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PARLIAMENT OF TASMANIA

PARLIAMENTARY STANDING COMMITTEE ON PUBLIC WORKS

SORELL CAUSEWAY BRIDGE REPLACEMENT AND ASSOCIATED WORKS

Presented to His Excellency the Governor pursuant to the provisions of the Public Works Committee Act 1914

MEMBERS OF THE COMMITTEE

LEGISLATIVE COUNCIL	HOUSE OF ASSEMBLY
Mr *Wing* (Chairman)	Mr *Green*
Mr *Harriss*	Mr *Hidding*
	Mr *Kons*

By Authority: Government Printer, Tasmania

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To His Excellency the Honourable Sir Guy Stephen Montague Green, Companion of the Order of Australia, Knight Commander of the Most Excellent Order of the British Empire, Governor in and over the State of Tasmania and its Dependencies in the Commonwealth of Australia.

MAY IT PLEASE YOUR EXCELLENCY

The Committee has investigated the following proposal:-

SORELL CAUSEWAY BRIDGE REPLACEMENT AND ASSOCIATED WORKS

and now has the honour to present the Report to Your Excellency in accordance with the *Public Works Committee Act 1914*.

INTRODUCTION

This reference sought the approval of the Parliamentary Standing Committee on Public Works to replace the Sorell Causeway Bridge.

BACKGROUND

The Sorell Causeway is a critical element in Tasmania's Strategic Road Network. By providing a link between Pittwater Bluff and Midway Point it forms a gateway from Hobart to the East Coast of Tasmania and the Tasman Peninsula.

The Causeway Bridge is located at the eastern end of the causeway between Pittwater Bluff and Midway Point. The 457m long structure spans an opening that allows tidal movement to a large area of water to the north of the causeway including Pittwater and Barilla Bay. In this area there are both commercial and environmental interests reliant on tidal movements.

Defects affecting the structure's load carrying capacity were first noted in the late 1980s with the number of recorded defects increasing dramatically in recent times. Several studies were undertaken on this subject in the 1990s which ultimately led to the decision by the Department of Infrastructure, Energy and Resource (DIER) to recommend that the bridge be replaced in the shortest possible time frame due to the advanced nature of the recorded defects.

PROPOSAL

A Value Management Study (VMS) was held in order to seek input to the decision making process from key stakeholder representatives. During the VMS and subsequent assessment of outcomes, the following matters were determined to be desired project requirements:

- The existing bridge is to be replaced and demolished;
- A pathway will be provided for the full extent of the project from the western end of the causeway to the Midway Point roundabout;
- The replacement bridge will maintain the existing waterway aperture;
- There is to be minimum disruption to traffic during construction;
- The existing bridge will remain safe for use during the construction period.

The assessment of project options was developed in terms of an increasingly focussed hierarchy of issues:

Planning

The traffic volumes and growth rate on the Tasman Highway are sufficient to expect that there will be pressure for duplication within the next twenty years. The design of the current proposed work should therefore be developed to allow for duplication.

The new bridge will be located close to the existing alignment. At Midway Point it is envisaged that the existing roundabout would be maintained, although a larger central island will be required to match the wider approaches on the Tasman Highway. At the western end, between Holyman Avenue and the causeway, it is anticipated most of the highway would be reconstructed to address current deficiencies.

Route Location

The proposal to locate the new bridge at the exact location as the existing bridge was discounted. The high cost of providing a temporary structure during the construction period is prohibitive.

A weighted comparison assessment was carried out for locating the bridge to either the north or south side of the existing bridge. Locating the bridge on the southern side of the existing bridge was preferred, primarily for the following reasons:

- It is approximately $\$1^{3}/_{4}$ million dollars cheaper;
- The beach at Midway Point is retained;
- No land acquisition is required;
- Pathway facilities are better suited to the location on the southern side of the bridge.

Southern Route Alignment

At Midway Point the horizontal alignment from Penna Road follows the existing road before tapering onto a new embankment to the south. Adoption of a design speed of 80 km/hour is consistent with the speed environment of the causeway and has little cost impact.

The new bridge will be straight, run parallel with the existing bridge and will be constructed at a grade to allow drainage back to the western end and provide a navigation clearance of 4 metres.

On the causeway the carriageway will extend westward approximately 500 metres to tie into the existing carriageway. Along the whole length of the carriageway, the roadway will be widened to suit the adopted road and pathway design standards.

Road Width

The road is classified as Category 2 under the Department's Draft Road Hierarchy and the target lane width is therefore 3.5 metres. Given the relatively high cost of providing additional width to the bridge and causeway, it is considered that the adoption of 1 metre wide shoulders is appropriate. This will provide an overall width of 9 metres between the road safety barriers (2 x 1 m shoulders and 2 x 3.5 lanes).

Foot and bike pathway

A single shared bicycle and pedestrian pathway will run between the Midway Point roundabout and the western end of the causeway. The pathway will be located to the southern side of the carriageway for the full length. It will be 2.5 metres wide.

Emergency Services

Bridge navigation clearance will be increased to 4 metres height, an increase of 2.5 metres, which will allow access under the bridge by emergency services vessels.

The concept design has the following key elements:

i) *Beams*

The bridge has 18 x 25.5m spans using pretensioned Super-T beams. The beams are simply supported for both dead and live load, using individual elastomeric bearings at all piers and abutments, but the deck slab is continuous except for expansion joints over Piers 2, 6, 10 and 14. The deck slab continuity means that longitudinal braking forces can be more efficiently shared between piers.

ii) *Piers*
The foundation conditions dictate piled piers. Two alternative basic forms for the piers can be considered:

a. Combined crosshead and pile cap at beam seating level. This is the arrangement used on the existing bridge and is aesthetically undesirable;
b. Pile cap near water level with a reinforced concrete wall, or columns, above supporting a separate crosshead.

On the balance of a number of considerations, the lower level pile cap scheme (b) has been adopted for the concept design and it has been included as a Principal's Project Requirement that piles cannot be exposed above mean low water level.

The pier is supported on 400 mm square precast prestressed concrete piles assumed founded in the dense sands or on hard clay. The prestressing has been provided to control cracking.

Corrosion protection
In addition to providing 50 mm minimum concrete cover to reinforcement in the piles, beams and deck, and 70 mm in the piers and abutments, it is proposed to incorporate a corrosion inhibitor admixture in all concrete.

Road alignments
The extent of the concept design for the roadworks is from the western end of the reverse horizontal curves west of the new bridge to immediately west of the Penna Roundabout in Midway Point. This allows for new road works to tie into the existing road alignment and widths.

Design speeds
The design speed of the western causeway and the bridge is 100 km/hr. The design speed from the eastern end of the bridge to the Penna Road roundabout at Midway Point is 80 km/hr.

Pathway
A pedestrian fence has been provided on the southern side of the pathway from the western end of the causeway to the access to the 'bed and breakfast' accommodation west of Penna Road in Midway Point. A pedestrian fence has been provided on the northern side of the pathway where it is adjacent to non-rigid safety barriers to keep the zone of dynamic deflection clear.

An unsealed pathway for pedestrians has been provided on the northern side of the highway between the beach at Midway Point and Penna Road Roundabout. This pathway is expected to have low usage and a pedestrian fence has not been provided between the pathway and the road. A pathway width of 1.5 m can be provided without any additional earthworks with exception of a 20 m length where a retaining wall with a maximum height of 800 mm has been provided to maintain a width of 1.5 m.

An asphalt pathway from the pathway on the southern side of the highway has been provided under the eastern bridge abutment to connect to the access road to the beach at Midway Point. The pathway width is 1.5m with a pedestrian fence on the outside of the pathway.

Safety barriers
The existing tensioned wire rope safety fence (TWRSF) on the western end of the causeway may remain in the existing position where the road is not being realigned.

In the area of road realignment west of the new bridge the safety fence needs to be replaced as the TWRSF is not suitable due to the dynamic deflection restraints. The TWRSF on both sides of the highway has been replaced with steel beam guard fence, which allows the embankment width to be reduced.

Public boat launching area
Access to the beach area on the northern side of the road at Midway Point for public boat launching is maintained for vehicles turning left or right into the access. Vehicles turning right into the access have a dedicated right turn lane (Type C right turn facility in accordance with Austroad guidelines).

Emergency boat ramp
A boat ramp for emergency services use only is provided off the end of the western causeway, at the existing western bridge abutment. Access to this is from the new road via a removable panel in the steel beam guardfence. The access provides for turning so that emergency vehicles can back a trailer with boat onto the boat ramp.

Wave protection
The concept design allows for placing armour rock on the southern face of the causeway embankment to prevent erosion from wave action. The armour rock will need to cover the face of the embankment from the toe to approximately RL 2.0 m to include the splash zone.

Future widening and duplication
The concept design includes widening of the causeway between Pittwater and the start or the road realignment west of the new bridge. This allows for the construction of the new pathway and provides a 2.5 m clear zone to allow for dynamic deflection of the existing tensioned wire rope safety fence. It also enables the existing road and safety barriers to be remain unaltered.

The additional widening of the causeway allows for future widening of the road on the southern side to provide 3.5 m lanes and 1.0 m shoulders.

The concept design allows for the future duplication of the highway with the east bound carriage way on the alignment of the existing highway. The causeway can be widened to the south to construct the west bound carriageway and to relocate the pathway. The new bridge would then be on the west bound carriageway with an additional bridge for the east bound carriageway on the alignment of the existing bridge.

The duplication of the highway would require the construction of retaining walls on the northern side of the highway at Midway Point. This would be required to avoid property acquisition.

As a part of the duplication the reverse curves to the west of the new bridge would be removed to provide an almost straight alignment.

COSTING

The total cost of the project referred to the Committee is $15.3 million comprising:

Item	$Million
Bridge	9.4
Road	2.1
Bridge Removal	3.3
Detailed Design & Services	0.5
D&C Contract Sum	**$15.3M**

EVIDENCE

The Committee commenced its inquiry on Friday, 8 December. The submission of the Department of Infrastructure, Energy and Resources was received and taken into evidence. The Committee inspected the site of the proposed works, following which, the Committee commenced hearing evidence. The following witnesses appeared, made the Statutory Declaration and were examined by the Committee in public:

- Rodney McGee - Asset Strategy Manager, Department of Infrastructure, Energy and Resources
- Graeme Nichols - Project Manager, Department of Infrastructure, Energy and Resources
- Philip Millin - Environmental Consultant

Background

The Asset Strategy Manager, Department of Infrastructure, Energy and Resources, Mr Rodney McGee provided the Committee with the background of the proposed replacement of the Sorell Causeway Bridge:-

"Back in 1978 there was some corrosion identified in the bridge and there was some early work done on repairs. ... The corrosion progressed and in the mid-1990s there was some work done in looking at options for addressing that sort of corrosion and seeing whether we could actually stop the corrosion and avoid replacement of the bridge. There are about eight or nine systems in place now that use this cathodic protection which is a small electric current to stop the corrosion. We extended a contract that was doing some work on the extreme western end of the Tasman Bridge as a trial for the Sorell Causeway and we found we could really stop the corrosion on the piers and the substructure part of it but the superstructure of the beams are really quite complex and difficult to address, both from the large numbers of beams but also the way they are actually made.

At a similar time, we started to see some longitudinal cracks in the beams ... we did some investigations and identified that that pre-stressing wire itself was corroding. We looked at some options but they really were not viable to address that corrosion ... it was not possible to come up with a solution for the corrosion that was occurring in the concrete beams.

We also undertook some load testing. In the last few years there have been increases in the permissible masses for heavy vehicles, so as of August last year trucks on certain routes ... semitrailers able to travel 45.5 tonnes gross now, its general ... is 42.5 tonnes. So we looked at the load capacity; there was also an issue about access for fishers and the width of the bridge - which is rather narrow in terms of contemporary standards - and we started to think about replacing the bridge itself.

As we continued to monitor the bridge more frequently than we had in the past, we saw the number of these corrosion problems were actually increasing fairly rapidly. It went from one of these cracks in one beam to three cracks and it became quite clear that we were getting to the stage where, if the replacement was delayed too much longer, there was going to be a major structural safety issue."

Alternative Routes

Mr McGee gave the following evidence as to the consideration given to alternative routes:-

> *"We looked at some alternative routes. The first option was the existing route essentially; the second one was taking the old Bellerive to Sorell railway route, which goes across just north of the old Llanherne aerodrome, uses the existing causeway and goes through the Penna area. That was substantially higher both in terms of capital cost and also in the additional costs for people using the route. There would also be major implications for the people who have actually bought and developed houses in that sort of area on the basis, I guess, of it being essentially rural residential. The other two routes that were looked at were really variations going through Richmond, one across the Richmond Bridge or perhaps even sort of building a ford north of it and across Brinktop Road, and the other is the classified road through Fingerpost Road. And again the costs both in terms of sort of upgrading for that route and the higher cost to users meant that it came down to the determination that the bridge needed to be replaced, it needed to be replaced in the near future, and that the most appropriate option was essentially in the same location as the existing structure. Because of the size of the project there was a second opinion sought from Professor Rob Melcher of Newcastle University, who has done a lot of work in risk associated with engineering structures, not bridges but also work in things like the offshore and chemical industries. His report really confirmed the general direction we were heading, conferring that the bridge itself needed to be replaced."*

Environmental assessment and planning process

Mr Philip Millin the Environmental Consultant for the project gave the following evidence in relation to the key environmental issues that were addressed during the assessment phase of the project:

> *"Upfront I'd like to just make a comment about the community involvement. This has been an integral part of the development of the concept and designs and through the environmental assessment process which is required under the State legislation and has been extended beyond those requirements. These included invitations for public comment at various phases of the project, the value management study that Mr Nichols referred to, direct consultations with special interest groups and meeting with the councils. There is also an additional involvement which commenced today, which is another period of display which is required under the Commonwealth legislation that I will refer to later.*

The planning and approvals process of the bridge and road works is located within the Sorell Council Planning Scheme of 1993, the lands are zoned rural and as such road works is a miscellaneous use. The project was determined through council and the Director of Environmental Management that it would be assessed as a level 1 activity - in other words, would be assessed by Sorell Council with some input from the State Government through the Director of Environmental Management in the Department of Primary Industries, Water and Environment.

We have a written statement from the Director of Environmental Management that he did not intend calling the project in for assessment by the board of Environmental Management and Pollution Control as he was satisfied that the assessment process by council would be adequate, given the level of community consultation and environmental investigation that were carried out for the project. An application was lodged with Sorell Council in the week of 9 October for advertising by council between 16-27 October which provided for any public representations to be made - and I understand that no such representations were made to council.

Being located within areas that involve matters of national environmental significance, the project was required to be referred to the Commonwealth Department of Environmental Heritage, known as Environment Australia. We made a referral under the Environmental Protection and Biodiversity Conservation Act which came into force on 17 July and, because we were involving national interests, we had to refer the project to the Commonwealth for their consideration. The Federal Minister for Environment Heritage declared the project a matter of national environmental significance and decided that Environment Australia would carry out an assessment on the project.

By mutual agreement with Sorell Council the statutory approval period was extended by 21 days so that they could take into consideration any issues or matters that the Commonwealth Government would raise before making their decision. We were advised last week of public display requirements by the Commonwealth and that period started today for a period of ten days which allows for further public representation to be made under the Commonwealth environment act. It is expected that a decision by Sorell Council will be made by 19 December - and, given the statutory period required under the Commonwealth act, it is expected that the Commonwealth decision would be made the end of January or early February.

I'd like now to move onto some of the environmental issues that were addressed during the assessment phase of the project. On a local level I will deal with the construction issues during the construction period. Obviously there is going to be disruption to the community. It is located close to residential areas and Midway Point, as we noted on the field trip, and some of the issues related to that would be noise, for example, during pile driving and the operation of heavy machinery, dust during periods, access to the highway during construction and just aesthetics, the general condition of a typical construction project when the area is disturbed. All of these issues have been addressed in a development proposal environmental management plan, which will be further developed by the successful design and construct contractor.

On the natural environmental side, the project is located in a significant area, being the Ramsar site - Ramsar was a convention signed by various countries and Australia is a signatory to that convention which looks at the protection of listed wetlands around the world. Australia is also a signatory to two international migratory bird species agreements known as Jamba and Camba, with the Japanese Government and Chinese Government respectively. Those agreements deal specifically with migratory bird species. I draw attention to those two matters, the Ramsar convention and the migratory bird species, as they were the critical issues that the Federal Government considered in assessing the project and will be considering further during their assessment of the project.

Localised environmental issues would be: being in marine environment, there are a number of values in and around the causeway, notably seagrass beds nearby. There is a threatened seastar species which inhabits either side of the causeway but more commonly on the north side. The general area of Pittwater is a protected shark nursery for school sharks, and there are whitebait fish species that migrate from lower to upper Pittwater where they breed at the mouth of the Coal River. There are a variety of other values which are dependent on high water quality and good tidal interchange between the lower and upper Pittwater. Vegetation: there is some remnant native vegetation, although fairly well infested with weeds. Replanting on the embankments will involve native vegetation of the types that are there presently. Fauna: there are no specific issues relating to fauna except for an Eastern Barred Bandicoot which is known to use the adjacent areas. The other fauna of importance, of course, are the migratory birds species which were noted and brought up by the Commonwealth Government. The causeway itself is not a particularly important area for those species, and we therefore will not have a significant impact on those bird species.

There are some historic and heritage values, again which will not be affected by the proposed works. There are listed Aboriginal sites at either end of the causeway, but that will also be outside of the construction works areas. Generally most of the critical environmental values are related to the north side of the causeway which will not be affected by the proposed work, and which added weight to the choice of the southern alignment, the alignment on the south side of the existing causeway.

One of the important things is to convey all the environmental values and protection of those values to the contractors. Those have been written into specifications and the tender documentation, with a requirement by the contractor to further develop their detail during their design and to prepare a construction environmental management plan that needs to meet the standards of the department.

I will move on to the impacts relating to the operation of the highway. The alignment is roughly 10 to 20 metres further from residential properties on the north side of the cutting; however, it will be elevated by about 2 metres with respect to the existing pavement. A noise study was done to try to determine what sort of impacts the new alignment would have on those residential properties, and it was found that generally there could be an increase of about 5 decibels above what is existing to those properties, and that 5 dba translates to a moderate increase which could be noticeable. However, it is considered not to be significant, given the existing noise environment along that part of the highway.

In terms of air pollution, there is no anticipated increase. Aesthetics: there will be a change to the appearance, obviously, to the bridge and certainly there is capacity to increase the aesthetics of the new bridge design. Provisions are made for lighting, landscaping of exposed areas and concealment of the water main, all lending to an improved aesthetic appearance to the new bridge.

Access to foreshore areas will be enhanced, or no access points will be taken away from the community, and there will be better ways of getting boats down to the waterway for recreational fishing and sailing and what-have-you. The existing beach on the north side was an important element to the community that needed to be retained, and there will also be provisions for parking of vehicles and boat trailers on disused portions of the highway on the Midway Point side. As mentioned earlier, the shared footway/cycleway will extend from the roundabout through to the quarry on the western side.

The other issue related to long-term use of the bridge, which will not change the result of the project, is the event of an accidental spillage of chemicals or fuels on the bridge and potential impacts on both the natural marine environment and the oyster growers upstream near Barilla Bay. A hazardous emergency response plan has been developed, and that will be put into action by the relevant service personnel."

Launching ramp

The Committee questioned the witnesses in relation to a submission received from John Duke of Avram, in which he sought that provision be made on the southern side of the proposed bridge for a launching ramp for larger vessels that may not fit under the bridge. Mr Graeme Nichols, the Project Manager submitted:

"I am not too sure where you would actually put it, Mr Chairman, because the only place that comes to mind is on the southern side, to launch from the quarry area that we looked at the Pittwater Bluff end and the water generally there is very, very shallow low water; it would be of no use whatsoever ... We did look extensively when we were looking at the various options at where we could launch from Midway Point. There is a launching facility at the yacht club. There is also a reluctance by people to pay $45 per year for a key to the gate to use that facility, which was one of the reasons it was appealing to retain the existing bay and access to it just to maintain the status quo. People do launch boats in that northern bay. Unfortunately Midway Point is virtually surrounded by cliffs and there are only two points that are readily available for launching and one is the yacht club I mentioned, the other is that little bay."

Mr McGee added:

"I think it is probably a practical issue. Until we got a key to the yacht club we actually launched the dinghy down at Lewisham to undertake the inspections to the bridge from the water. That whole area from Dodges Ferry, and particularly where Iron Creek comes into that bay, there are some channels that move around and so on but generally that whole bay is really quite shallow. At times we've run aground a 14 foot aluminium dinghy in that area navigating from Lewisham up to the bridge itself. Larger vessels are probably going to find it difficult to actually launch and navigate in that particular area."

Future demand

The Committee questioned the witnesses in relation to the future demands upon the bridge and the potential for future upgrading to a four-lane carriageway. Mr Nichols responded:

> *"... we're planning to construct the ultimate dual carriage way bridge on the present alignment of the existing bridge ... when traffic volumes require that to be done ... (which will be in) twenty or 30 years on present traffic growth. We will be looking at another probably $15 million on present values to do that."*

Retention of the existing bridge for public type use

The Committee questioned the witnesses in relation to the possibility of retaining the existing bridge for public use, such as parking for fishermen. Mr McGee responded:

> *"I think, when you look at those pictures, that the bridge will continue to deteriorate. We're managing it through rigour inspections and contingency plans and so on consistent with our broader emergency procedures. So I'm managing the bridge so that we can be confident that it will be able to be safely used until the new one is in place. But if it's left in place beyond that it will continue to deteriorate and it always gets to a situation where potentially it does become a safety issue* (where) *... at some stage in the future it actually collapses. There are efficiencies in having the one contractor where they're established on site to work on completing the new bridge, getting the traffic onto that, demolishing the old bridge and then the site is essentially clear."*

CONCLUSION AND RECOMMENDATION

The evidence presented to the Committee clearly demonstrated the need for the replacement of the Sorell Causeway Bridge. Defects affecting the structure's load carrying capacity have been increasing dramatically in recent times necessitating the replacement of the bridge in the shortest possible time-frame.

Accordingly, the Committee recommends the project in accordance with the plans and specifications submitted, at an estimated cost of $15,300,000.

Parliament House
HOBART
21 December 2000

Hon. D. G. Wing M.L.C.
CHAIRMAN