heard or to appeal.

18. I again thank the Environment Select Committee for the opportunity to submit on the Bill. I wish to be heard in relation to my submission.
Auckland Harbour Bridge clip-on lanes

Ministerial Briefing from NZTA dated 13 September 2018 considers 3 scenarios:
https://www.nzta.govt.nz/assets/projects/awhc/docs/BRI-1270-awhc-transport-modelling.pdf?fbclid=IwAR3PEoHGaXMNztvEsws508CaYPKm4dIpMlhQY6J7aOFJeD5ywwkmUHy3SBU

Background

4. Current investigation work into an additional Waitemata Harbour Crossing needs to be completed to provide more certainty about the optimal timing, modal mix, configuration and operation of the crossing. Consistent with earlier ATAP work construction is not anticipated to commence until at least the late 2030s.

Scenario 1: 2046 Do Minimum - No Road or Rapid Transit AWHC1 (Additional Waitemata Harbour Crossing)

The likely need for future heavy vehicle restrictions

32. Forecasts indicate that restrictions for heavy vehicles on the AHB (clip-ons) may be required by approximately 2030. Work done during ATAP by NZTA suggested restricting heavy vehicle weights on the AHB to less than 35 tonnes as one option. Additional work is needed to understand the on the best option to manage heavy vehicles and the economic impacts.

33. The estimated average cost of diverting a single weekday truck trip from the AHB to the Western Ring Route is approximately $40. In 2046, approximately 27,000 HCV cross harbour trips are forecast per day.

Limited additional capacity of the northern busway

30. As a result of increased travel demand and the forecast traffic congestion, demand for public transport is forecast to double in the AM and PM peak periods by 2046. For example, in the 2046 AM peak, cross harbour forecast public transport patronage is 22,000 person trips - double current patronage. This patronage will exceed the practical capacity of the bus system well before this date without improvements.

31. Auckland Transport’s North Shore Rapid Transit Programme Business Case (2017) predicts that growth of travel demand on the Northern Busway will put pressure on the AHB and city centre public transport (PT) infrastructure. It concludes that a higher capacity PT mode will be required by the mid-2030s.
Scenario 2: If the AWHC is built as a combined road/LRT crossing, and pricing is implemented what is the impact on network performance?

39. Pricing has a significant impact on reducing congestion across the network. However, a road AWHC is forecast continue to experience congestion southbound - down from highly congested in the no pricing scenario. Severe congestion would continue to be experienced on the northern approach to the AWHC between Northcote Road and Constellation Drive.

Scenario 3: If the AWHC is LRT only crossing, and pricing is implemented what impact is there on road network performance?

44. The highest number of PT trips is achieved through a LRT (includes tram-train) only option with pricing and no road crossing. The highest number of car users would be achieved through a combined road and LRT crossing and no road pricing."

In summary

if nothing is done, some time around 2030 trucks on the clip-ons will be restricted to 35 tonnes. That would strangle upper North Island road freight services. There are currently 11,000 heavy vehicles using the bridge every day, predicted to increase to 27,000 heavy vehicles.

if a road / rail tunnel is built and road pricing introduced there would still be severe congestion

if a new rail crossing is built, pricing introduced and no additional peak road capacity is built, the highest PT use would result.
If the bridge is not replaced by 2030 road freight in the upper North Island will be strangled from round 2030, and, public transport capacity across the bridge will also be strangled from round 2030. The proposed tunnel would not be completed till round the mid to late 2040’s.

If the bridge is replaced, all heavy vehicles possible, including those of the heaviest weights possible, will be able to drive on any of five lanes each way for the foreseeable future, and, rail to the North Shore will accommodate all public transport users possible for the foreseeable future.

NZTA’s claim from 2007 that a traffic jam of fully laden trucks becoming stationary over the central span causing catastrophic failure is a once in a 2000 year event is of enormous concern.

It means that there was a 1 in 2000 chance every year that one of the central spans of the a clip-ons would collapse and fall into the Waitemata harbour if enough fully laden trucks had come to a halt on a central span. Traffic comes to a halt on the bridge many times a week. 10 to 15 trucks taking on a full load at the Auckland port, then heading north at say 5:30am when there was little car traffic heading north, driving on the clip-ons rather than the single lane over the central arch, and coming to a halt on the western AHB clip-on due to an accident, does not seem that unlikely.

Even if was 1 in 2000 chance every year, over the 40 years from 1969 to 2009 that is a 1 in 50 chance of catastrophic collapse.

The 2009-2011, $100 million box girder strengthening project may have eliminated the chance of such catastrophic failure for the time being, but only for the time being. A solution is needed by 2030 at the latest.
Harbour Bridge risking serious failure

3 Jan, 2009 10:58pm
4 minutes to read

A BCEA report identified the areas of most notable deficiency. Photo / Herald on Sunday graphic

Herald on Sunday
By: Jared Savage, Jared Savage

KEY POINTS:

Wear and tear on Auckland Harbour Bridge is now so bad that trucks may have to be banned on the clip-ons for good, even after a $45 million upgrade that was supposed to make the link safe for the next 30 years.

Official reports suggest that if trucks are allowed back on the clip-ons - which an earlier report said were at risk of "catastrophic failure" - those lanes might only last 10 more years.

Trucks were banned from crossing the outer lanes in 2007 and urgent repair work ordered after engineering reports revealed the risk of damage from heavy traffic could "no longer be accepted".

Transit said the work would meet current standards to carry peak traffic loads, as well as meet extra demand generated by the Rugby World Cup 2011. But new engineering reports show the transport lifeline for New Zealand could not cope with unrestricted numbers of heavy trucks or a dedicated cycleway.

Even once the $45m upgrade is completed next year, the New Zealand Transport Agency says the steel box-girders that support the outer lanes could need to be replaced - an action that would cause an "unacceptable" impact on the Auckland economy.
The news accelerates the impetus for construction to begin on a third harbour crossing - underground tunnels costing up to $4 billion - as well as other major roading projects.

Transport Minister Steven Joyce is expected to announce that several infrastructure projects will start sooner than planned - which may include the Waterview connection to complete the western motorway to bypass Auckland.

The lifespan of the Auckland Harbour Bridge was calculated by NZTA engineers exploring the possibility of adding a cycleway to the clip-on lanes.

Last month, the NZTA (a merger of Transit and Land Transport New Zealand) told Auckland politicians and cycle campaigners that the extra weight made the proposed cycleway impossible.

A presentation to the meeting showed that if the ban on trucks was lifted, the clip-on lanes would last only 10 to 20 years.

With unrestricted traffic and the added weight of a cycleway, the safe load capacity would be immediately breached and the lanes would be unsafe to use.

Christine Rose, chair of the Auckland Regional Council transport committee, said Transit officials had earlier assured her in writing that adding a cycleway was possible, even with unrestricted traffic.

The about-turn raised the possibility that the clip-ons were in worse shape than first thought. "We had never heard of this before," she said. "Transit told us the strengthening work would future-proof the bridge for walking and cycling and prolong the life of the bridge.

"All of a sudden, to be told by NZTA officials that: 'Oh no, we can't accommodate walking and cycling, the bridge is structurally worse off than we thought'. It was a bolt out of the blue."

If the traffic restrictions stay in place, the bridge clip-ons would be safe to use for between 25 to 40 years - as long as no cycleway is built.

Wayne McDonald, NZTA Auckland regional director, said that with "prudent and careful" management the clip-ons would last at least 30 years.

(NZTA confirms that it expects the clip-ons to provide service indefinitely, but not what level of service. In 2013, after the strengthening project, NZTA said that it expected weight restrictions to be implemented on the clip-ons in the early 2030s. The current weight restriction on the clip-ons is 50 tonnes. Trucks heavier than that must use the central lanes. Trucks heavier than 50 tonnes are not common, but trucks up the 62 tonnes are allowed for regular service on particular routes under NZTA's High Productivity Motor Vehicle (HPMV) programe. More restrictive weight restrictions on the clip-ons would strangle the upper North Island freight supply chain. The only responsible thing to do is start planning replacing the clip-ons asap by replacing the whole bridge.)

The extension bridges were a sister design to Westgate Bridge in Melbourne, built at the same time in 1969, but which collapsed during construction.

(The Westgate Bridge collapsed into the Yarra River mudflats in October 1970 killing 35 men who were taking a break in the smoke room which was underneath the bridge. In some ways the the dust from the West Gate Bridge disaster hasn't fully settled now. The world is full of shocking tragedies,
but having 2000 tons of a major bridge, being built for people to drive across every day, fall 200 feet from the sky to land on 35 people, well you couldn’t exaggerate the shock. The 1971 Royal Commission found that one of the two causes of the disaster was the design of the steel box girder bridge by Fox & Partners, the same design used for the clip-ons)

"That was a warning that our designers had not got safety margins high enough. So that meant a lot of care and attention to the clip-ons here," McDonald said. "Safety for us is totally paramount."

McDonald said the clip-on lanes were not designed to carry a growing number of heavy trucks, one of which causes as much damage to the structure as 10,000 cars.

(The original bridge was designed in the 1950’s to carry, and could carry, thousands of the heaviest tank ever made lined up nose to tail on all four central lanes. The clip-ons were not even designed in the 1960’s to carry heavy trucks!)

"It’s like a piece of No 8 fencing wire. If you bend a piece of wire a number of times, eventually it will snap. We’re never going to let that happen."

(Best not to given anyone the chance of letting that happen.)

Before the $45m upgrade is completed next year, McDonald said a decision would be made whether to allow trucks back on the clip-ons.
Auckland Harbour Bridge


"The main steel box girder span of each clip-on of 800 feet was only 9 ¼ feet deep in the middle.

The consultants (Freeman Fox) had used 9 ½ feet ...... right outside any codes of practice or design rules available. I even phoned up some of my old colleagues at the California Bridge Department, who were as concerned as I at such a slender structure. ... I went back to find out why the consultants had used 9 ½ feet. The answer turned out to be simple. 9 ½ feet was the gap between the bridge deck level planned by the National Roads Board and the clearance of 143 feet required by the Auckland Harbour Board."

"Since all the Port facilities are down harbour from the bridge crossing this seemed to me to be a bit unrealistic. So we squeezed 4 feet out of the Harbour Board and the consultants redesigned the bridge with a 13 ½ foot deep centre span. (42% deeper!)"

In 1970 two similar steel box girder bridges designed by Freeman Fox collapsed, the second being the disaster at the Westgate Bridge in Melbourne where 35 men lost their lives.

"In 1971 (approx) a partner in Freeman Fox traveled to Auckland from Melbourne to inspect the clip ons. "Yes, there it is" he said, 'just as I predicted'. The 9.7m high stiffening member was buckled 61 mm out of line. The bridge was quietly and successfully strengthened."

"What would have happened if the Works Department had simply accepted without question a design produced by one of the world’s top consulting firms? At the worst would a row of ARA busses filled with the bones of passengers now be rusting on the bottom of the Waitemata Harbour?"

Evolving Auckland, Mike Lancaster, Chapter 7, p 52.

Some 15 years after the clip ons were finished (circa 1985) some fillet welds were found to be cracked. Heavy traffic was confined to the centre bridge while repairs were made and the whole process took about a year, as several thousand welds were needed.

Waitemata Harbour Crossing Study Phase 1 - Option Short List Report Transit NZ 2007, p8. "ability to cope with change, e.g. removal and replacement of the AHB clip on lanes, is important"

NZTA 2013 – ‘The lifespan of the clip-ons is expected to be indefinite, however heavy traffic on them will be excluded from around 2020.'
AHB Box Girder Strengthening Project – TBS Group

Location: Auckland
Client: NZTA
Duration: 3 years
Completion: September 2011
Value: $85 million ($100 m plus in 2019 dollars)

The Project

In order to meet future traffic demands on the AHB, it was determined that the load carrying capacity of the Box Girder Extension Bridges (‘clipons’) had to be increased. This upgrade came in the form of the Box Girder Strengthening Project.

The scope and scale of the strengthening works was unprecedented for this type of bridge. Approximately 600,000 man hours were expended over the duration of the project and nine hundred tonnes of new steel components were distributed along the full length of the bridge. This included:

- 2,300m of deck stiffeners closely fitted to the steel deck during night time traffic closures.
- 14,000m of new and strengthened web stiffeners.
- 190 tonnes of bottom flange stiffeners.
- 300 cantilever cross girders strengthened outside the box girders.
- Internal strengthening of 12 pier brackets

The project brought many associated challenges, including difficult access and logistics, work at height, confined spaces, ventilation issues, the delivery of approximately 10,000 individual components (each weighing up to 500kg), strict road closure conditions and extremely tight design fit-up tolerances of less than 1mm for the components welded in high fatigue areas.

The successful outcome of the project required innovative design work and construction methods, combined with a collaborative approach from not only project team members but also local residents, stakeholders and the road user.
Auckland Harbour Bridge strengthened against risk of 'catastrophic failure'

Author Bernard Orsman, NZ Herald, Thursday, 16 August 2018, 11:13AM

The Auckland Harbour Bridge and other major bridges undergo a general inspection every two years and more detailed inspections every six years, says the New Zealand Transport Agency.

Responding to the deadly bridge collapse in the Italian port city of Genoa, the agency said some bridges have even more rigorous inspection programmes designed to identify changes to their condition.

While the cause of the Morandi bridge collapse in Genoa yesterday that killed at least 39 people is not yet known, there has been widespread debate over the state of the bridge and Italy's infrastructure in general in recent years.

It comes amid growing fury over the collapse, after it was revealed there were numerous ominous warnings over problems with the structure.

The highway bridge, in the northern Italian city, crashed to the ground without warning on Tuesday, with almost 40 cars and trucks falling 45 metres with it.

An NZTA spokesman said given the strategic importance and iconic contribution to Auckland's skyline, the Auckland Harbour Bridge has a team of engineering specialists that undertake a wide range of activities to ensure the safe and reliable operation of the bridge.

"These activities are regularly tested and challenged to ensure they are consistent with international best practice for significant bridges and appropriate for the safeguarding of the Auckland Harbour Bridge," the spokesman said.

After engineers warned in 2007 of a potential for "catastrophic failure" in a worst-case scenario, 920 tonnes of extra steel was bolted and welded onto the clip-ons to extend the life of the bridge.

At the time, restrictions were placed on heavy vehicles using the clip-ons to reduce vibration and help keep the bridge stable during welding of steel inside the box girders.

Today, the clip-on lanes are open to 50-tonne maximum permitted heavy vehicles and heavier vehicles can only use the truss bridge.

In 1996, the agency began a seismic screening programme to identify existing bridges that may sustain damage in an earthquake. Following this, strategic bridges, such as Wellington’s Thorndon Overbridge and Auckland’s Harbour Bridge, were upgraded.

The agency said it had completed the upgrading of bridges on high-importance routes needing minor upgrades and is completing the remaining upgrade of low-risk work on an annual basis.

It is progressing with detailed assessments and upgrade works for the highest-priority bridges that require significant upgrading.
Friday 17 August 2018 NZ Herald Letters

Seeing sag in Harbour Bridge Arch
For many years after the clip-on extensions were added to the Auckland Harbour Bridge I noticed the western extension was considerably higher at the top of the ridge than the main span (original bridge). As I travelled across the bridge to work each day I used to look at it and wonder how the design engineers could get it so wrong. Now, the same section is considerably lower than the main span at the same point so my question is, what has happened?

Arches don’t normally drop at the top unless something as moved or is it because so much steel has been added that it is now sagging due to the extra weight? I now us the main span at all times when possible.

Ian Langley, Albany.

Clip-ons not sagging
The “sagging” of the Auckland Harbour Bridge “clip-ons” or extension bridges that one of your readers has commented on follows the strengthening project 2008-2011. About 900 tonnes of steel were bolted and welded on to the extension bridges to increase their load-carrying capacity. The added weight of the strengthening steel cause the deflection (or “sagging”) of the extension bridge structures which was expected and designed for.

No additional load was applied to the central truss bridge which remained at the same level, which is why there’s a visible difference in levels between the two separate structures.

The extra steel improves the structural capacity of the extension bridges to carry increasing traffic loading and they are expected to remain in service indefinitely.

Wayne Oldfield, Senior System Manager,
NZ Transport Agency

The amount of steel added to the clip-ons in 2008-2011, 900 kgs, amounts to 10.6% of the 8,500 tonnes of steel used to build clip-ons.

Despite the headline that the Herald put above the letter from NZTA, NZTA confirms twice in its letter that the clip-ons are sagging.

NZTA confirms that it expects the clip-ons to provide service indefinitely, but not what level of service. In 2013, after the strengthening project, NZTA said that it expected weight restrictions to be implemented on the clip-ons in the early 2030s. The current weight restriction on the clip-ons is 50 tonnes. Trucks heavier than that must use the central lanes. Trucks heavier than 50 tonnes are not common, but trucks up the 62 tonnes are allowed for regular service on particular routes under NZTA’s High Productivity Motor Vehicle (HPMV) programe. More restrictive weight restrictions on the clip-ons would strangle the upper North Island freight supply chain. A responsible, consentable, affordable, buildable quickly enough course of action is start planning replacing the clip-ons asap by replacing the whole bridge. Alternatives are not apparent.
'Catastrophic failure' warning on Harbour Bridge  14 Oct, 2007 8:01am  By: Jared Savage

Auckland Harbour Bridge has been at risk of "catastrophic failure", says an official report that undermines earlier assurances that the bridge's wear and tear poses no major safety problems.

Herald on Sunday inquiries have uncovered an official engineer's report, written less than a year ago, which says the risk of damage from heavy traffic loads on parts of the bridge can "no longer be accepted".

On one particular part of the bridge, and under certain circumstances - such as a traffic jam of fully laden trucks - "there would be a risk of catastrophic failure of the deck", says the Beca Infrastructure report, commissioned by roading authority Transit New Zealand.

Last week, Transit announced it was spending $45 million to urgently strengthen the bridge's clip-ons.

Transit made the announcement a day before having to release the engineering reports to the Herald on Sunday, under the Official Information Act. The authority did not mention the reports in its public statements - instead, it has repeatedly assured the public and city leaders that there were no major safety issues.

The papers reveal Transit officials had underestimated the traffic load on the clip-ons, which failed to meet standards by a "large margin" when tested last year.

"If the level of load in this assessment representing a traffic jam situation with maximum heavy vehicle concentrations at the centre of span two (between piers one and two) in both lanes were to occur, there would be a risk of catastrophic failure of the deck," the Beca report says.

To prevent further damage, engineers recommended immediate measures to reduce the number and weight of heavy vehicles on the bridge, including live video monitoring to stop long queues and banning trucks from clip-ons and shoulders.

Last July, Transit banned trucks weighing 13 tonnes or more from the outer clip-on lanes to reduce metal fatigue.

But Transit reassured motorists that the harbour crossing was safe.

"The 165,000-vehicle-per-day lifeline that is the Auckland Harbour Bridge is going to be around forever and will continue to provide service to Auckland and the rest of the country," said chief executive Rick van Barneveld.

More than 142,000 bolts, 313 tonnes of steel and 6.8km of welding will be used to fast-track work on the clip-on extensions in the next two-and-a-half years. This is half the original time scheduled. The work involves strengthening the hollow box girders directly under the traffic lanes.

The second task is to stiffen and strengthen the attachments of large steel angle brackets under the clip-ons to five of the seven concrete piers supporting the bridge across the Waitemata Harbour.
Joseph Flanagan, Transit northern operation manager, said a "catastrophic failure" was a worst-case scenario and a once-in-every-2000 years event.

In effect, "catastrophic failure" would only happen if there was a traffic jam on the bridge with fully laden trucks, Flanagan said.

He assured motorists that this "just wouldn't happen" because trucks were (now) banned from the clip-ons and live cameras meant Transit could divert traffic.

If those systems failed, Flanagan said, the new strengthening work could handle the load.

Van Barneveld denied Transit had downplayed the reports and said that Transit was vigilant in keeping the bridge safe. All of the recommendations in the reports were being implemented.

Asked when Transit planned to tell the public of the urgent upgrade, van Barneveld said there was "absolutely no alarm" as banning trucks and the 24/7 surveillance made the bridge "perfectly safe".

However, the Beca engineering report released to the Herald on Sunday found that Transit NZ had underestimated the numbers of heavy trucks on the clip-on bridges which would make them less safe - and put the clip-ons at risk of further damage.

Van Barneveld was adamant that the structure was not in worse repair than first thought.

He said Transit regarded it as good practice to complete the upgrade earlier, given that consultants had identified the need to strengthen the clip-ons because of the increased traffic load.

Van Barneveld said it was critical to stress that the bridge was safe, and the upgrade was planned preventive maintenance work similar to that carried out a number of times since the clip-ons were opened in 1969.

Additions of extra steel to the clip-ons made over the years meant they were stronger than when first opened.

More than $3 million is spent every year on bridge maintenance, including annual and three and six-monthly inspections of some parts. The most recent inspection, last January, said the overall condition of the box girder extensions was good, "with the exception of the known defects".

At a glance

* A 2006 Beca engineering report said if there was a traffic jam of trucks in both lanes at the centre of span 2 on the clip-ons, there would be "a risk of catastrophic failure of the deck".

* Last week Transit announced it would fast-track a $45 million upgrade of the bridge, $37m more than was budgeted two years ago.

* In July 2007 Transit banned trucks weighing 13 tonnes or more from the outside lanes of the clip-ons, saying it was to make the bridge last longer.