Sunshine Coast Private Hospital bus turnaround: An example of a risk management approach to design, concept to completion

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Abstract

When particular site constraints prohibit the application of design standards, we need to adopt a different approach. What seemed to be a straightforward bus facility upgrade requirement within the grounds of Sunshine Coast Private Hospital became a design process based on risk assessment and management to ultimately provide safe facilities for all the users. This paper documents the real design process adopted on a real project. It will cover the original objectives of the project, the constraints faced and the design process undertaken to develop a solution that met the objectives of a public transport facility without detriment to the other users. The site constraints included existing buildings, access restrictions, development approval requirements and protected habitat. A risk management design process developed that included the engagement of all the stakeholders, including the Transport and Workers Union. Key issues within the process will be examined, including the identification and acceptance of the real problems as well as the proposed solutions. The design process involved examining the potential impact of each part of the solution on each of the users in the area, in this way a coherent project emerged. Design of the project started in January 2011 with construction kick off in September of the same year. The construction of the project is now complete and the facility has been operating for over 12 months. Was it a success? What are the key learnings?

Background

Aurecon were approached by TransLink in June 2011 to design a bus turnaround and improved access arrangements for the Sunshine Coast Private Hospital in Buderim. The original scope of the project included minor kerb realignment in the turn area and on the entrance road.

The buses using the route had been upgraded from mini buses to 12.5m rigid buses. This resulted in the bus no longer being able to turn within the existing turn area without carrying out a reversing manoeuvre. Due to the following safety concerns raised by the bus operator, the stop was no longer serviced after 22 November 2010:

- The access road does not suitably accommodate safe bus access due to tight geometry and insufficient lane width
- The bus stop does not suitably accommodate 12.5m buses due to insufficient vehicle manoeuvring area on the approach/ departure.

Buses subsequently stopped on Syd Lingard Drive, to the north of Elsa Wilson Drive to allow patrons to alight some 600 metres away for the original bus stop location. TransLink determined that this was an unacceptable Level of Service for its patrons, as the route to the main entrance of the hospital entailed walking from the ad-hoc stop, along the grassed verge on Syd Lingard Drive and then along Elsa Wilson Drive and through the hospital car park. Elsa Wilson Drive has a footpath on the southern side and a grassed verge on the northern side. There is no formal crossing available for pedestrians to cross. Once at the entrance to the Private hospital the pedestrians were required to walk through the car park and access road, which had been previously identifies as having poor visibility.
Objectives

The objectives of the project were to:

- Reconfigure the bus stop approach by providing a wider turning area for the buses, so that they had a simplified approach to the bus stop
- Reconfigure the access road to the car park area to provide sufficient width for a bus to travel safety into the car park area, and to improve sight lines to reduce the likelihood of conflict between buses and oncoming vehicles

The originally proposed scope of works included the following:

- Realignment of kerb lines and additional road pavement on the approach to the bus stop to improve swept path/vehicle manoeuvring
- Relocation of 2 light poles and associated works
- Realignment of the footpath
- Realignment and widening of the hospital access road.

Safe System approach

The Safe System Approach was first developed in Sweden and the Netherlands in the mid 90’s and adopted as an aspirational approach in Australia in 2004 and was included within the Austroads Guide to Traffic Management Part13: Road Environment Safety in 2009.

The main principal of the Safe System Approach is an acceptance that users are human and therefore can and will make mistakes. Therefore, the system should be developed to be as forgiving as possible to the users by minimising the risk exposure within the system.

The key components within the road system that impact upon the risk exposure include:

- The vehicles
• The road environment
• The users

The Sunshine Coast hospital grounds are private and the type of usage would not be expected to warrant the level of provision that would result from the application of full road design standards. In addition, there were no recorded safety incidents within the grounds. However, there were conflicting uses within the restricted space available.

In assessing an acceptable design approach the author examined approaches that were outside the normal procedure. The Safe System Approach offered a best fit ethos. In developing a specific approach for this project it was considered that we had no control over the vehicles, although early consideration was given to the possibility of reverting to the use of mini buses. We were therefore left with the environment and users to consider and influence.

**Developed Design Process**

**Redefined objectives and constraints**

In line with the Safe System Approach to the project, the objective was defined to be the following:

*Provide improved bus facilities, whilst maintaining or improving the level of provision and safety of pedestrians and other users in the area.*

A simplified process is shown in Figure 2 above demonstrating our design approach.

![Figure 2. Adopted safe system design approach](image-url)
During the initial concept phase of the project discussions with the hospital administrators, the bus operators and unions, the planning authority and the client established a set of constraints that the project was required to adhere to. These are listed below:

- No loss of parking
- No impacts on surrounding roads
- No change to the access/exit point
- Maintain access to underground loading area
- Retention of disabled parking spaces
- No impacts on the protected fauna habitat

**Identify traffic measurement measure**

Each change to the existing environment for the benefit of a user group was considered an identified traffic measurement measure for the purposes of this project. Therefore, moving a kerb to accommodate bus turn circles was considered a measure due to the potential impact on pedestrians and other vehicles, and taken through the process.

**Develop measure within project constraints**

Each measure then underwent a high level design to check that it could be incorporated into the project within the constraints listed above and to establish the likely footprint and allow an assessment of the impacts on other user groups.

**Assess Impacts for Each User Group**

Once a traffic management measure was identified for the benefit of a user group and developed to a sufficient level the impacts were assessed against the different user groups. For this project the user groups were defined as follows:

- Pedestrians, staff (regular users)
- Pedestrians, visitors (occasional users)
- Drivers, regular
- Drivers, occasional
- Bus drivers, professional driver
- Delivery drivers, professional driver

Through this process it was determined whether each measure had an impact that was a worsening, no impact or an improvement for the other user groups.

**Decide on Impact Level and Next step**

Through this iterative approach, each measure was considered in terms of impacts on the other road users within the Sunshine Coast Private Hospital system. If there were measures that resulted in a worsening impact upon a road user that could not be refined to either remove or mitigate that impact, then that measure was discarded from further consideration.
An example

An example of the project and how it was progressed through the process is detailed below. The subject of this example is the incorporation of car parking into the centre of the bus turning area.

Constraints

A significant constraint was the requirement to have no net loss of car parking within the hospital site. This was a requirement of the Planning Authority. Any loss of parking would trigger the requirement for Development Approval for the bus upgrade works. The installation of the bus turn area resulted in a net loss of 6 spaces.

Identify traffic measurement measure

Initial investigations sought to locate the parking that was lost into other areas of the hospital grounds. In discussion with the hospital architect, the only location that could potentially house additional parking was near the entrance to the hospital. This was deemed to be a worsening impact to all other drivers within the site and could potentially worsen the situation for pedestrians as they would be required to walk further through the car park. This solution was capable of providing 3 additional spaces so would not meet the requirements.

Additional consideration was given therefore to the space in the centre of the turn-around area and how this could be managed. Using standard turning templates for the 12.5m rigid bus the area of potentially dead space in the centre of the bus movement was identified and options for including parking explored.

Develop the measure within the project constraints

Three options were identified and are shown in Figure 3 below.

Figure 3. Car parking options
**Assess Impacts for Each User Group**

**Drive through parking**

This option had a net loss of 1 car parking space. This option was deemed to have a potentially worsening effect on all users for the following reasons:

- Cars could drive in/out from either direction
- Cars could reverse in/out from either direction
- The extra space at the ends of the spaces could lead to abuse by regular users parking across the spaces.
- No other spaces in the area permitted drive in/ drive out
- It may lead to an abuse of the one way system

**Angled parking**

This option had a net gain of 3 car parking spaces. This option was deemed to have either no impact or an improvement for all users for the following reasons:

- Cars could only drive in and reverse out due to the angled configuration
- Drive through issues could be avoided by the introduction of bump kerbs.
- It would be easier for other vehicles to see the reversing lights and therefore react to car movement
- All the car parks in the area would operate in the same way making legibility easier
- It would avoid abuse of the one way system
- It would allow for the narrowing of the circulatory carriageway because of the reduced depth necessary for exiting the space.

**90 degree parking**

This option had a net gain of 4 car parking spaces. This option was deemed to have either no impact or a worsening for all users for the following reasons:

- Cars could only drive in and reverse out due to the configuration
- Drive through issues could be avoided by the introduction of bump kerbs.
- All the car parks in the area would operate in the same way making legibility easier
- The car, on reversing could reverse in either direction resulting in abuse of the one-way system
- It would require a wider circulatory carriageway because of the depth needed to reverse out of the parking bay

**Decide on Impact Level and Next step**

Based on the assessment it was considered that the drive-through did not satisfy the constraints or the aspirations of a safe systems approach. The 90 degree parking option did not satisfy the aspirations of the safe systems approach. The angled parking option was therefore incorporated into the design.
The result

The approach

The Design Approach involved a process that was, in practice, highly iterative. It involved the emergence of design through the development of a series of layouts, conversations with stakeholders and design and safety workshops to achieve a result that satisfied all of the project objectives was considered acceptable to the all.

The design

It was originally intended that the design would incorporate the following:

- Realignment of kerb lines and additional road pavement on the approach to the bus stop to improve swept path/vehicle manoeuvring.
- Relocation of 2 light poles and associated works
- Realignment of the footpath
- Realignment and widening of the hospital access road.

After completion of the Safe Systems Design approach the project incorporated the following:

- Realignment of the kerb lines and additional road pavement on the approach to the bus stop (approximately 10 times the area originally scoped)
- Relocation of 2 light poles, installation of 2 additional light poles
- Re-alignment of the footpath
- Construction of a bus boarder platform
- Reconfiguration of existing car parking
- Incorporation of additional replacement parking
- Upgrade of disabled car parking spaces to meet standards
- Realignment and widening of hospital access road
- Bus friendly humps
- Shared space signage
- Improved signage along the bus route within the hospital
- Advance warning signs on Elsa Wilson Drive.
- Reconfigured stormwater drainage

Figures 4 and 5 show the completed designs.
The approach was very hands on and required an experienced engineer with a broad base of experience to be involved.

The construction of the design was undertaken towards the end of 2011. On completion the bus driver’s union raised further concerns because it was a non-standard arrangement but agreed to trial it for 12 months.

We installed the first bus boarding platform in Queensland – I think.
To date there have been no incidents and the buses continue to serve the Sunshine Coast Private Hospital in Buderim.

The hospital administrators have since installed additional signage restricting access to the bus turning area to disabled and doctors only.

References


Appendix – Photos of the completed project
Realigned Hospital Exit