
Cycle Superhighways Route East-West

Trinity Square Redesign

Stage 2 Road Safety Audit

Ref: 2263.36/000/A3211/TLRN/2017

Prepared for:

**Cycle Superhighways
TfL Projects and Programmes Directorate (PPD)**

By:

Road Safety Audit, TfL Engineering

Prepared by: Andrew Coventry, Audit Team Leader

Checked by: Chris Gooch, Audit Team Member

Approved by: Shane Martin

Version	Status	Date
A	Audit report issued to Client	07/11/2017



1.0 INTRODUCTION

1.1 Commission

- 1.1.1 This report results from a Stage 2 Road Safety Audit carried out on the Cycle Superhighways Route East-West, Trinity Square Redesign proposals.
- 1.1.2 The Audit was undertaken by TfL Road Safety Audit in accordance with the Audit Brief issued by the Client Organisation on 26th October 2017. It took place at the Palestra offices of TfL on 6th November 2017 and comprised an examination of the documents provided as listed in Appendix A, plus a visit to the site of the proposed scheme.
- 1.1.3 The visit to the site of the proposed scheme was made on 6th November 2017. During the site visit the weather was sunny and the existing road surface was dry.

1.2 Terms of Reference

- 1.2.1 The Terms of Reference of this Audit are as described in TfL Procedure SQA-0170 dated May 2014. The Audit Team has examined and reported only on the road safety implications of the scheme as presented and how it impacts on all road users and has not examined or verified the compliance of the designs to any other criteria. However, to clearly explain a safety problem or the recommendation to resolve a problem the Audit Team may, on occasion, have referred to a design standard without touching on technical audit. An absence of comment relating to specific road users / modes in Section 3 of this report does not imply that they have not been considered; instead the Audit Team feels they are not adversely affected by the proposed changes.
- 1.2.2 This Safety Audit is not intended to identify pre-existing hazards which remain unchanged due to the proposals; hence they will not be raised in Section 3 of this report as they fall outside the remit of Road Safety Audit in general as specified in the procedure SQA-0170 dated May 2014. Safety issues identified during the Audit and site visit that are considered to be outside the Terms of Reference, but which the Audit Team wishes to draw to the attention of the Client Organisation, are set out in Section 4 of this report.
- 1.2.3 Nothing in this Audit should be regarded as a direct instruction to include or remove a measure from within the scheme. Responsibility for designing the scheme lies with the Designer and as such the Audit Team accepts no design responsibility for any changes made to the scheme as a result of this Audit.
- 1.2.4 In accordance with TfL Procedure SQA-0170 dated May 2014, this Audit has a maximum shelf life of 2 years. If the scheme does not progress to the next stage in its development within this period, then the scheme should be re-audited.
- 1.2.5 Unless general to the scheme, all comments and recommendations are referenced to the detailed design drawings and the locations have been indicated on the plan located in Appendix B.
- 1.2.6 It is the responsibility of the Design Organisation to complete the Designer's response section of this Audit report. Where applicable and necessary it is the responsibility of the Client Organisation to complete the Client comment section of this Audit report. Signatures from both the Design Organisation and Client Organisation must be added within Section 5 of this Audit report. A copy of which must be returned to the Audit Team.

1.3 Main Parties to the Audit

1.3.1 Client Organisation

Client contact details: Alex Sykes – TfL Sponsorship
Rita Wanogho – TfL PPD

1.3.2 Design Organisation

Design contact details: Conway AECOM

1.3.3 Audit Team

Audit Team Leader: Andrew Coventry – TfL Road Safety Audit

Audit Team Member: Chris Gooch – TfL Road Safety Audit

Audit Team Observer: None present

1.3.4 Other Specialist Advisors

Specialist Advisor Details: None present

1.4 Purpose of the Scheme

1.4.1 The purpose of the scheme is to modify the layout at the junction of Trinity Square and Byward Street to facilitate the left turn from Byward Street.

1.5 Special Considerations

1.5.1 The Audit Team has no special considerations to raise.

2.0 ITEMS RAISED IN PREVIOUS ROAD SAFETY AUDITS

The proposals were subject to a Stage 1 Road Safety Audit carried out during May 2017 by TfL Road Safety Audit (ref: 2021.44/000/A3211/TLRN/2017). Items raised in that report can be summarised as follows:

Problem 3.1.1 Alignment of segregated facility may increase potential for conflict between cyclists or the physical island within the junction

This item is considered to remain in the proposed layout so is raised again as problem 3.1.1 in this Stage 2 Road Safety Audit.

Problem 3.2.1 Reduction in footway width may pose a hazard to pedestrians.

This item is considered to remain in the proposed layout so is raised again as problem 3.2.1 in this Stage 2 Road Safety Audit.

Problem 3.3.1 Close proximity of stop line may lead to left turning drivers from Trinity Square failing to appreciate the necessity to stop

This item is considered to remain in the proposed layout so is raised again as problem 3.3.1 in this Stage 2 Road Safety Audit.

Problem 3.4.1 Insufficient queue capacity may pose a hazard to road users

This item is considered to remain in the proposed layout so is raised again as problem 3.4.1 in this Stage 2 Road Safety Audit.

3.0 ITEMS RAISED AT THIS STAGE 2 ROAD SAFETY AUDIT

This section should be read in conjunction with Paragraphs 1.2.1, 1.2.2 and 1.2.3 of this report.

3.1 CYCLE FACILITIES

3.1.1 PROBLEM

Location: A – Trinity Square junction with Byward Street

Summary: Alignment of segregated facility may increase potential for conflict between cyclists or the physical island within the junction

The Audit Team is concerned that the alignment of the segregated facility requires a substantial deviation to the right for westbound cyclists to bypass the central island within the junction and the left turn facility for general traffic. The requirement for cyclists to make a substantial deviation may lead to eastbound cyclists ignoring the deviation and taking the more natural 'straight line' past the island. Cyclists who perform this manoeuvre are at an increased potential for conflict with opposing cyclists, or forcing opposing cyclists west into the central island. An exacerbated potential for conflict may therefore exist as a result.

RECOMMENDATION

It is recommended to modify the layout of the cycle track to remove the necessity for cyclists to deviate their path substantially. If this is not possible it may be beneficial to provide measures, such as additional road markings to highlight the alignment on the approach and adjacent to the island westbound.

Design Organisation Response	Accepted / Part Accepted / Rejected
The alignment is governed by the requirements for the traffic islands for signal equipment and realignment to the extent required to stop the deviation would not be possible. The designer will extend the cycleway centreline to the west to encourage the eastbound cyclists to stay within their lane. Additionally, the centreline on the approach to the pedestrian crossing from Trinity Square will be extended back to the 1010 marking to maximise the division between the east and westbound cycleway.	
Client Organisation Comments	
Agree with the designer. The alignment is necessary for requirements governed by signal equipment. Extending the cycle centreline will encourage cyclists to stay within their lane, additionally providing further markings to maximise division between eastbound and westbound cycleway will improve visibility for cyclists.	
Furthermore, the islands have been aligned so that a straight path through the junction is provided. This allows the cyclists to use the entire mouth of the junction when proceeding through.	

3.2 PEDESTRIAN FACILITIES

3.2.1 PROBLEM

Location: B – Tower Hill outside All Hallows Church

Summary: Reduction in footway width may pose a hazard to pedestrians.

The Audit Team is concerned that the footway cutback reduces the footway width available to pedestrians. This area is known to experience substantial pedestrian footfall, with pedestrian numbers already exceeding the space available. In the revised arrangement, pedestrians may walk within the carriageway due to the limited footway width, with an exacerbated potential for conflict with vehicles as a result.

Furthermore, the tight carriageway geometry may lead to westbound drivers travelling in close proximity to the footway, especially on the apex of the bend. Drivers who travel in close proximity to the kerb may increase the potential for pedestrians to be struck by overhanging or close passing wing mirrors / bodywork, further exacerbating a potential for conflict.

RECOMMENDATION

It is recommended to provide adequate footway provision for pedestrians. If this cannot be achieved, it may be beneficial to consider measures to discourage pedestrians entering the carriageway, such as a pedestrian deterrent similar to pedestrian guardrail.

Design Organisation Response	Accepted / Part Accepted / Rejected
<p>Guidance suggests that 2.0m is sufficient width to allow wheelchair users to pass one another. The footway width proposed outside All Hallows Church is 2.5m wide at minimum and is therefore considered sufficient in width to accommodate the volume and type of pedestrians likely to use it.</p>	
Client Organisation Comments	
<p>Agree with designer. A 2.5m pedestrian footway has been provided at this location, which meets the standard required for the number of pedestrians which will be using the footway. A Pedestrian audit was completed using established methods on the design. This confirmed that the Pedestrian Comfort Level (PCL) was not eroded.</p> <p>Pedestrian deterrents were considered at this location but were not deemed necessary following the PCL undertaken.</p> <p>The footway will be kept under review through the RSA 4A and 4B process after 12 and 36 months respectively. Should any additional measures need to be included these will be looked at and recommendations made.</p>	

3.3 JUNCTIONS

3.3.1 PROBLEM

Location: C – Byward Street east of Trinity Square

Summary: Close proximity of stop line may lead to left turning drivers from Trinity Square failing to appreciate the necessity to stop

It is proposed to allow left turning vehicles exiting Trinity Square to turn left onto a red traffic signal for the controlled pedestrian crossing facility across Byward Street. The Audit Team are concerned that the close proximity of the stop-line and traffic signals to the junction may lead to left turning drivers failing to appreciate the necessity to stop, especially as they have just been given a green signal to proceed. Left turning vehicles may therefore fail to stop at the pedestrian crossing, with an exacerbated potential for conflict with pedestrians using the facility as a result.

Alternatively, drivers may brake abruptly upon seeing the red traffic signal. Following drivers may not anticipate a driver ahead braking abruptly on the exit from the junction with an exacerbated potential for late braking 'shunt' type conflicts.

RECOMMENDATION

It is recommended that the method of control be altered so left turning drivers are not required to stop on the exit to the junction.

Design Organisation Response	Accepted / Part Accepted / Rejected
The traffic signal design and operation is outside of the designers remit and comment is therefore to be referred back to the client organisation.	
Client Organisation Comments	
The left turn from Trinity Square onto an internal stop line is not an unknown method of operation in London. The internal stop line has been designed to provide a distance of c.17m from the eastern kerb of Trinity Square and the stop line on Tower Hill to ensure left turning drivers are suitably aware of the stop line.	
To minimise any see through problems and driver confusion, the pedestrian crossing across Tower Hill and the green the signal for traffic on Trinity Square will always appear together if either is demanded. Additionally, when traffic on Trinity Square gets a green signal the pedestrian crossing across Tower Hill will always be on a green man. This proposed layout and junction operation was reviewed and accepted by TfL's Highway and Traffic Principle Engineer and passed a full traffic signals safety check.	
Whilst no issues are anticipated a police presence will be requested on site to enforce compliance of the internal stop line and ensure road users adapt to the new layout. In addition the location will be kept under review through the RSA 4A and 4B process after 12 and 36 months respectively.	

3.4 CARRIAGEWAYS

3.4.1 PROBLEM

Location: D – Byward Street west of Trinity Square

Summary: Insufficient queue capacity may pose a hazard to road users

The Audit Team is concerned that the length of the left turn flare may not be adequate to accommodate the volume of left turning vehicles at this location. The left and the ahead lanes operate independently with the ahead proceeding first. Should the left turn lane queue extend beyond the length of the left turn lane, eastbound drivers may attempt to bypass the queue by crossing over the double white lines. Drivers undertaking this manoeuvre are at an exacerbated potential for conflict with opposing westbound vehicles.

RECOMMENDATION

It is recommended to ensure the left turn flare is sufficient to accommodate the volume of left turning vehicles. If this cannot be achieved it may be beneficial to ensure the left turn lane and the ahead lane run concurrently to negate the necessity to pass a static queue.

Design Organisation Response	Accepted / Part Accepted / Rejected
The traffic signal design, modelling and operation is outside of the designers remit and comment is therefore to be referred back to the client organisation.	
Client Organisation Comments	
The left turn flare has been designed to maximise the capacity and cater for the expected demand.	
The green time for left turning traffic into Trinity Square will be reviewed post implementation and increased should it be necessary. Furthermore a continuous review of the queue lengths and performance of the corridor will be undertaken, ensuring they run safely and efficiently.	

End of list of problems identified and recommendations offered in this Stage 2 Road Safety Audit

4.0 ISSUES IDENTIFIED DURING THE STAGE 2 ROAD SAFETY AUDIT THAT ARE OUTSIDE THE TERMS OF REFERENCE

Safety issues identified during the audit and site inspection that are considered to be outside the Terms of Reference, but which the Audit Team wishes to draw to the attention of the Client Organisation, are set out in this section. It is to be understood that, in raising these issues, the Audit Team in no way warrants that a full review of the highway environment has been undertaken beyond that necessary to undertake the Audit as commissioned.

4.1 ISSUE

Location: General to scheme, multiple locations

Reason considered to be outside the Terms of Reference: Drafting error

The Audit Team noted the drawings indicate Evo-S bollards on the traffic islands although the proposed signs drawings and sign schedule do not identify all the indicated bollard locations. It is recommended that the correct 'keep left', 'keep right' or plain faced sign are used at the proposed bollard locations.

Design Organisation Response	Accepted / Part Accepted / Rejected
Accepted. Drawings and schedules to be reviewed and amended to include all bollards.	
Client Organisation Comments	
Agree with designer. Designs to be amended and updated to include all bollard types.	

5.0 SIGNATURES AND SIGN-OFF

5.1 AUDIT TEAM STATEMENT

We certify that we have examined the drawings and documents listed in Appendix A. to this Safety Audit report. The Road Safety Audit has been carried out in accordance with TfL Procedure SQA-0170 dated May 2014, with the sole purpose of identifying any feature that could be removed or modified in order to improve the safety of the measures. The problems identified have been noted in this report together with associated suggestions for safety improvements that we recommend should be studied for implementation.

No one on the Audit Team has been involved with the design of the measures.

AUDIT TEAM LEADER:

Name: Andrew Coventry
BEng (Hons), CMILT, MCIHT, MSoRSA

Signed: 

Date: 07/11/2017

Organisation: Transport for London, Road Safety Audit
Engineering Services

Address: 4th Floor Palestra, 197 Blackfriars Road, London, SE1 8NJ

Contact: 

AUDIT TEAM MEMBER:

Name: Chris Gooch
BSc. (Hons), CMILT, MCIHT, MSoRSA

Signed: 

Date: 07/11/2017

Organisation: Transport for London, Road Safety Audit
Engineering Services

Address: 4th Floor Palestra, 197 Blackfriars Road, London, SE1 8NJ

Contact: 

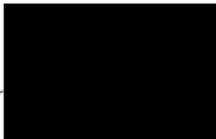
5.2 DESIGN TEAM STATEMENT

In accordance with SQA-0170 dated May 2014, I certify that I have reviewed the items raised in this Stage 2 Safety Audit report. I have given due consideration to each issue raised and have stated my proposed course of action for each in this report. I seek the Client Organisation's endorsement of my proposals.

Name: Andrew Child

Position: Associate Director

Organisation: AECOM

Signed: 

Dated: 13/11/2017

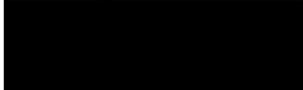
5.3 CLIENT ORGANISATION STATEMENT

I accept these proposals by the Design Organisation.

Name: ALEXANDER SYKES

Position: SPONSOR

Organisation: TRANSPORT FOR LONDON

Signed: 

Dated: 28/11/17.

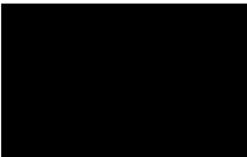
5.4 SECONDARY CLIENT ORGANISATION STATEMENT (where appropriate)

I accept these proposals by the Design Organisation.

Name: JONATHAN HANES

Position: LEAD SPONSOR

Organisation: TRANSPORT FOR LONDON

Signed: 

Dated: 22/11/17

APPENDIX A

Documents Forming the Audit Brief

DRAWING NUMBER

60320925-F001-DWG-0101-0102
 (revision 1)
 60320925-F001-DWG-0103-0104
 (revision 1)
 60320925-F001-DWG-0105-0106
 (revision 1)
 60320925-F001-DWG-0107
 (revision 1)
 60320925-F001-DWG-0108
 (revision 1)
 60320925-F001-DWG-0201-0202
 (revision 1)
 60320925-F001-DWG-0503-0504
 (revision 1)
 60320925-F001-DWG-0701-0702
 (revision 1)
 60320925-F001-DWG-1101-1102
 (revision 1)
 60320925-F001-DWG-1201-1202
 (revision 1)
 60320925-F001-DWG-1203-1204
 (revision 1)
 60320925-F001-DWG-1205-1207
 (revision 1)
 60320925-F001-DWG-1301-1302
 (revision 1)
 60320925-CP12-SD-0401-1201
 (revision 1)

DRAWING TITLE

Existing Site Layout
 Proposed Site Layout
 Setting Out
 Proposed Utility Diversion
 Setting Out
 Site Clearance
 Proposed Contours
 Proposed Pavement
 Kerb and Footway
 Proposed Signs and Lining
 Setting Out Road Markings
 Proposed Sign Schedule
 Lighting
 Standard Details

DOCUMENTS

- Safety Audit Brief
- Site Location Plan
- Traffic signal details
- TfL signal safety checklist
- Previous Road Safety Audits
- Previous Designer Responses
- Collision data
- Traffic flow / modelling data
- Other documents

DETAILS (where appropriate)

APPENDIX B

Problem Locations



