

South St Andrew Street, Edinburgh

Tram Cycle Safety
Road Safety Audit Stage 2

The City of Edinburgh Council

Project number: 60584045
AECOM Reference: RSA/370/S2A

6 April 2023

Quality information

Prepared by	Checked by	Verified by	Approved by
Senior Engineer	Principal Engineer	Associate Director	Associate Director

Revision History

Revision	Revision date	Details	Authorised	Name	Position
-	06/04/2023	RSA Team Approval and Verification			Associate Director
0	06/04/2023	FINAL Report Issue to Client			Associate Director

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1. Project Details

Report Title:	South St Andrews Street, Edinburgh Stage 2 Road Safety Audit
Date:	05/04/2023
AECOM Document Reference:	RSA/370/S2A
Overseeing Organisation Reference:	-
Prepared By:	AECOM
Overseeing Organisation:	The City of Edinburgh Council

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2. Introduction

- 2.1 This report results from a Stage 2 Road Safety Audit carried out on the proposal to provide walking and cycling improvements along the alignment of the Edinburgh Tram at the junction with Princes Street and South St Andrew Street, Edinburgh. The Audit was carried out at the request of the City of Edinburgh Council (the Overseeing Organisation).
- 2.2 The report indicates each of the problems identified together with recommendations to solve or mitigate the problems, the Audit Team Statement and a schedule of documents reviewed.
- 2.3 This is the second formal Road Safety Audit of the scheme. A Combined Stage 1/2 Road Safety Audit was undertaken in June 2018 (Ref: RSA/18/017/RSA2) on a wider package of improvements to active travel infrastructure along the Edinburgh Tram line, including the junction of Princes Street and South St Andrew Street. Alterations to the design have warranted a re-auditing of the scheme. Any items outstanding from the most recent Road Safety Audit are provided in section 3 of this report.
- 2.4 The Audit Team who were approved by Brendan Forrester of the City of Edinburgh Council (the Overseeing Organisation) were as follows:

Team Leader

CEng FIHE RegRSA (IHE), Certificate of Competency in Road Safety Audit
Associate Director, AECOM

Team Member

EngTech MICE MIHE RegRSA (IHE) MCIHT MSoRSA
Senior Engineer, AECOM

Team Member

MEng(hons) MCIHT MSoRSA Certificate of Competency in Road Safety Audit
Principal Engineer, AECOM

- 2.5 A Road Safety Audit brief was provided and approved by Brendan Forrester of the City of Edinburgh Council (the Overseeing Organisation). This brief was accepted by the Audit Team.
- 2.6 The Road Safety Audit took place at AECOM's Edinburgh office during March to April 2023. The Road Safety Audit consisted of an examination of the documents provided by the designers (see Appendix A). In addition to examining the documents supplied, the Audit Team visited the site together on 28th March 2023 between 17:30 hrs and 18:30 hrs. During this time the weather conditions were wet with a light rain, and the carriageway and footway surfaces were wet / damp. Traffic flows were high, although no congestion was evident.
- 2.7 Construction works were ongoing at the time of the site investigation, with the extents of the construction site being fenced off. The Audit Team were therefore unable to access these areas.
- 2.8 The scheme is located on Princes Street in Edinburgh at the junction with South St Andrews Street, located in the city centre. Princes Street is a wide single carriageway urban road, with a speed limit of 20 mph. The scheme is bounded by commercial and recreation frontages. There are three pedestrian crossings within the scheme extents and the carriageway has footways present on both sides of each of the roads. The area is illuminated by a system of street lighting.
- 2.9 The scheme comprises a new cycle facility to enable cyclists to cross over tram tracks at a determined angle. These proposals include a mixture of cycle lanes at carriageway level and a segregated facility at existing footway level. A new cycle crossing of the tram tracks over the junction of South St Andrews Street and Princes Street is proposed, along with footway build outs and carriageway resurfacing works. Since the previous audit report in 2018, the junction into Waverley Bridge has been closed off as part of a Spaces for People scheme. This closure was

implemented late in 2020 as a temporary measure and is still in place. The closure effectively prevents any vehicle from entering or exiting Waverley Bridge.

- 2.10 The terms of reference of the Road Safety Audit are as described in GG119 of the Design Manual for Roads and Bridges. The Road Safety Audit Team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the designs to any other criteria. The scheme has not been examined or verified for compliance with any other standards. However, in order 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 for information only. Any Audit comments should not be construed as implying that a technical audit has been undertaken in any respect.
- 2.11 Section 3 of this report includes outstanding issues identified from previous Audit Reports and Section 4 describes the safety issues identified in this Stage 2 Audit together with recommendations for improvement, to either remove or reduce the associated risk in connection with this highway proposal.
- 2.12 Any recommendations included within this report should not be regarded as being prescriptive design solutions to the problems raised. They are intended only to indicate a proportionate and viable means of eliminating or mitigating the identified problem, in accordance with GG119, and in no way imply that a formal design process has been undertaken. There may be alternative methods of addressing a problem which would be equally acceptable in achieving the desired elimination or mitigation and these should be considered when responding to this report.
- 2.13 No departures from standards have been notified to the Audit Team on the proposals.
- 2.14 All traffic sign and road marking diagram number references are made to The Traffic Signs Regulations and General Directions, 2016 (TSRGD).
- 2.15 Where applicable, the locations of problems are shown in conjunction with the scheme proposals in Appendix B where the reference numbers relate to the problems identified in this report.
- 2.16 The Design Organisation(s) and Overseeing Organisation are advised of the following:
 - a. The RSA team shall produce and issue an RSA report directly to the Overseeing Organisation for all stages. Where changes are agreed to an RSA report between the RSA team and Overseeing Organisation, a revised version of the RSA report shall be produced by the RSA team and issued to the Overseeing Organisation.
 - b. Following the issue of the Road Safety Audit report the Road Safety Audit Response Report is produced by the Design Organisation(s) in collaboration with the Overseeing Organisation. To assist with this, the Design Team must prepare a Road Safety Audit Response Report to the audit at Stage 1, 2 and 3 Road Safety Audits.
 - c. The Road Safety Audit Response Report must contain a response from the Overseeing Organisation and a Road Safety Audit action for each problem agreed between the Design Organisation(s) and the Overseeing Organisation. The Overseeing Organisation and Design Organisation(s) shall sign the Road Safety Audit Response Report to indicate their agreement on the Road Safety Audit actions. A copy of the signed Road Safety Audit Response Report is to be sent to the Audit Team Leader for information.

3. Items Outstanding from Previous Audits

- 3.1 This is the second Road Safety Audit of the scheme. A Combined Stage 1/2 Road Safety Audit was carried out in June 2018 (Ref: RSA/18/017/RSA2). Outstanding issues from the most recent Road Safety Audit are provided below.

Stage 2	3.1.1	Stage 1/2	3.1.1
Problem Ref:		Problem Ref:	

Location(s):	South St Andrew Street, Edinburgh – North Eastern Signalised Crossing
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Drawing(s):	60487449-DD-C-WP1-4.2.1-0701, 60487449-DD-C-WP1-4.2.1-0702, & 60487449-DD-C-WP1-4.2.1-1201
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Summary:	Potential for new low level cycle signal to be obscured by a utility / communications cabinet, increasing the risk of missed signals and collision with trams.
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Description:

The location of the new low-level signal is located downstream of a utility / communications cabinet, there is a risk that the cabinet may reduce visibility or obscure the signal head, potentially resulting in cyclists riding across South St Andrew Street during a tram signal phase. This issue is exacerbated by the curved alignment of the approach maximising the time the signal maybe obscured.

Stage 1/2 Recommendation:

It is recommended that visibility to the low-level cycle signal is clear and unobstructed.

Designer's Response:

-

Stage 2 Comment:

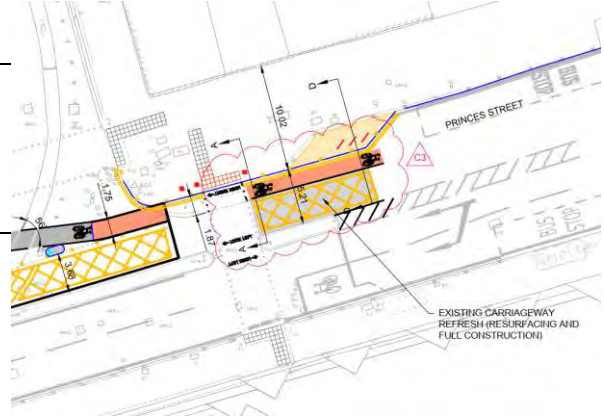
It is recommended that visibility to the low-level cycle signal is clear and unobstructed or that a secondary signal head for cyclists is provided.

Stage 2 3.1.2	Stage 1/2 3.3.1
Problem Ref:	Problem Ref:

Location(s): South St Andrew Street, Edinburgh

Drawing(s): 60487449-DD-C-WP1-4.2.1-0201,
60487449-DD-C-WP1-4.2.1-0701,
& 60487449-DD-C-WP1-4.2.1-0702

Summary: Risk of conflict between non-motorised road users and motorised road users due to increased crossing times.



Description:

The proposals are relocating the frontiers of the pedestrian crossings on the north side of Princes Street by a minimum of 1.75m, thus increasing the crossing time for non-motorised road users. It is unclear from the information provided if the signal timings have been altered to accommodate the increased crossing time; if not, non-motorised road users may be exposed to conflict with motorised road users.

Stage 1/2 Recommendation:

It is recommended that the signal times provide sufficient time for non-motorised road users to safely cross the road.

Designer's Response:

-

Stage 2 Comment:

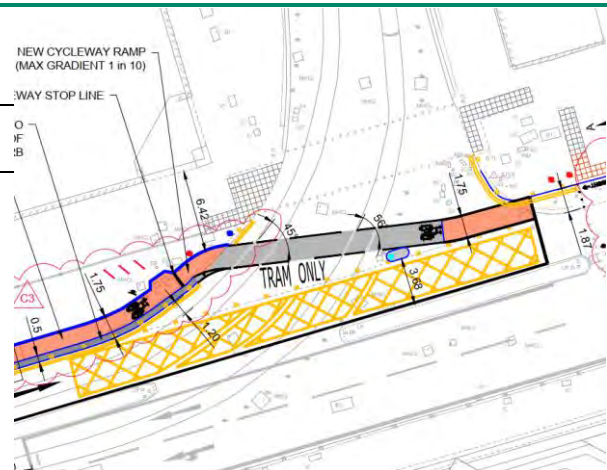
It is recommended that the signal times provide sufficient time for non-motorised road users to safely cross the road.

Stage	2	3.1.3	Stage	1/2	3.4.1
Problem Ref:	Problem Ref:				

Location(s): Princes Street, Edinburgh – Scheme extents

Drawing(s): 60487449-DD-C-WP1-4.2.1-0701

Summary: Risk of cyclists falling from their bicycle and sustaining a personal injury.



Description:

The angle of the crossing over the tram tracks is between 45° and 56° across the South Street Andrew Street-bound tram line. At such angles, there is a risk that cyclists could get one or both of their wheels stuck in the tram tracks or slipping / skidding on the tram track, leading to them falling and sustaining a personal injury.

"Guidance on Tramways - Railway Safety Publication 2" by the Office of Rail Regulation (2006) states that crossing angles should be *"as far as possible, at right angles to the tracks"* and *"Where the achieved crossing angle is less than 60°, consideration should be given to alternative crossing layouts and other measures that mitigate the risks faced by cyclists"*.

Furthermore, on the City of Edinburgh Council's 'Tram Safety' web page, under the "Advice for Cyclists" section it is advised to *"Cross the tracks close to a right angle. This will not always be possible, but by crossing as close to a right angle as you can you'll avoid slipping on the tracks."*

Stage 1/2 Recommendation:

It is recommended that the crossing angles are increased to 90°, or close to 90°, and that the layouts are amended accordingly.

Designer's Response:

-

Stage 2 Comment:

It is recommended that the crossing angles are increased to 90°, or close to 90°, and that the layouts are amended accordingly.

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4. Items Resulting from the Combined Stage 1/2 Road Safety Audit

4.1 General

4.1.1 No problems identified at this Stage 2 Road Safety Audit.

4.2 Local Alignment

4.2.1 No problems identified at this Stage 2 Road Safety Audit.

4.3 Junctions

4.3.1 No problems identified at this Stage 2 Road Safety Audit.

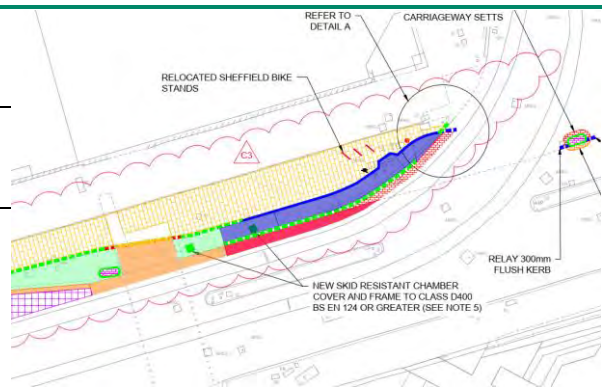
4.4 Non-Motorised User Provision

Problem: 4.4.1

Location(s): Princes Street, Edinburgh – Scheme extents

Drawing(s): 60487449-DD-C-WP1-4.2.1-0701 & 60487449-DD-C-WP1-4.2.1-0702

Summary: Risk of collisions between opposing non-motorised road users and cyclists resulting in personal injury



Description:

The Audit Team have not been provided anticipated walking and cycling flow rates; however, it is acknowledged that the scheme passes through one of the busiest areas in Edinburgh. The addition of the infrastructure proposed at the tram crossing continues the development of Active Travel infrastructure in the city centre and existing active travel flows are likely to be high. Whilst it is noted that the DMRD CD195 and 'Cycling by Design' state the desirable width for one-way cycling is 2.5m; both qualify this based on flow. CD195 suggest 2.0m is suitable for 150 cycles per hour or less and 'Cycling by Design' 300 cycles per hour or less. It is unclear if the provided width of between 1.75m and 1.87m will be sufficient for the anticipated flow of active travel users.

If cycleways are not sufficiently wide there is a risk of conflict and potential collisions resulting in personal injury, either as a result of cyclists entering the footway due to congestion on the cycleway or pedestrians stepping onto the cycleway. It is noted that the width of footways alongside the cycleways are generally the same as they are currently.

The issue could be exacerbated by the limited physical segregation. Whilst it is noted there will be a 50mm separation in levels between the footway and cycleway the chamfered kerbs would make transition between the footway and cycleway fairly easy.

Recommendation:

It is recommended that the footway and cycleway provision is sufficiently wide to accommodate the likely / anticipated pedestrian and cycle flows.

Problem: 4.4.2

Location(s): Princes Street, Edinburgh – Scheme extents

Drawing(s): 60487449-DD-C-WP1-4.2.1-0701 & 60487449-DD-C-WP1-4.2.1-0702

Summary: Risk of non-motorised road users collided with the street furniture or make a sudden manoeuvre, resulting in loss of control type collisions or coming into conflict with other non-motorised road users.

Secondary risk that the location of the traffic signal cabinet could also mask pedestrians, who may inadvertently step into the cycleway and be struck by passing cyclists resulting in personal injury.

**Description:**

During the site investigation it was observed that the presence of the existing traffic signal cabinet and feeder pillars during the hours of darkness or of poor visibility is difficult for non-motorised road users, especially cyclists and those that may not be familiar with the layout at the junction. If these features are not clear to cyclists, there is a risk that they could collide with the cabinets or make a sudden manoeuvre to avoid the street furniture, resulting in loss of control type collisions or coming into conflict with other non-motorised road users.

There is a secondary risk that the location of the traffic signal cabinet could also mask pedestrians, who may inadvertently step into the cycleway and be struck by passing cyclists resulting in personal injury.

The issue could be exacerbated by the limited physical segregation. Whilst it is noted there will be a 50mm separation in levels between the footway and cycleway the chamfered kerbs would make transition between the footway and cycleway fairly easy.

Recommendation:

It is recommended that the visibility of the street furniture be maximised and be made appropriately conspicuous during hours of darkness / periods of reduced visibility.

Problem: 4.4.3

Location(s): Princes Street, Edinburgh – Dropped signalised crossings locations

Drawing(s): 60487449-DD-C-WP1-4.2.1-0701 & 60487449-DD-C-WP1-4.2.1-0702

Summary: Risk that non-motorised road users, particularly mobility or visually impaired users, may slip or inadvertently step onto the slopes and fall, especially in wet conditions, resulting in personal injury.

**Description:**

From the plans provided to the Audit Team, it was observed that the transition between the existing kerb upstand of approximately 100mm and the dropped kerb of between zero and six millimetres is proposed to occur over a single kerb length. The Roads for All: Good Practice Guide for Roads, Section 4.1.9, Page 12 and 13 states the following:

"That the use of single transition kerbs at crossings is common practice throughout Scotland, but this results in most footways exceeding the maximum recommended gradients. 'Inclusive Mobility' deals with design of footways and states that the maximum gradient should be 8 per cent (1 in 12) in such circumstances. All dropped kerbs at crossing installations are to be dropped over two transition kerb lengths to achieve the required approach gradients unless the layout of the crossing provides an alternative way of achieving this."

There is a risk that non-motorised road users, particularly mobility or visually impaired users, may slip or inadvertently step onto the slopes and fall, especially in wet conditions, resulting in personal injury.

Recommendation:

It is recommended that suitable transitions that meet the recommended approach gradients be provided at dropped crossing points.

4.5 Road Signs, Carriageway Markings and Lighting

Problem: 4.5.1

Location(s): Princes Street, Edinburgh – Scheme extents

Drawing(s): 60487449-DD-C-WP1-4.2.1-0701 & 60487449-DD-C-WP1-4.2.1-1201

Summary: Risk of non-motorised users colliding with a sign pole or other street furniture and sustaining a personal injury due to appropriate colour contrasting banding not being provided.



Description:

From the plans provided to the Audit Team a number of existing and new traffic signs and poles are provided / proposed at several locations. It is unclear if colour contrasting banding is to be provided on the traffic sign posts and other street furniture. If such banding is not provided, there is a risk of visually impaired pedestrians not being able to differentiate the safest route through the area and colliding with these, resulting in personal injury.

Recommendation:

It is recommended that appropriate colour contrasting banding is provided on the signposts and other street furniture.

End of problems / recommendations raised in this Stage 2 Road Safety Audit.

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5. Audit Team Statement

We certify that this Road Safety Audit has been carried out in accordance with GG119.

AUDIT TEAM LEADER:

Name: [REDACTED] CEng FIHE RegRSA (IHE), HE
Certificate of Competency in Road Safety Audit Signed: [REDACTED]

Position: Associate Director Date: 05/04/2023

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AUDIT TEAM MEMBER:

Name: [REDACTED] EngTech MICE MIHE MCIHT
MSoRSA RegRSA (IHE) Signed: [REDACTED]

Position: Senior Engineer Date: 05/04/2023

Organisation: AECOM

AUDIT TEAM MEMBER:

Name: [REDACTED] MEng(hons) MCIHT MSoRSA HE
Certificate of Competency in Road Safety Audit Signed: [REDACTED]

Position: Principal Engineer Date: 05/04/2023

Organisation: AECOM

Enquiries regarding this Road Safety Audit should be made to the Audit Team Leader.

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Appendix A Documents Submitted to the Audit Team

The following documents were submitted as part of the Road Safety Audit:

Document Number	Rev	Description	Date
DOCUMENTS			
-	-	Princes Street/St Andrews Square, Tram Cycle Safety, Stage 2 Road Safety Audit Brief	Mar 2023
RSA/18/017/RSA2	-	Tram Walking and Cycling Improvements Phase 3, Road Safety Audit Stage 1/2	Aug 2018
DRAWINGS			
60487449-DD-C-WP1-4.2.1-0001	C0	Location Plan	Aug 2022
60487449-DD-C-WP1-4.2.1-0101	C0	Existing Public Utilities	Aug 2022
60487449-DD-C-WP1-4.2.1-0201	C3	Site Clearance	Mar 2023
60487449-DD-C-WP1-4.2.1-0501	C2	Drainage Plan	Mar 2023
60487449-DD-C-WP1-4.2.1-0701	C3	General Arrangement	Mar 2023
60487449-DD-C-WP1-4.2.1-0702	C3	Civils Works	Mar 2023
60487449-DD-C-WP1-4.2.1-0703	C1	Cross Sections	Mar 2023
60487449-DD-C-WP1-4.2.1-0703A	C2	Cross Sections	Feb 2023
60487449-DD-C-WP1-4.2.1-0704	C2	Setting Out Details	Mar 2023
60487449-DD-C-WP1-4.2.1-0901	C0	Construction Details 1 of 4	Aug 2022
60487449-DD-C-WP1-4.2.1-0902	C1	Construction Details 2 of 4	Mar 2023
60487449-DD-C-WP1-4.2.1-0903	C0	Construction Details 3 of 4	Aug 2022
60487449-DD-C-WP1-4.2.1-0904	C2	Construction Details 4 of 4	Mar 2023
60487449-DD-C-WP1-4.2.1-1201	C2	Traffic Signs and Road Markings	Mar 2023
60487449-DD-C-WP1-4.2.1-1301	C2	Illuminated Sign Connection	Mar 2023

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