Technical Advice Note

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cc	Project Team and CRRDA	File reference	
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Subject	Technical Advice Note: Traffic Signal at Parkland Boulevard and Parkland Crescent Intersection		

1 Introduction

1.1 Background

The Concept Design Report prepared and issued on 1st July 2018 on behalf of the Cross River Rail Delivery Authority (CRRDA) documented the proposed Concept Design of the Brisbane Temporary Coach Terminal. The Concept Design Report included preliminary design information and detailed the design process, while highlighting key design assumptions and identified design issues.

A key design issue identified was the safety of the existing Parkland Boulevard / Parkland Crescent (South) intersection, it was noted that it is currently a priority-controlled (stop sign) intersection. The sight lines at this intersection are limited due to the configuration of the ramp and concrete barriers. Due to the relocation of the coach terminal to Parkland Crescent, the volume of vehicles traversing this intersection is expected to increase, thus leading to an increased risk of collision.

It was recommended in this issued Concept Design Report that the conversion of this intersection to a signalised intersection would assist in controlling this conflict point. As a result, it was recommended that the conversion of this intersection to include signals be investigated for practicality in achieving all requirements to meet compliance within all applicable design guidelines.

1.2 Objectives

The objectives of this Technical Advice Note (TAN) is to detail the practicality of achieving a compliant traffic signal design at the Parkland Boulevard / Parkland Crescent (South) intersection and provide the CRRDA a recommended design solution.

1.3 Existing Intersection

The existing intersection is confined by a retaining wall on one side and the rail corridor on the other. As a result, there is limited width to carry out intersection geometry improvements. This is particularly constraining in implementing a compliant design.

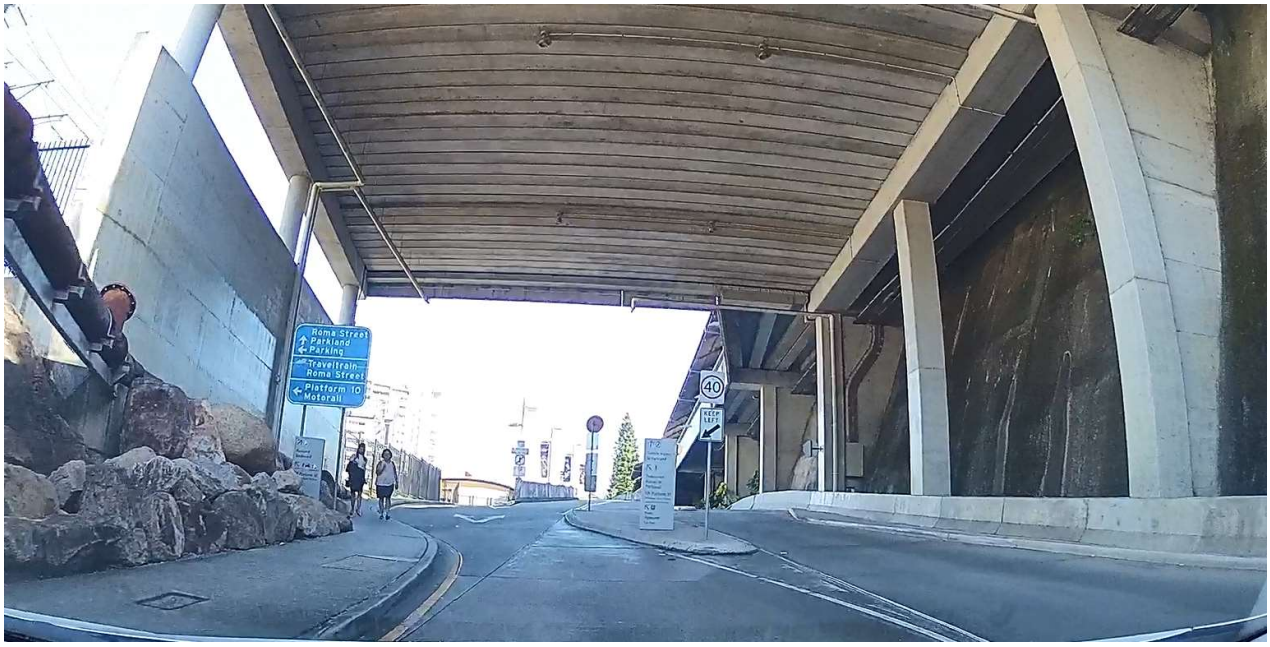


Figure1.1: Approach to intersection from rail underpass.

Figure 1.2: View of ramp up Parkland Boulevard

2 Traffic

2.1 Design Review

The traffic assessment completed for the Parkland Boulevard / Parkland Crescent intersection indicated that the existing priority-controlled (stop sign) intersection layout could operate satisfactorily from a capacity point of view following the development of the temporary coach terminal. In particular, the degree of saturation expected at this intersection were estimated to remain within acceptable limits (under 80% degree of saturation).

A review of the two intersections most impacted by the temporary coach terminal (the Parkland Boulevard / Parkland Crescent intersection and the Parkland Boulevard / Roma Street intersections) based on guidelines from the TMR Guide to Traffic Impact Assessment (GTIA) also indicated that the increase in overall vehicle delays would be under 5%.

A review of the traffic survey data indicated that a significant number of cyclists use Parkland Boulevard, and it is identified as a priority cycle route on the South East Queensland Principal Cycle Network Plan. Over 160 cyclists were recorded travelling down the ramp during the morning peak hour. The development of the temporary coach terminal will lead to increased frequency of interactions between these cyclists and vehicles (e.g. coaches) entering the intersection from Parkland Boulevard.

In order to address the increased risk of collisions at this intersection, means of reducing the likelihood of collisions were investigated. Signalisation of the intersection was considered to reduce this risk by separating the conflicting movements with respect to time. However, in order for signalisation to provide these benefits, the distance between the stop lines and the conflict point should be minimised. Greater separation between the stop lines and the conflict point would require greater clearance times.

Excessive separation could also lead to an increased risk of collision as:

- vehicles (e.g. coaches) travelling below the speed limit may not clear the intersection before the next movement begins; and
- the longer clearance (all-red) time may lead to drivers or cyclists becoming impatient and running through red lights.

2.2 Outcomes

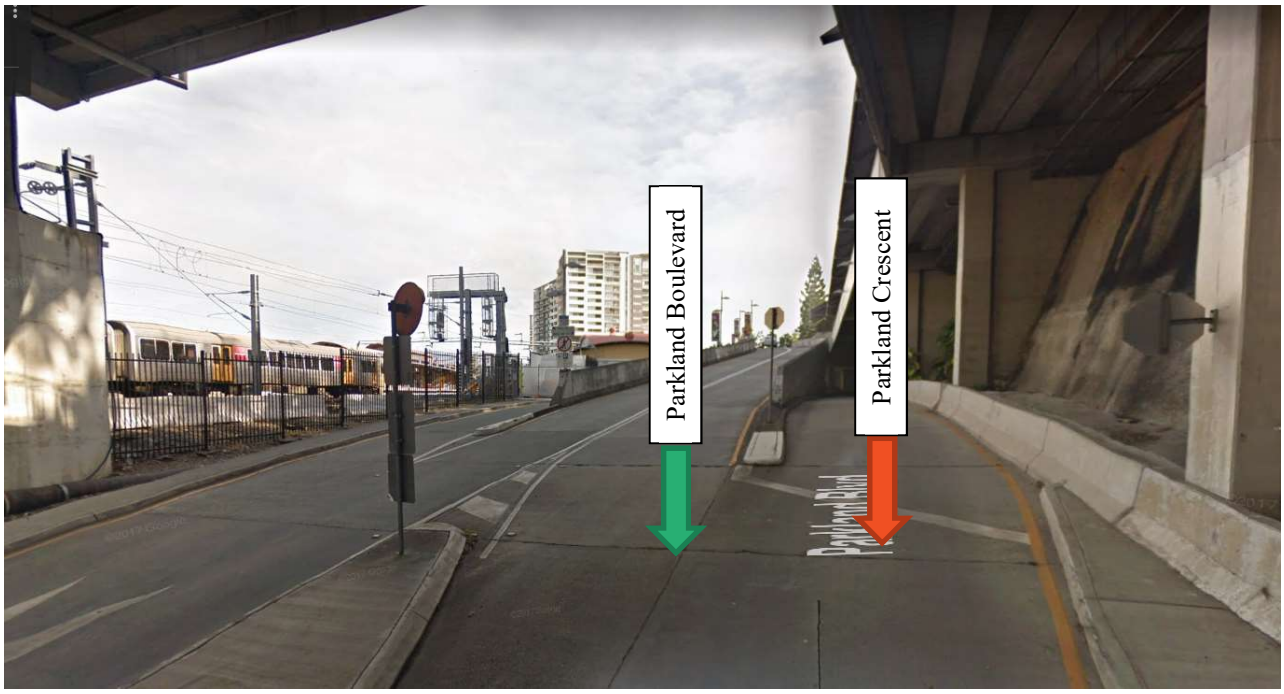
In order to mitigate the increased risk of collisions between users of Parkland Boulevard and Parkland Crescent, it was recommended that signalisation of the intersection be investigated. The layout of the signals should minimise the distance between the stop lines and the conflict zone to maximise the benefits of the signalisation.

3 Traffic Signals

3.1 Design Review

A traffic signals design has been completed for the Parkland Boulevard and Parkland Crescent intersection at Roma Street Parkland as best as possible to BCC standards and to TMR standards where BCC standards do not exist.

The proposed intersection has an unusual arrangement. The primary entering movements that need to be separated by signalisation to manage conflicts are the ramp down from Parkland Boulevard and Parkland Crescent. Both signalised directions of travel are in the same direction and in close proximity to each other horizontally. As viewed in the figure below.



With standard stop line arrangements, vehicles can see the exact same traffic signals lanterns for each movement at their respective stop lines. This creates issues with controlling these movements separately as the both vehicles desire to move in the same direction.

Given this, the placement of standard secondary and tertiary lanterns is ineffective at controlling the driver's movements, and would likely result in significant driver confusion. These posts have been omitted to avoid this issue.

Options were explored to significantly offset the stop lines, such that the primary and secondary lanterns would not be visible to either vehicles approaching from the coach terminal or the ramp. However as mentioned, this impacts intersection operation quality, and will likely result in any vehicles that passed through on an amber at the coach terminal approach needing to give way to the ramp traffic.

There is also significant geometric constraints that would result in the installation of non-compliant signals infrastructure. Particularly lantern clearance to edge of kerb and existing services locations. Further design details are discussed below.

3.1.1 Design Assumptions

Key assumptions are as follows:

- Brisbane City Council will own and maintain this intersection.
- Given the size of the intersection and quantity of lanterns proposed a single cable run is proposed as opposed to the typical two cable run redundancy.
- Traffic signal controller can be accommodated in the existing barrier as shown on the drawings, without causing significant impact to structural integrity.
- Installation of detector loops on the down ramp will not impact reinforcement or ramp structural integrity
- Nominated point of supply has sufficient capacity to feed traffic signal controller
- No network interface or communications link is proposed for this intersection, and it is to operate as standalone.
- Based on the presence of an existing switchboard nearby the proposed traffic signal controller location, it is assumed a similar maintenance regime can be adopted for controller access.
- Overhead primary lanterns are sufficient to control the movements to be signalised and no additional lanterns are required for the ramp movement
- Maintenance of overhead lanterns via cherry picker is acceptable to BCC

3.1.2 Risks and Issues

The Key risks/issues with the traffic signals design are as follows:

- Based on vehicles having almost identical lines of sight to secondary and tertiary lanterns, it is thought the inclusion of these lanterns would add to driver confusion. Based on this and the low design speed through this area, the design has only provisioned primary lanterns for each movement.
- Due to the limitations with lack of existing infrastructure for signals and very narrow existing footpaths and barriers, the ability to provide compliant ground mounted signals infrastructure is limited without major geometric intervention. Clearances of the signals lanterns cannot be met and a proposal for the overhead mounting lanterns has been put forward as shown on the drawings.
- Given the constrained nature of the site, the inclusion of a full set of signals infrastructure would cause serious issues with other services. If the use of overhead primary lanterns is not accepted, serious focus is required regarding major changes to the current geometry to ensure clearances requirements to other services are met.
- As there is no immediate point of supply or point of presence near the intersection, significant work may be required to trench underneath the existing pavement to reach the Energex Transformer nominated for the electrical connection. As stated above, no provision has been made for a communications connection to the traffic signal controller. BCC may desire this controller to interface to the wider network.

- The proposed traffic signal controller location is currently shown where there is existing guardrail and concrete barrier. A relatively significant amount of civil work may be required to install the traffic signal controller. Space proofing will be required to confirm there is sufficient space for controller door to open without contacting guard rail.

3.2 Outcomes

It is recommended that considering the associated risk and inclusion of multiple non-standard traffic signals items no traffic signals are installed.

Attempting to control the same direction of travel separately through significant offset of the stop line compromises intersection efficiency and increases phase times for vehicle clearance. As such it is suggested that the current unsignalised arrangement is retained as there is an increased risk to driver / cyclist safety by introducing traffic signals that may be confusing to drivers travelling in the same direction.

4 Geometric Improvements

Where it has been mentioned previously, the location of the intersection is constrained which limits the improvement options available. Traffic signals will not be compliant within applicable design standards but minor geometric improvements may improve safety by increasing visibility of vehicles in the intersection giving more time to react to possible conflicts.

The figure below shows a compliant improved layout that should increase vehicle visibility and improve coach manoeuvrability. The improvements include:

- Remove existing kerbed island on the northern verge and straighten alignment to free more road space;
- Remove existing boulders on the southern verge and shift kerb back to straighten alignment and free more road space;
- Remove existing median island and replace with a narrower painted island to improve manoeuvrability and free more road space; and
- Move the existing stop line forward approximately 8m to give a clear length of approximately 18m to the retaining wall to improve vehicle visibility.

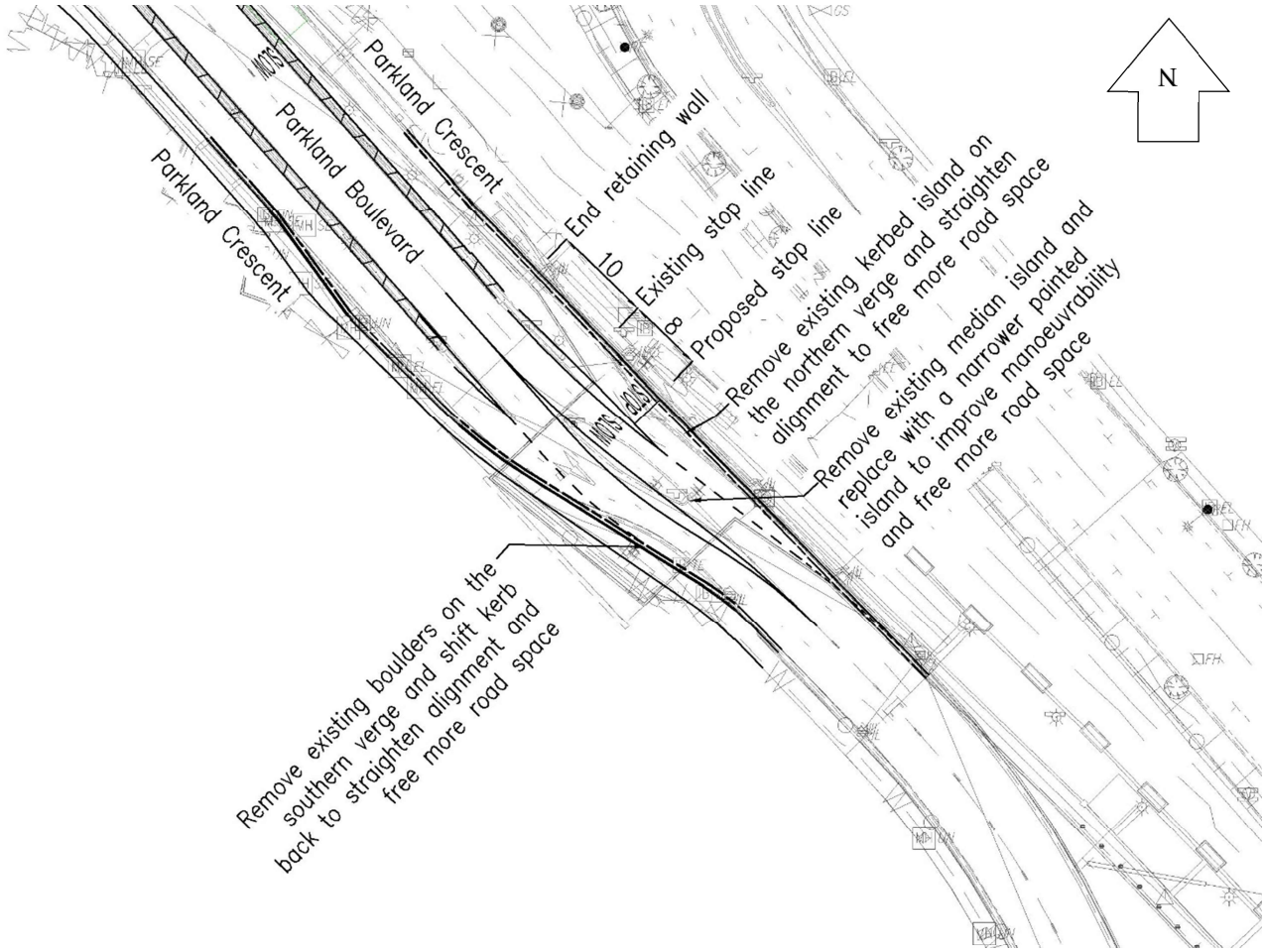


Figure 4.1: Proposed Geometric Improvements

5 Conclusion

The intersection between Parkland Boulevard and Parkland Crescent is not conventional and as a result conventional controls cannot be implemented easily. On initial consideration, traffic signals appeared to be the best option for controlling overall movement through the intersection. However, the constrained environment and the need to maintain all movements dictate that a conventional signal layout cannot be applied. Due to the nature of the intersection and that the signal heads cannot be clearly separated per direction of traffic, signals could increase safety risks in operation.

6 Recommendation

It is recommended that:

1. Traffic signals not be used at the intersection of Parkland Boulevard and Parkland Crescent.
2. Alternative priority controls are to be used.
3. Parkland Crescent to remain as a stop control.

4. Parkland Boulevard (from the ramp) to be a give way control to heighten awareness to road users and encourage slowing of traffic.
5. The stop line and give way lines be pushed forward along the roadway from the barrier to maximise visibility.
6. Additional speed awareness measures are used such as the Speed Awareness Monitors (SAM).

DOCUMENT CHECKING (not mandatory for File Note)

	Prepared by	Checked by	Approved by
Name			
Signature			