



Park Street Bike Link
South Melbourne



Road Safety Audit

Audit Stage: Concept design

Report for SMEC



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Information Page

DATE: 13/9/2021

CLIENT: SMEC

PROJECT NUMBER: S20210294

QUALITY RECORD:

Issue	Date	Description	Prepared By	Reviewed By	Approved By
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Executive Summary

Safe System Solutions Pty Ltd has been engaged by SMEC to undertake a concept design stage Road Safety Audit for the proposed bicycle link on Park Street, South Melbourne between Kings Way and St Kilda Road. The scope of the works is primarily installing bicycle lanes on both side of Park Street, although it should be noted that this road safety audit only reviews a section of the proposed works and the "Alt Design" which retains some on-street parking.

The Road Safety Audit team has reviewed the provided drawings and identified some issues associated with the following areas which require further consideration:

- a) Intersections
- b) Functionality
- c) Line/Pavement Markings
- d) Pavement Quality

These issues are detailed in Section 3 Audit Findings and Recommendations of the Road Safety Audit report.



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List of Abbreviations

- AS – Australian Standards
- DoT – Department of Transport
- RSA – Road Safety Audit
- SUP – Shared User Path



1. Background

1.1 Road Safety Audit Procedure

Road safety audit is a term used internationally to describe an independent review of a road project or existing road to identify any safety or performance concerns. The audit team considers the safety of all road users and qualitatively reports on road safety issues or opportunities for safety improvement. The team also considers other factors that are relevant to the existing site.

A road safety audit is therefore a formal examination of a road project, or any type of project which affects road users (including cyclists, pedestrians, mobility impaired etc.) or an existing road, carried out by an independent qualified team who identify and document road safety concerns. The objective of a road safety audit is to provide reasonable (but not absolute) assurance that potential, foreseeable hazards for all road users when a road is operational which may result in injury (in particular fatal and serious injury) are identified.

A road safety audit is intended to help deliver a safe road system and is **not** a review of compliance with standards.

1.2 The Safe System

The Austroads Guide to Road Safety Part 6 (2019): Managing Road Safety Audits states that: *"for any project, there is a responsibility on the road authority to maximise alignment with Safe System principles"*. The Guide continues to offer two methods for achieving this:

1. Undertake a Safe System Assessment in the early stages of the project.
2. Integrate Safe System principles into the Road Safety Audit process.

VicRoads Safe System Assessment Guidelines (2018) states that a Safe System Assessment *must* be undertaken for any Victorian Government project greater than \$5M in value, is *desirable* for where the project value is greater than \$2M and *optional* for projects under \$2M. Where A Safe System Assessment is not undertaken, the project team should document how the project has considered Safe System alignment. Safe System Assessments are most valuable when conducted during the early stages of a project.



Table 1: Safe System Kinetic Energy

	Crash Type	Tolerable (10%) Speed (passenger vehicle)
	Head-On	~70km/h
	Side Impact (90°)	~50km/h
	Side Impact (45°)	~60km/h
	Side Impact into Point Source Hazard (eg. Tree, Power Pole)	30 – 40km/h
	Pedestrian, Cyclist, Motorcyclist	~30km/h

Source: Austroads (2018).

This RSA has been undertaken to conform with AGRS Part 6: Managing Road Safety Audits (2019). As such, an assessment has been undertaken for each RSA finding to determine if the kinetic energy associated with the possible crash is above tolerable levels (as set out above). Also, each recommendation has been categorised into one of the Austroads Safe System treatment categories described in Table 2 below.

Table 2: Safe System Treatment Categories

Primary	Road planning, design and management considerations that practically eliminate the potential of fatal and serious injuries occurring in association with the foreseeable crash types.
Supporting (step towards)	Road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types, but not expected to virtually eliminate the potential of fatal and serious injury occurring. Improves the ability for a Primary Treatment to be implemented in the future.
Supporting	Road planning, design and management considerations that improve the overall level of safety associated with foreseeable crash types, but not expected to virtually eliminate the potential of fatal and serious injury occurring. Does not change the ability for a Primary Treatment to be implemented in the future.
Non-Safe System Other Elements	Road planning, design and management considerations that are not expected to achieve an overall improvement in the level of safety associated with foreseeable crash types occurring. Reduces the ability for a primary treatment to be implemented in the future.

Source: Austroads (2018a).



1.3 The Safety Audit Team

It is a requirement in Victoria that road safety audits are undertaken in teams of two or more, with at least one Senior Road Safety Auditor. Each auditor must be accredited and registered on VicRoads Register of Road Safety Auditors (www.vrsa.com.au). The team consisted of:

Table 3: Road Safety Audit Team

Senior Road Safety Auditors	Road Safety Auditors	Engineering Intern
Thuan Nguyen Safe System Solutions Pty Ltd	Nathan Louey Safe System Solutions Pty Ltd	Adrian Gray Safe System Solutions Pty Ltd

1.4 Site inspections and meetings

A list of site inspections and meetings associated with this road safety audit is provided in the table below:

Table 4: Inspection and meetings

Activity	Location	Date	Time
DAYTIME SITE INSPECTION	Park Street, South Melbourne	03.09.21	09:00
NIGHTTIME SITE INSPECTION	Park Street, South Melbourne	03.09.21	20:30

1.5 Documents Assessed

The documents listed in the table below have been reviewed by the auditors as part of the road safety audit process.

Table 5: Documents Assessed

Document Type	Author/Assessor/Designer	Document Number
DRAWINGS	SMEC	3042212 – Alt Design
		200923_PARK STREET BIKE LINK_LMP (DRAFT)



1.6 Audit process

This road safety audit has been conducted in accordance with the procedures set out in the *Austrroads Guide to Road Safety Part 6: Managing Road Safety Audits (2019)* and *Austrroads Guide to Road Safety Part 6A: Implementing Road Safety Audits (2019)*. A review of the site has been completed and the details contained within the supporting documentation examined to identify issues that affect road user safety and other relevant issues. The auditors cannot guarantee that every issue that affects road user safety has been identified. Although the adoption of the audit recommendations will improve the level of safety of the site it will not, however, eliminate all the road user safety risks.

Road safety audit is a formal process and the audit findings and recommendations should be documented by the client in writing. If recommendations are not accepted by the client then reasons should be included within the written response. A client is under no obligation to accept all the audit findings and recommendations and should consider these in conjunction with all other project considerations. It is not the role of the auditor to approve the client's response to an audit.



1.7 Risk assessment

The potential road safety problems identified have been assigned a risk rating based on the **likelihood** of a crash occurring as a result of the deficiency together with the potential **consequence** of that crash.

The risk ratings adopted are:

- ⇒ **Intolerable**
- ⇒ **High**
- ⇒ **Medium**
- ⇒ **Low**

Tables 6 to 8 below show the risk rating process.

Table 6: Likelihood of a crash (Austroads, 2019)

Frequency	Description
Frequent	Once or more per week
Probable	Once or more per year (but less than once a week)
Occasional	Once every five to ten years
Improbable	Less often than once every ten years

Table 7: Likely severity of a crash (Austroads, 2019)

Severity	Description	Examples
Catastrophic	Likely multiple deaths	<ul style="list-style-type: none"> - High speed, multi-vehicle crash on a freeway - Car runs into crowded bus stop - Bus and petrol tanker collide - Collapse of a bridge or tunnel
Serious	Likely deaths or serious injury	<ul style="list-style-type: none"> - High or medium speed vehicle/vehicle collision - High or medium speed collision with a fixed roadside object - Pedestrian or cyclists struck by a car
Minor	Likely minor injury	<ul style="list-style-type: none"> - Some low-speed vehicle collisions - Cyclist falls from bicycle at low speed - Left turn rear-end crash in a slip lane
Limited	Likely trivial injury or property damage only	<ul style="list-style-type: none"> - Some low-speed vehicle collisions - Pedestrian walks into object (no head injury) - Car reverses into post

Table 8: Resulting level of risk (Austroads, 2019)

	Frequent	Probable	Occasional	Improbable
Catastrophic	Intolerable	Intolerable	Intolerable	High
Serious	Intolerable	Intolerable	High	Medium
Minor	Intolerable	High	Medium	Low
Limited	High	Medium	Low	Low

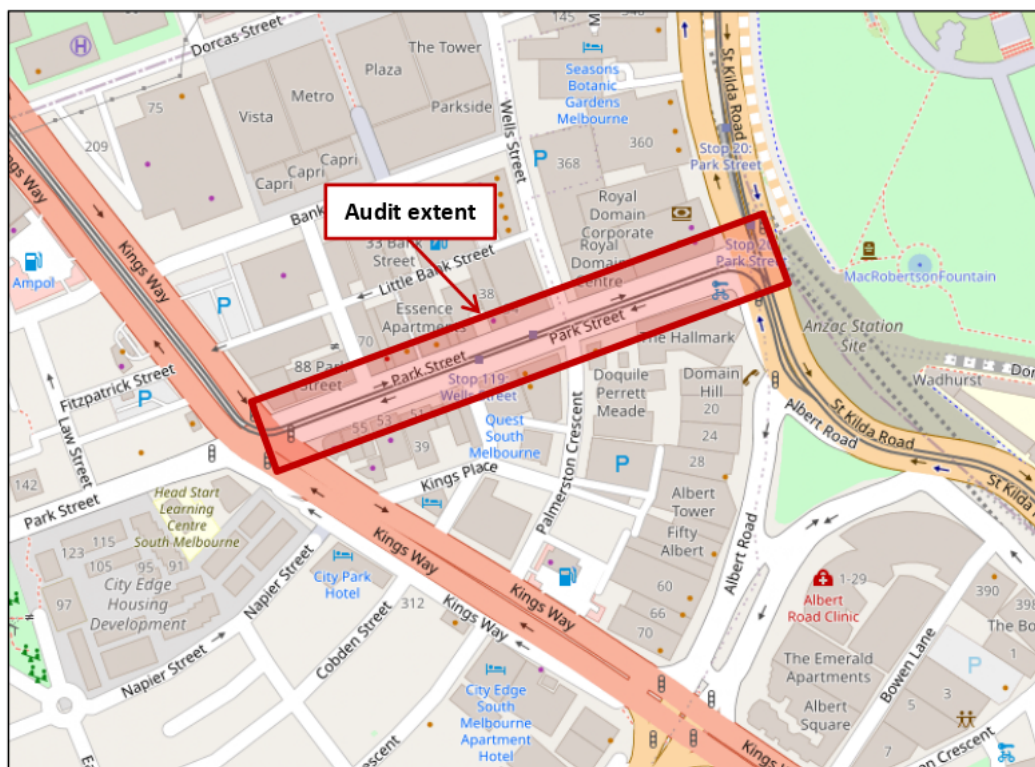


2. Scope of Audit

Safe System Solutions Pty Ltd has been engaged by SMEC to undertake a concept design stage Road Safety Audit for the proposed bicycle link on Park Street, South Melbourne between Kings Way and St Kilda Road. The scope of the works is primarily installing bicycle lanes on both side of Park Street although it should be noted that this road safety audit only reviews a section of the proposed works and the “Alt Design” which retains some on-street parking. A map of the audit extents is provided in **Figure 1**.

Park Street is a two-lane, two-way major road which runs east-west through South Melbourne and provides access for through traffic as well as to commercial and residential buildings which run along Park Street. The intersections with St Kilda Road and Kings Way are signalised while the minor intersections are priority controlled, with several restricted to left-in left-out movements. Dual tram tracks are located in the centre of the carriageway with the 58 tram route running along Park Street and the 119-Wells St/Park St stop located between Millers Lane and Wells Street/Palmerston Crescent. Sharrow line markings are provided along Park Street and there are several sections of on-street parallel parking. The alignment of Park Street is straight although the carriageway does elevate towards the intersection with St Kilda Road. Park Street has an AADT of approximately 10,000 vpd (6% heavy vehicles) and has a posted speed limit of 40 km/h.

Figure 1: Map of audit extents (Source: Open Street Map)

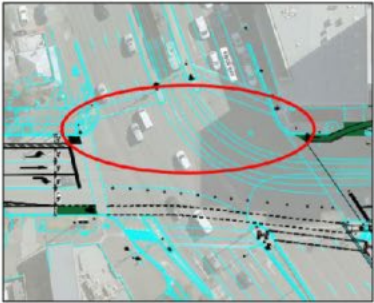




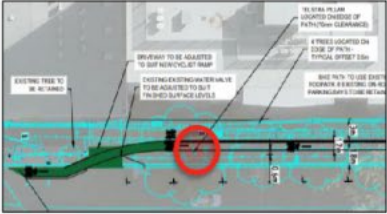



Eight crashes have been recorded along this section from 1/1/2014-24/07/2019 with a summary provided below:


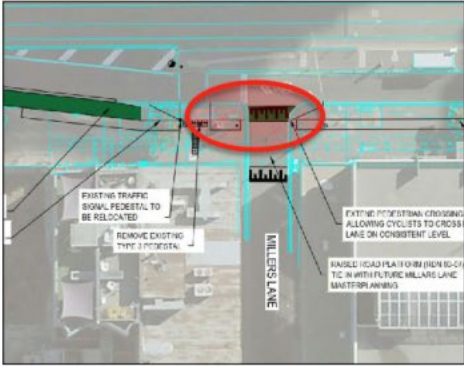
Road	Persons Involved	Date	Severity	Road user type
Palmerston Crescent	1	17/03/2015	Other	Car
Park Street	1	22/02/2015	Serious	Bicycle
Park Street	2	08/10/2017	Serious	Car/Pedestrian
Park Street	2	04/01/2015	Other	Car/Bicycle
Park Street	1	25/11/2015	Other	Car/Bicycle
Kings Way	1	24/09/14	Other	Car/Pedestrian
Kings Way	2	15/12/2016	Serious	Car/Bicycle
Kings Way	5	22/07/2014	Other	Car

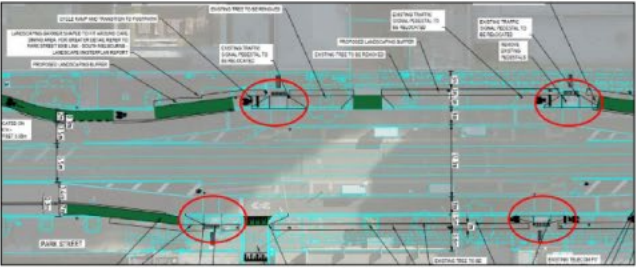

3. Audit Findings and Recommendations



Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary S – Supporting	ST – Step Towards N – Non-Safe System	Accept Yes/No
<p>a) Intersections</p>					
<p>i. The westbound bicycle lane is marked at the intersection with Kings Way, however there appears to be no line marking for eastbound cyclists. This increases the potential for a collision between cyclists and vehicles.</p> 	<p>Occasional Serious HIGH</p>	<p>Above tolerable limits (important)</p>	<p>Consider installing bicycle lane markings for eastbound cyclists across the intersection to guide cyclists and increase awareness of cyclists crossing. (S)</p>		
<p>ii. On westbound lanes just before Palmerston Crescent, the car lane narrows slightly. In the proposal, the bicycle lane will end at this location and cyclists will veer slightly left to reach the footpath on the other side of Palmerston Crescent. Drivers may fail to notice cyclists and give them enough space increasing potential collisions between cyclists and vehicles.</p> 	<p>Occasional Serious HIGH</p>	<p>Above tolerable limits (important)</p>	<p>Consider:</p> <ul style="list-style-type: none"> Rerouting the bicycle path through the footpath on approach to this intersection (P) Consider installing green pavement marking of the bicycle lane through the intersection to increase awareness of drivers to cyclists. (S) Painting a sharrow in the lane as it narrows and the bicycle lane ends (S). This may make it more likely that cars pay attention to cyclists. 		


Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary ST – Step Towards S – Supporting N – Non-Safe System	Accept Yes/No	Comments
<p>iii. Road users may be unaware of the bicycle lane and cyclists crossing despite the installation of green pavement markings.</p>	<p>Occasional Serious HIGH</p>	<p>Above tolerable limits (important)</p>	<p>Consider raising the bike lanes where they cross accesses and minor legs as it reduces the traffic speeds at the crossing points as well as increasing the conspicuity of pedestrians and cyclists crossing at these locations. (S)</p>		
b) Functionality					
<p>iv. At several points in the route, there is roadside furniture located close to bicycle path which are potential snagging hazards for handlebars on bicycles. Some of the locations are noted below:</p> <p>a. There is a Telstra pillar located on north side of Park Street just east of Kings Way intersection. The proposal notes that 70 mm clearance is provided. This is insufficient and likely to cause snagging hazard to handlebars.</p>  <p>b. The plans show the bicycle lane occupying the footpath immediately to the west of Palmerston Crescent. The plans note that the existing telecom pit and sewer vent will need to be relocated, but the auditors are concerned that clearance to the streetlight pole highlighted will not be sufficient.</p> 	<p>Occasional Minor MEDIUM</p>	<p>Within tolerable limits</p>	<p>Consider:</p> <ul style="list-style-type: none"> Relocating or undergrounding the identified hazards (P) Realigning the bicycle lane to increase the clearance to roadside furniture (S) 		

Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary S – Supporting ST – Step Towards N – Non-Safe System	Accept Yes/No	Comments
<p>v. Several parallel parking spaces are proposed to be retained along Park Street which are in close proximity to the bicycle lanes and introduce the potential risk for dooring. This is particularly relevant in some sections where there is only 0.3m of separation between the parking and the bicycle lane.</p>	<p>Occasional Minor MEDIUM</p>	<p>Within tolerable limits</p>	<p>Consider increasing the separation between on-street parking and the bicycle lanes (S)</p> <p>OR</p> <p>Remove the on-street parking along Park Street (P)</p>		
<p>vi. The exit of Little Bank Street into Park Street crosses the proposed bicycle lane. This exit has very limited line of sight for vehicles and motorists may fail to give way to crossing pedestrians and cyclists, increasing the likelihood of collisions.</p> <p>It is noted that the Final Concept Design Report draft provided by SMEC includes plans to improve the amenity and safety of Little Bank Street.</p>	<p>Occasional Serious HIGH</p>	<p>Above tolerable limits (important)</p>	<p>Consider:</p> <ul style="list-style-type: none"> Installing mirrors to assist drivers with line of sight when exiting Little Bank Street (S) Installing warning signs (W6-9, W8-23) at the exit of Little Bank Street to warn drivers of the pedestrian footpath and bicycle lane (S) 		

Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary ST – Step Towards S – Supporting N – Non-Safe System	Accept Yes/No	Comments
<p>c) Line/Pavement Markings</p>					
<p>ix. Several tactile ground surface indicators (TGSIs) were noted as having significant damage which limits their effective use by people with impaired vision.</p> 	To Note	-	Consider repairing all damaged TGSIs along the route (S)		
<p>x. One of the bicycle lane crossings (south west) does not appear to have stop line markings at the signalised crossing. Hence, cyclists may be unaware of the pedestrian crossing and fail to stop for the signals. There also appears to be minimal storage space, with cyclists potentially blocking access to Millers Lane.</p> 	<p>Occasional Minor MEDIUM</p>	<p>Within tolerable limits</p>	<p>Consider:</p> <ul style="list-style-type: none"> Installing a stop line at the signalised crossing (S) 		

Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary ST – Step Towards S – Supporting N – Non-Safe System	Accept Yes/No	Comments
<p>xi. Cyclists & pedestrians may be unaware of each other at the signalised crossings to the tram stop increasing the potential for collisions.</p> 	<p>Improbable Minor LOW</p>	<p>Within tolerable limits</p>	<p>Consider</p> <ul style="list-style-type: none"> Installing “slow” line marking to warn cyclists of crossing (S) Installing green pavement markings over the crossing points to alert both road users to crossing (S) 		
<p>d) Pavement Quality</p>					
<p>xii. Park Street and the adjacent footpath south of the tram stop has pavement surfacing defects (cracking, potholes, rutting). The uneven surface may destabilise a cyclist.</p> 	<p>Improbable Minor LOW</p>	<p>Within tolerable limits</p>	<p>Consider reviewing the pavement quality within the project area. Consider rectifying pavement surface defects. (S)</p>		

Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary ST – Step Towards S – Supporting N – Non-Safe System	Accept Yes/No	Comments
<p>xiii. The quality of footpath pavement at the southeast side of Kings Way is poor. This could cause a hazard to cyclists as they ramp up onto the footpath to reach the stopping point at the lights. It is noted that some works are ongoing in the area, but it is unlikely that these works relate to the footpath surface.</p>  <p>The footpath on the north side of Park Street just to the east of Little Bank Street was also noted to be in poor condition.</p> 	<p>Improbable Minor LOW</p>	<p>Within tolerable limits</p>	<p>Consider resurfacing all worn or damaged pavements along the bicycle path (S)</p>		

Audit Findings	Level of Risk	Safe System Energy	Recommendations	Responsible Officer	
			P – Primary ST – Step Towards S – Supporting N – Non-Safe System	Accept Yes/No	Comments
<p>xiv. The exit of Little Bank Street has been noted above for its visibility issues. The auditors also note the presence of a kerb along the current footpath and exit of Little Bank Street (as seen below). If unchanged, this would present discomfort and a tripping hazard for cyclists.</p> <p>It is noted that the Final Concept Design Report draft provided by SMEC includes plans to improve the amenity and safety of Little Bank Street.</p> 	<p>Improbable Minor LOW</p>	<p>Within tolerable limits</p>	<p>Consider:</p> <ul style="list-style-type: none"> Raising the level of the bicycle path to ensure smooth passage for cyclists along the new alignment (P) Additionally consider raising the footpath, to create a wider pedestrian-cyclist zone that slows vehicle traffic (S). This approach is in the proposal for Millers Lane. 		




4. Conclusion

This road safety audit has been conducted in accordance with the procedures set out in the *Austrroads Guide to Road Safety Part 6: Managing Road Safety Audits (2019)* and *Austrroads Guide to Road Safety Part 6A: Implementing Road Safety Audits (2019)*. The findings, recommendations and Safe System elements are provided for consideration by the client and any other interested parties.


Auditors:


..... 13/9/2021

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Senior Road Safety Auditor


..... 13/9/2021

Nathan Louey BEng (Hons)
Road Safety Auditor


..... 13/9/2021

Adrian Gray Engineering Intern
Road Safety Auditor



Appendix A: Photos



Photo 1: Park Street approaching St Kilda Road intersection – facing east



Photo 2: Park Street footpath (south) – facing west



Photo 3: Park Street and Palmerston Crescent intersection – facing west

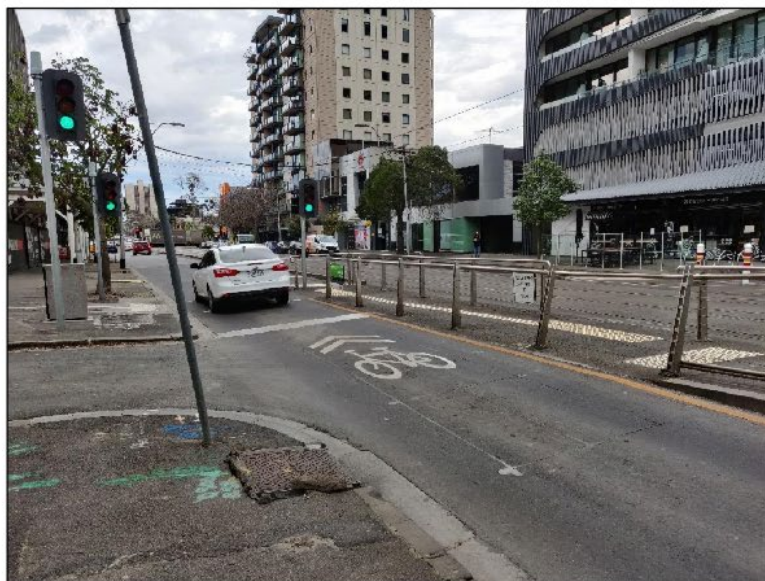


Photo 4: Park Street and Millers Lane intersection – facing west



Photo 5: Park Street approaching Kings Way intersection – facing west

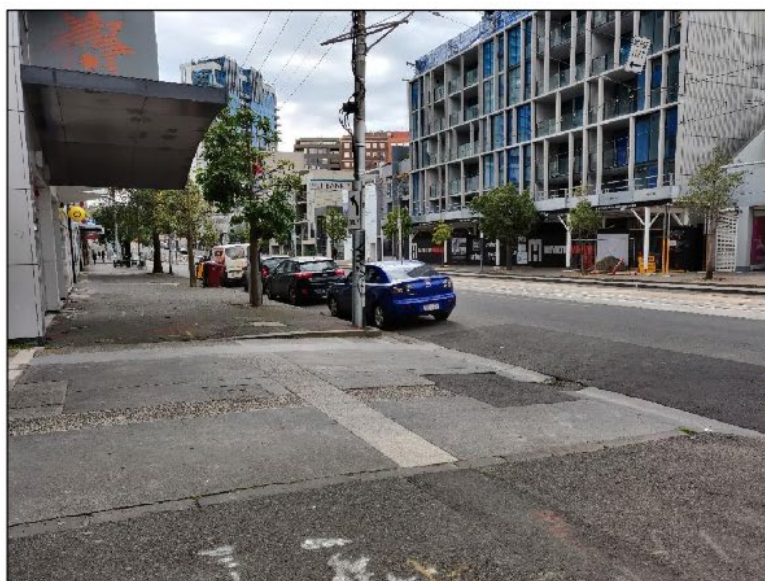


Photo 6: Park Street and Little Bank Street intersection – facing east



Photo 7: Park Street footpath (north) – facing east



Photo 8: Park Street and Palmerston Crescent intersection – facing east



Photo 9: Wells Street at Park Street intersection – facing south



Photo 10: Park Street at St Kilda Road intersection – facing east



Photo 11: Park Street footpath (south) – facing west (at night)



Photo 12: Park Street and Palmerston Crescent intersection – facing west (at night)



Photo 13: Park Street footpath (south) at tram stop – facing west (at night)



Photo 14: Park Street and Kings Way intersection – facing west (at night)



Photo 15: Park Street and Kings Way intersection – facing east (at night)

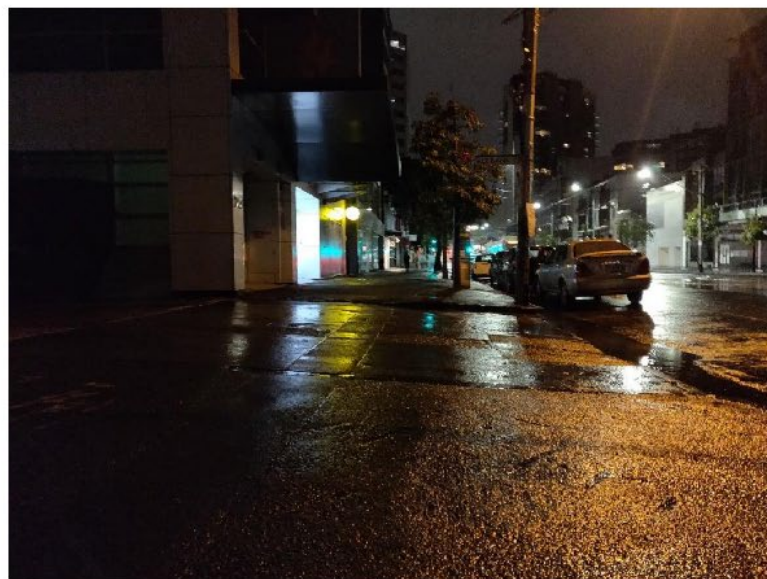


Photo 16: Park Street and Little Bank Street intersection – facing east (at night)



Photo 17: Park Street and Wells Street intersection – facing east (at night)

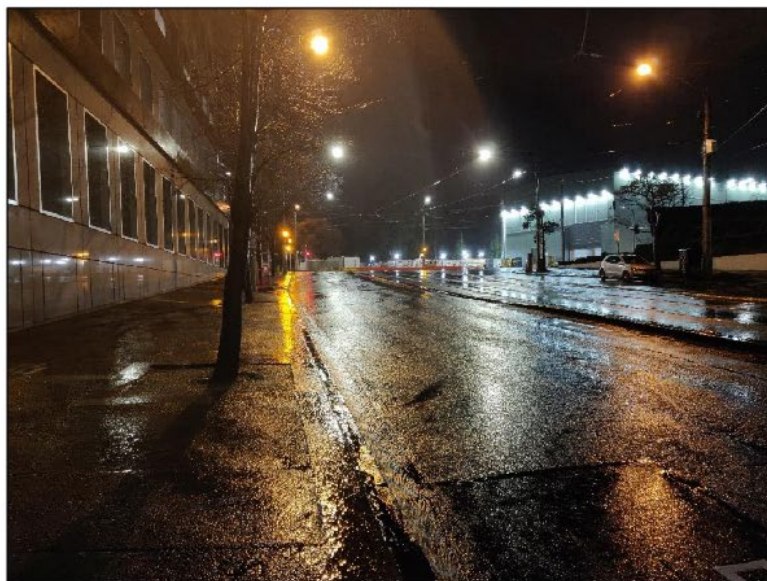


Photo 18: Park Street facing towards St Kilda Road intersection – facing east (at night)