Transport Problem: Negotiating Port Phillip Bay
Adapted from a first year civil engineering report – this report was an exercise in brainstorming alternatives. The information is not completely accurate.

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<td>This report proposes a solution to an existing Victorian transport problem – the time taken to travel around Port Phillip Bay from the Bellarine Peninsula to the Mornington Peninsula. The report proposes a number of options including: the current choices of car and ferry; a new bridge across Corio Bay, a helicopter service and a tunnel under Port Phillip Bay. Each alternative was weighed against a set of criteria including: cost, sustainability, practicality and time efficiency of travel. It was concluded that the construction of a new bridge posed the best alternative.</td>
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1. Introduction

**Purpose**

This project takes an existing transport problem, the current distance and time taken travelling around Port Phillip Bay, and proposes a solution. The proposal is required to follow a number of stages:

- problem definition
- canvassing of alternatives
- weighing alternatives against a set of established criteria
- recommended outcome

![Figure 1. Port Phillip bay and the two Peninsulas](http://home.vicnet.net.au/~prace/beach/mapbay.htm)
Problem Definition
The metropolitan area of Melbourne spreads out at a fair distance from the centre of the city following the contours of Port Phillip Bay from the Bellarine Peninsula in the West to Mornington Peninsula in the East. For reasons of employment, goods distribution, family responsibilities and recreation many people currently make the journey on a regular, if not daily, basis from one side of the bay to the other. A recent survey (Vic. Dept. of Infrastructure, 2006) indicated that residents of the peninsulas are increasingly concerned about the time and efficiency in travelling to and from either side of the bay. At present there are only two transport alternatives for making this journey:

- Car – the vast majority of people drive the around Port Phillip Bay via freeways, all of which have to pass through the centre of Melbourne. This is a slow and often stressful journey due to traffic congestion.
- Ferry – a small minority use the passenger or car ferry service from Queenscliff to Sorrento. This is a more pleasant journey but slow and expensive on a regular basis.

The survey found unanimous support for a faster, more direct route across the Bay.

This report provides some alternative options including a tunnel, a bridge and passenger helicopter service, as well as raising some other problem areas.

2. Criteria For Assessing Alternatives
The proposed alternative must comply with the following criteria:

- **Sustainability**: be forward looking so that the construction will be relevant in the long term. Materials must be well-chosen to balance cost and durability.
- **Environmental standards**: comply with all Australian environmental standards and must balance the overall benefit to the community with concern for the impact on the environment. Must comply with the Mornington Peninsula and Westernport Biosphere Report (2002)
- **Practicality**: meet the researched and stated need of the communities
- **Economics**: take a relatively conservative approach in design so as to avoid unnecessary cost.
3. Transport Alternatives (only one alternative provided)

Note: The original report included the current transport options outlined in the problem definition, as well as an underwater tunnel and passenger helicopter service.

**Bridge**

Another option is to build a bridge spanning the 3.4 kilometre stretch of water known as the "Rip" between Queenscliff and Portsea and connecting the Bellarine Highway and the Mornington Peninsula Freeway. This will result in a giant road loop around the Bay.

**Cost:** No formal costings have currently been carried out on this alternative and the costing itself is likely to be an expensive project requiring specialist consultants. However rough estimations (see appendix) indicate the cost to be lower in the long term than either the tunnel or passenger helicopter service.

**Materials:** will need to withstand high winds, changing tides, and the stress of the vast span of the bridge so will have to be of high quality and durability adding to the overall cost.

**Travel Time:** Due to the relatively short distances involved (3.4 km for the water span and an approximately 2 km of freeway extensions) the travel time should be fairly fast. Travelling at an average speed of 80kph a 3.4 kilometre bridge would take about 2 minutes and 33 seconds.

**Attraction:** As well as being fast and direct the bridge has the design potential to be an attractive addition to the Bay.

**Other issues:**

A number of concerns have been raised:

- environmental disturbance associated with the construction of pylons
- potential disruption to shipping due to pylons
- visual concerns – the intrusion of the bridge into the current vista of the bay.
- increased traffic flow in peninsula towns

4. Evaluation of alternatives

After weighing the five alternatives against the required criteria it is clear that the bridge is the most favourable alternative.

- The current ferry option is impractical requiring a
significant increase in services and additional transportation at either end. The notoriously rough seas of the 'Rip' make the service unreliable and faster and bigger models of boat unviable.

- The current round-route driving option is time-consuming and not environmentally sustainable.
- The tunnel would be enormously expensive (see proposed costings in the appendix) and make significant long-term disruption the environment of the bay.
- The passenger helicopter service is similarly an expensive capacity is very low. Further transport issues at either end of the service would also need to be addressed.

4. Recommendation

It is recommended that a suspension bridge spanning a total distance of 3.4 km from Queenscliff to Portsea, connecting the Bellarine Highway and the Mornington Peninsula be constructed. This would be the longest bridge ever built. (The current longest bridge is the Akashi Kaikyo in Japan, with a length of 1, 990m (Ostrow, 1997)

Most bridges covering large distances are suspension bridges. The proposed bridge would be suspension with three supports to minimise stress created by changing tides, strong winds and churning waters. The bridge also needs to allow ships to pass underneath so must be a minimum height of 50m above sea level.

5. Conclusion

The problem of the travel around Port Phillip Bay has been escalating as Melbourne expands along coastal areas. There is a clear need to reduce the time it takes to travel from one side of the bay to the other. This report has canvassed five alternatives to this transport issue. Using a set of criteria it has weighed the options and recommended a 3.4 km suspension bridge as the preferred alternative. The bridge
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