

STAGE 1 ROAD SAFETY AUDIT REPORT FOR ACTIVE TRAVEL IMPROVEMENTS BETWEEN MEADOWS AND GEORGE STREET, EDINBURGH.



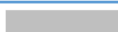
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**Meadows to George Street, Edinburgh.
Road Safety Audit Stage 1**

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Report Title	Stage 1 Road Safety Audit Report For Active Travel Improvements Between Meadows And George Street, Edinburgh.			
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Prepared for	City of Edinburgh Council (Overseeing Organisation).			
Report Author Signature				
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Issued by Signature				
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1. INTRODUCTION.

1.1. The objective of a Road Safety Audit (RSA) is to identify any aspects of a road design or construction scheme that could give rise to road safety concerns and, where possible, to suggest modifications that would improve the road safety of the resultant scheme. This report results from a Stage 1 RSA carried out on the design of cycleway, footway and carriageway improvements along roads between Meadows and George Street in Edinburgh. The audit was instructed by City of Edinburgh Council and was carried out by Wyllie Lodge Ltd, Independent Road Safety Consultants on behalf of Stantec UK Ltd.

1.2. The Audit Team members were;

Audit Team Leader

[REDACTED]

Audit Team Member

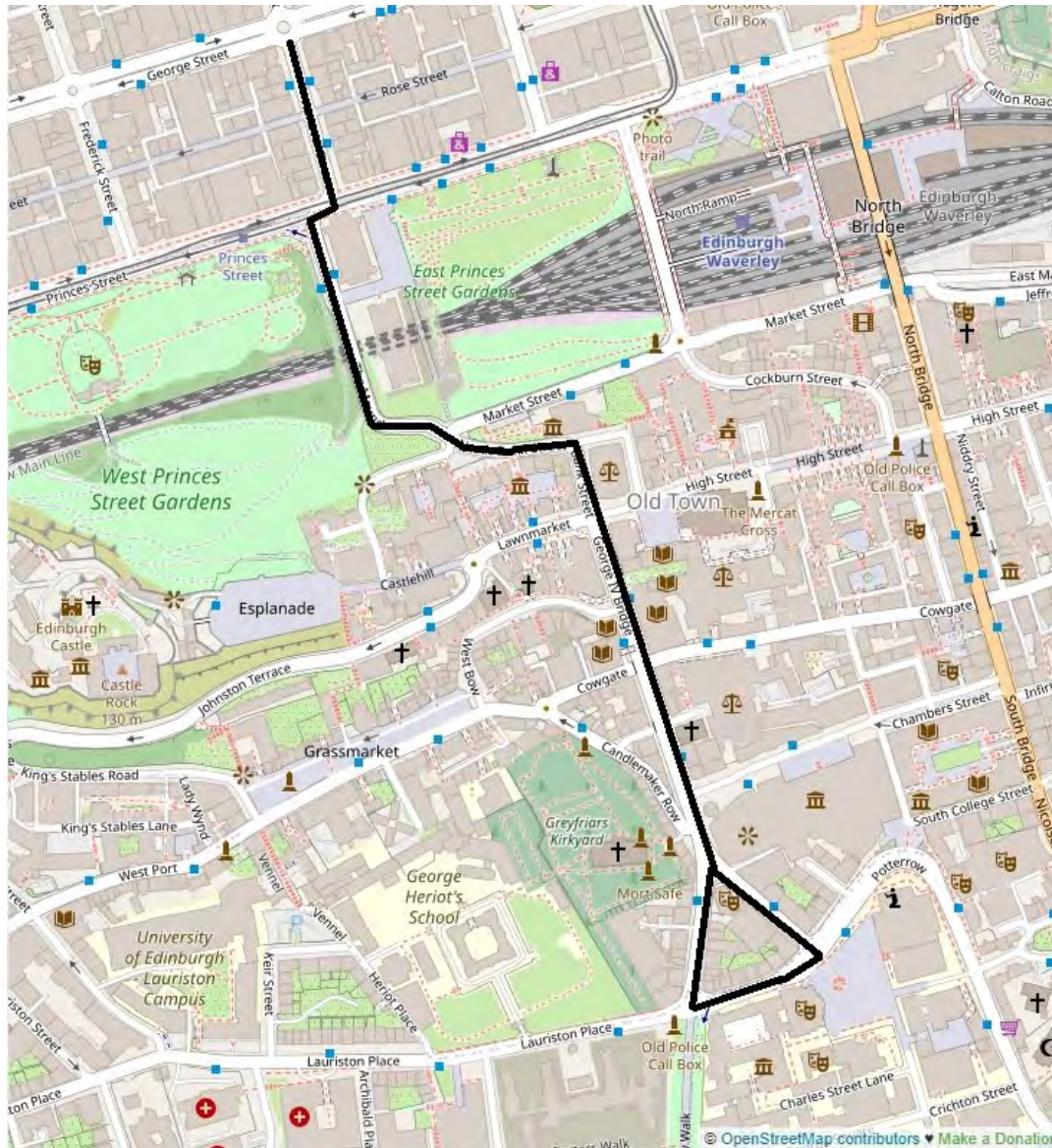
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Both audit team members hold the Transport Scotland / Highways Agency Certificate of Competence in Road Safety Auditing.

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2. PROJECT DETAILS.

- 2.1. The project consists of the reallocation of road space to provide improved facilities for people to walk, cycle and access public transport, and introduces access restrictions for some categories of vehicles, along the roads between Meadows and George Street Edinburgh. This route (shown in black below) connects the neighbourhood of University of Edinburgh campus with the city centre and is an arterial route within the wider city cycle network.



Location Plan.

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2.2. The audited proposals include;

- 2.2.1. 1.5m wide one-way cycle lanes along both sides on Hanover Street and the repositioning of bus stops and service bays.
- 2.2.2. Reconfiguration of the traffic signals at the junction of Hanover Street, Princes Street and The Mound to include cycle only stages and cycle lane markings across the tramlines that run along Princes Street.
- 2.2.3. A 3.0m wide two-way segregated cycle lane along the east side of The Mound with a 2.5m wide pedestrian refuge between the cycle lane and the southbound bus stop.
- 2.2.4. Reconfiguration of the traffic signals at the junction of The Mound, Market Street, North Bank Street and Mound Place to include a cycle only stage.
- 2.2.5. A 2.5 - 3.0m wide two-way segregated cycle lane along North Bank Street.
- 2.2.6. The introduction of traffic signals to control a one-way vehicle traffic flow around the bend between North Bank Street and Bank Street.
- 2.2.7. A left turn only exit from St Giles Street onto Bank Street.
- 2.2.8. A 3.0m wide two-way segregated cycle lane along Bank Street.
- 2.2.9. Reconfiguration of the traffic signals at the junction of Bank Street, Royal Mile, George IV Bridge and Lawnmarket to include a cycle only stage.
- 2.2.10. A 3.0m wide two-way segregated cycle lane along the east side of George IV Bridge with a 2.0m wide pedestrian refuge between the cycle lane and the vehicular carriageway. The repositioning and narrowing of the vehicle carriageway to 6.5m, the repositioning of bus stops and provision of a zebra crossing.
- 2.2.11. Reconfiguration of the junction of George IV Bridge and Chambers Street to provide segregated signalised crossing facilities for pedestrians and cyclists.
- 2.2.12. Providing a priority give way system on Candlemakers Row at its junction with George IV Bridge.
- 2.2.13. Reconfiguration of the junction of George IV Bridge, Bristo Place and Forrest Road to provide segregated signalised crossing facilities for pedestrians and cyclists.
- 2.2.14. Restricting vehicle access to Forrest Road and making it one-way northbound for permitted vehicles and two-way for cyclists. Widening footways and improving the public realm.
- 2.2.15. Providing a simpler and more direct signalised crossing of Teviot Place between Middle Meadow Walk and Forrest Road.

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- 2.2.16. Changing Bristo Place from a one-way traffic flow to a two-way flow and providing an on-carriageway southbound 1.5m wide cycle lane.
- 2.2.17. Changing Teviot Place from a one-way traffic flow to a two-way traffic flow and providing an on-carriageway westbound 1.5m wide cycle lane.
- 2.2.18. Reconfiguration of the traffic signals at the junction of Teviot Place and Bristo Place.

An overview plan of the proposal is shown in appendix A and detailed plans shown in appendix B.

- 2.3. The information made available for the audit is listed below;

Drawing Ref.	Title
60579473-SHT-C-0000	Design Proposals – Overview.
60579473-SHT-C-0001	Design Proposals - Sheet 1 of 7.
60579473-SHT-C-0002	Design Proposals - Sheet 2 of 7.
60579473-SHT-C-0003	Design Proposals - Sheet 3 of 7.
60579473-SHT-C-0004	Design Proposals - Sheet 4 of 7.
60579473-SHT-C-0005	Design Proposals - Sheet 5 of 7.
60579473-SHT-C-0006	Design Proposals - Sheet 6 of 7.
60579473-SHT-C-0007	Design Proposals - Sheet 7 of 7.
60579473-SHT-C-0008	Cross Sections - Sheet 1 of 3.
60579473-SHT-C-0009	Cross Sections - Sheet 2 of 3.
60579473-SHT-C-0010	Cross Sections - Sheet 3 of 4.
60579473-SHT-C-0901	Pavement Construction Details.
60579473-SHT-C-1201	Traffic Signs and Markings - Sheet 1 of 7.
60579473-SHT-C-1202	Traffic Signs and Markings - Sheet 2 of 7.
60579473-SHT-C-1203	Traffic Signs and Markings - Sheet 3 of 7.
60579473-SHT-C-1204	Traffic Signs and Markings - Sheet 4 of 7.
60579473-SHT-C-1205	Traffic Signs and Markings - Sheet 5 of 7.
60579473-SHT-C-1206	Traffic Signs and Markings - Sheet 6 of 7.
60579473-SHT-C-1207	Traffic Signs and Markings - Sheet 7 of 7.
60579473-SHT-C-1211	Hanover Street / Rose Street Traffic Signals Layout.
60579473-SHT-C-1212	Princes Street / Hanover Street / The Mound Traffic Signals Layout.

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Drawing Ref.	Title
60579473-SHT-C-1213	The Mound / Market Street / North Bank Street Traffic Signals Layout.
60579473-SHT-C-1214	North Bank Street / Bank Street Traffic Signals Layout
60579473-SHT-C-1215	Bank Street / Lawnmarket / George IV Bridge Traffic Signals Layout.
60579473-SHT-C-1216	George IV Bridge / Chambers Street Traffic Signals Layout.
60579473-SHT-C-1217	George IV Bridge / Bristo Place Traffic Signals Layout.
60579473-SHT-C-1218	Teviot Place / Forrest Road / Lauriston Place Traffic Signals Layout.
60579473-SHT-C-1219	Teviot Place / Bristo Place / Lothian Street Traffic Signals Layout.
60579473-SHT-C-2601	Hanover Street / Rose Street Vehicle Swept Paths.
60579473-SHT-C-2602	Princes Street / Hanover Street / The Mound Vehicle Swept Paths.
60579473-SHT-C-2603	The Mound / Bank Street Vehicle Swept Paths.
60579473-SHT-C-2604	The Mound / Market Street / North Bank Street Vehicle Swept Paths.
60579473-SHT-C-2605	Bank Street / Lawnmarket / George IV Bridge Vehicle Swept Paths
60579473-SHT-C-2606	Bank Street / Lawnmarket / George IV Bridge Vehicle Swept Paths.
60579473-SHT-C-2607	George IV Bridge / Chambers Street Vehicle Swept Paths.
60579473-SHT-C-2608	Candlemaker Row / George IV Bridge Vehicle Swept Paths.
60579473-SHT-C-2609	George IV Bridge / Bristo Port / Bristo Place Vehicle Swept Paths.
60579473-SHT-C-2610	Teviot Place / Forrest Road / Lauriston Place Vehicle Swept Paths.
60579473-SHT-C-2611	Teviot Place / Bristo Place / Lothian Street Vehicle Swept Paths.
181203_MGS_OP_4100	Detailed Arrangements - Flexible Loading Bay.

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Document Ref.	Title
60579473_MGS_TrafficOperations_v2.0	Proposed Traffic Operations.
60579473_MGS_Collision_Analysis	Collision data within original Meadows to George Street project extents.
60579473_MGS_Collision_Analysis_Type	Collision data plotted by type.
RSA262/S1-A	Previous Stage 1 RSA Report.
Dated 12/10/2020	Previous Stage 1 RSA Designers Response.

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3. PROCEDURE.

- 3.1. The audit was carried out following the general principles and procedures set out in GG 119 of the Design Manual for Roads and Bridges (DMRB), with adaptations to meet the requirements of the local road authority (Overseeing Organisation). The Road Safety Audit procedure is not an examination or verification of compliance to a design standard. Any notified departures from the design standard have been referenced within the report. The recommendations in this report are considered by the audit team to be appropriate and proportionate to the concerns and problems identified.
- 3.2. The audit was carried out between 2nd and 17th December 2021 at the offices of Wyllie Lodge and on site. A daytime site visit was carried out between 11:00 and 13:45 hours by both audit team members on Wednesday, 8 December 2021.
- 3.3. During the site visit pedestrian and cyclist traffic flows were moderate. There was vehicle congestion at the junction of George IV Bridge and Chambers Street due to the use of temporary traffic signals. The weather was cold, windy and dry and the road surface was dry.
- 3.4. In accordance with GG 119, the Overseeing Organisation should consider the recommendations contained within this audit. In doing so, the Overseeing Organisation shall consult with the Design Team. The design team shall prepare a road safety audit response report that has been agreed with the Overseeing Organisation and signed by both parties indicating their agreement on the RSA actions.
- 3.5. For the purposes of this audit the following are defined as:

Organisation	Contact
Overseeing Organisation	City of Edinburgh Council.
3 rd Party Organisation /Project Promoter	City of Edinburgh Council.
Design Organisation	Aecom.
Road Safety Audit Organisation	Wyllie Lodge Limited.

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4. PREVIOUS ROAD SAFETY AUDITS.

- 4.1. A previous stage 1 road safety audit of an earlier version of the design was carried out for this project by Aecom in July 2020 (Report reference RSA262/S1-A) and a designer's response issued in October 2020. Any problems identified in these reports that are considered still relevant have been included within this stage 1 report.

5. IDENTIFIED PROBLEMS

Local Alignment.¹

5.1 PROBLEM

Location Old Town, Edinburgh.

Summary Increased risk of conflict between vehicles with pedestrians and cyclists.

The proposals introduce various new restrictions on vehicle access and movements. Many drivers, in particular tourists, may follow out of date Sat Nav directions and may find themselves displaced into neighbouring areas where they may carry out hazardous and avoidable turning manoeuvres in areas where there is high levels of pedestrian and cyclist activity.

Recommendation

It is recommended that;

1. Sat Nav data providers are informed of the changes to vehicle access restrictions and movements.
2. Direction signage in the wider area of the proposals is reviewed and amended to reflect the changes in traffic flow directions and restrictions.

5.2 PROBLEM

Location George IV Bridge, south of junction with Lawnmarket.

Summary Risk of injury to wheelchair users from a fall.

Cross section EE on drawing No. 60579473-SHT-C-0008 shows a 7.3% crossfall on the west footway along the frontage of the Radisson Hotel. Some wheelchair users may not be able to push themselves from the kerb to the hotel due to this steep gradient, and those traveling along the footway will be at risk of veering towards the carriageway or toppling from their chair.

Recommendation

It is recommended that the gradient of the crossfall is reduced.

¹ DMRB GG-119 standard list

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General.

5.3 PROBLEM

Location Hanover Street.

Summary Risk of injury to wheelchair user from a fall.

Segregation islands separate the bus, loading and taxi bays from the cycleway and footway. Drop kerbs with tactile paving is provided for bus passengers to cross the cycle lane onto the segregation island, however no similar provision is shown for wheelchair users to access the taxi bays or delivery drivers who will push goods by barrow. The lack of drop kerbs to provide safe access to the segregation islands may result in wheelchair users toppling out of their chair and sustaining injuries from a fall.

Recommendation

It is recommended that drop kerbs are provided at all taxi and loading bays to allow wheeled access to the segregation islands.

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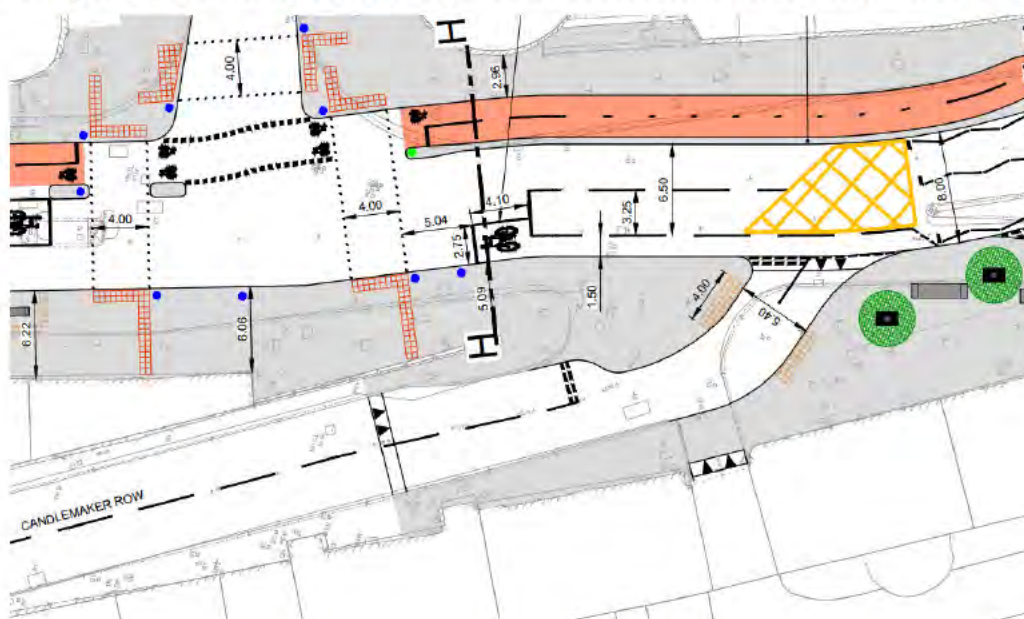
Junctions.

5.4 PROBLEM

Location Candlemakers Row.

Summary Risk of cyclists and pedestrians being knocked down.

A priority give way system is proposed on Candlemakers Row. This requires southbound drivers to give way to vehicles that have still to turn into Candlemakers Row. In considering the narrowing of the Candlemakers Row carriageway, the approach alignment from Bristo Place and the sightline obstruction caused by large numbers of pedestrians on the footway, it is unlikely that drivers waiting at the priority give way on Candlemakers Row will be able to adequately see approaching traffic in sufficient time to clear the carriageway narrowing without blocking the traffic flow at the junction. Where junctions are blocked with queuing traffic pedestrians often step out between queuing vehicle and in doing so expose themselves to being knocked down when a vehicle begins to move off.



Recommendation

It is recommended that the carriageway narrowing and priority give way signing is removed.

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5.5 PROBLEM

Location Teviot Place.

Summary Risk of shunt type collisions.

On the eastbound approach to the junction with Bristo Place the road alignment bends to the left and taxi and disabled parking bays are to be provided along the nearside kerbline. High vehicles parking in these bays may obstruct an eastbound driver's sightline of the primary signal head. This could contribute to late braking and shunt type collisions.

Recommendation

It is recommended that the sightlines are checked and if required a high mounted signal head provided.

5.6 PROBLEM

Location Princes Street.

Summary Increased risk of cyclist injury from a fall.

Drawings No. 60579473-SHT-C-0002 show a 3.0m wide two-way cycle lane weaving across the tramlines on Princes Street between The Mound and Hanover Street. No indication of the forecasted volume of cyclists that will use this facility has been given. With 1.5m wide lanes in each direction it is very likely that this will be too narrow to contain all cyclists that are released from the stop line, consequently some may overspill onto the carriageway out with the lane and cross the tramlines at an unsafe angle. If a cyclist crosses the tramlines at too shallow an angle they risk getting their wheel(s) caught in the tramline, falling from their cycle and sustain an injury or possibly being run over by a vehicle or tram.

Recommendation

It is recommended that;

1. A wider cycle lane is provided across Princes Street.
2. The cycle lane is surfaced with a red screed.

5.7 PROBLEM

Summary	Risk of cyclists and pedestrians being knocked down.
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FORRESTER ROAD TO BE ONE WAY NORTHBOUND FOR PERMITTED VEHICLES (TWO WAY FOR CYCLISTS). NO RIGHT TURN ON EXIT TO GEORGE IV BRIDGE.

It is recommended that the splitter island between at the Forrest Road exit is increased in size to help discourage illegal right turn manoeuvres.

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Walking, Cycling and Horse Riding.

5.8 PROBLEM

Location The Mound.

Summary Risk of head on collisions between cyclists.

The footway on The Mound is often very busy and only 2.2m wide, and the two-way cycle lane will be 3.0m wide. At the bend on The Mound a cyclist's forward sightline will be blocked by pedestrians on the footway. Cyclists will be released from the traffic signals at the Market Street junction and travel in a group downhill towards this bend and will easily reach speeds above 20mph (30kph), and cyclists heading up hill will be slower and may start weaving out with their 1.5m wide lane at this point. The speed of a descending cyclist and the inadequate dynamic sight distance (67m for 30kph)² between approaching cyclists is very likely to lead to head on collisions between cyclists.



Sightline
blocked by
pedestrians

Recommendation

It is recommended that;

1. The cycle lane is widened and a solid white line provided to separate the opposing flows within the cycle lane, and.
2. Speed control measures are applied to the downhill cycle lane, or.
3. The existing layout with uphill and downhill cycle lanes on each side of the carriageway is retained.

² Cycling By Design, Table 3.5

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5.9 PROBLEM

Location North Bank Street.

Summary Risk of head on collision between cyclists.

Along North Bank Street the two-way cycle lane varies in width between 2.5-3.0m. This street is on a steep incline, (downhill westbound) and some cyclist will easily exceed 20mph (30kph). No indication of the forecasted volume of cyclists that will use this facility has been given, however a 2.5m wide lane is considered too narrow to safely allow large numbers of cyclists to pass each other at these speeds. There will be high risk of cyclist colliding with each other on North Bank Street.

Recommendation

It is recommended that;

1. The cycle lane is widened and a solid white line provided to separate the opposing flows within the cycle lane,
2. Speed control measures are applied to the downhill cycle lane.

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5.10 PROBLEM

Location The Mound / Market Street / Mound Place junction.

Summary Increased risk to visually impaired pedestrians of being knocked down.

The tactile paving shown on drawing No. 60579473-SHT-C-0003 does not extend to the rear of the footways at the Market Street (west) and The Mound (southeast) crossing points. This could result in visually impaired pedestrians missing the controlled crossing point and attempting to cross at a less safe location where they will be at greater risk of stepping out into the path of a vehicle or cycle and being knocked down and sustaining an injury.



Recommendation

It is recommended that the tactile paving is extended to the rear of the footway.

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5.11 PROBLEM

Location Bank Street.

Summary Increased risk of pedestrians being knocked down by a vehicle.

The proposed loading bay is alongside a double height retaining kerblineline with a pedestrian guardrail along the top of the kerblineline. This will force delivery persons to walk further along the carriageway until they reach a lowered kerb, and this will expose them to a longer period of risk from being knocked down by a vehicle.



Recommendation

It is recommended that the design includes for the ability to barrow goods from the carriageway onto the footway.

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5.12 PROBLEM

Location George IV Bridge, east footway.

Summary Risk of pedestrian injury from trip and fall.

Concrete bollards along the existing footway are a tripping hazard, they are provided to prevent delivery vehicles from parking on the footway. The cycleway will occupy the road carriageway currently being used for loading, hence there should be no further need for the bollards.



Recommendation

It is recommended that the bollards are removed.

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Traffic Signs, Carriageway Markings and Lighting.

5.13 PROBLEM

Location	Scheme extents.
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Summary	Risk of excessive vehicle speeds.
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The roads within the project are subject to a 20mph speed limit however this is not reflected on the traffic sign and markings drawings Nos. 60579473-SHT-C-1201 to 1207. If the speed limit is not clearly and legally signed there may be excessive speeding, most likely during off peak times, and this will increase the risk of collisions and casualty severities.

Recommendation

It is recommended that the speed limit signing and road markings are repositioned and refreshed to reflect the new traffic flows.

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6. AUDIT TEAM STATEMENT

AUDIT TEAM STATEMENT

MEADOWS TO GEORGE STREET EDINBURGH.
ROAD SAFETY AUDIT STAGE 1

We certify that we have examined the works listed in this report. The examination has been carried out with the sole purpose of identifying any features of design or construction that can be modified in order to improve the safety of the scheme. The problems identified have been noted in this report together with recommendations, which should be studied for implementation.

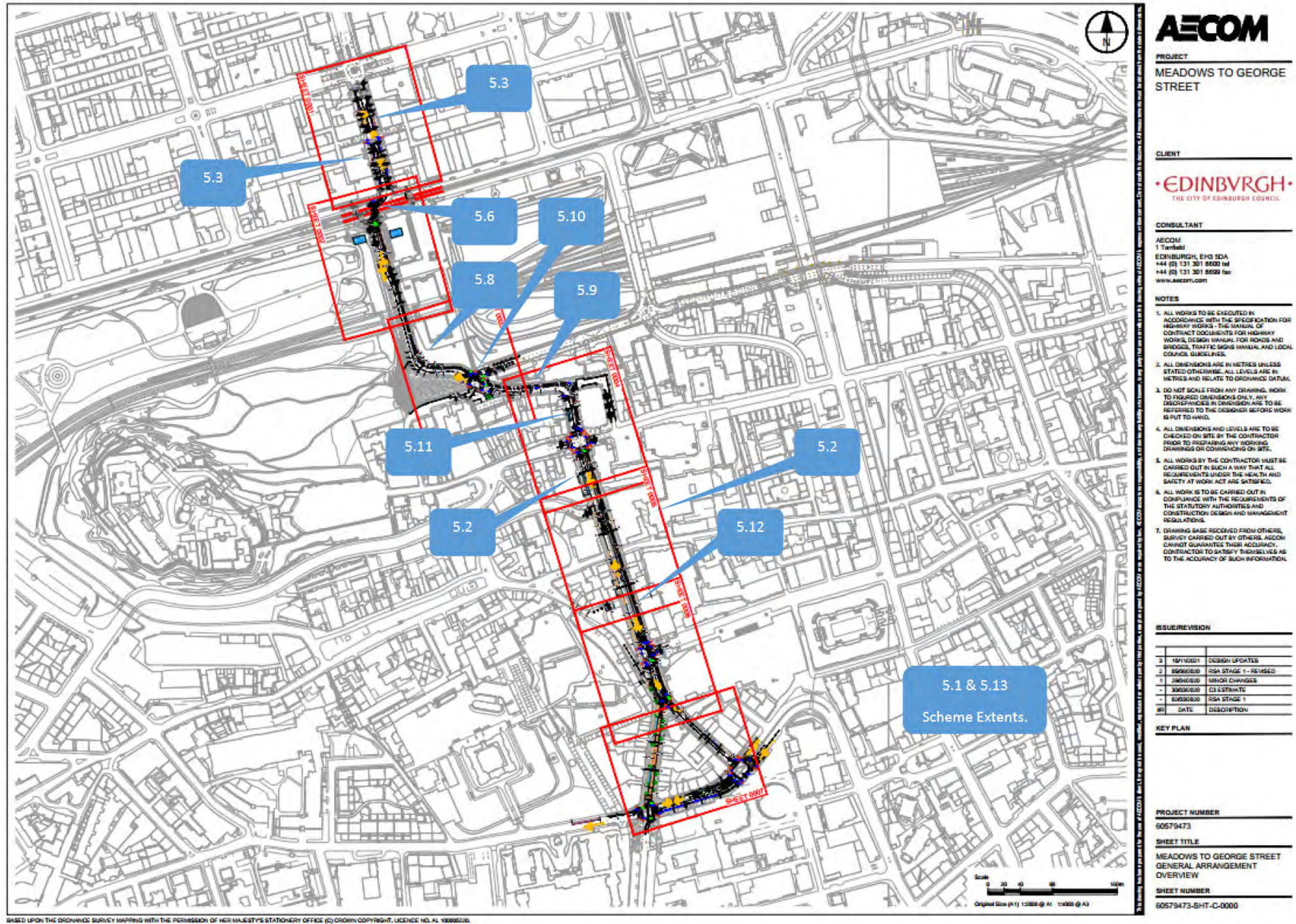
We certify that this Road Safety Audit has been carried out in accordance with GG 119.

Signed..........Audit Team Leader Date 17 December 2021.

Signed..........Audit Team Member Date 17 December 2021.

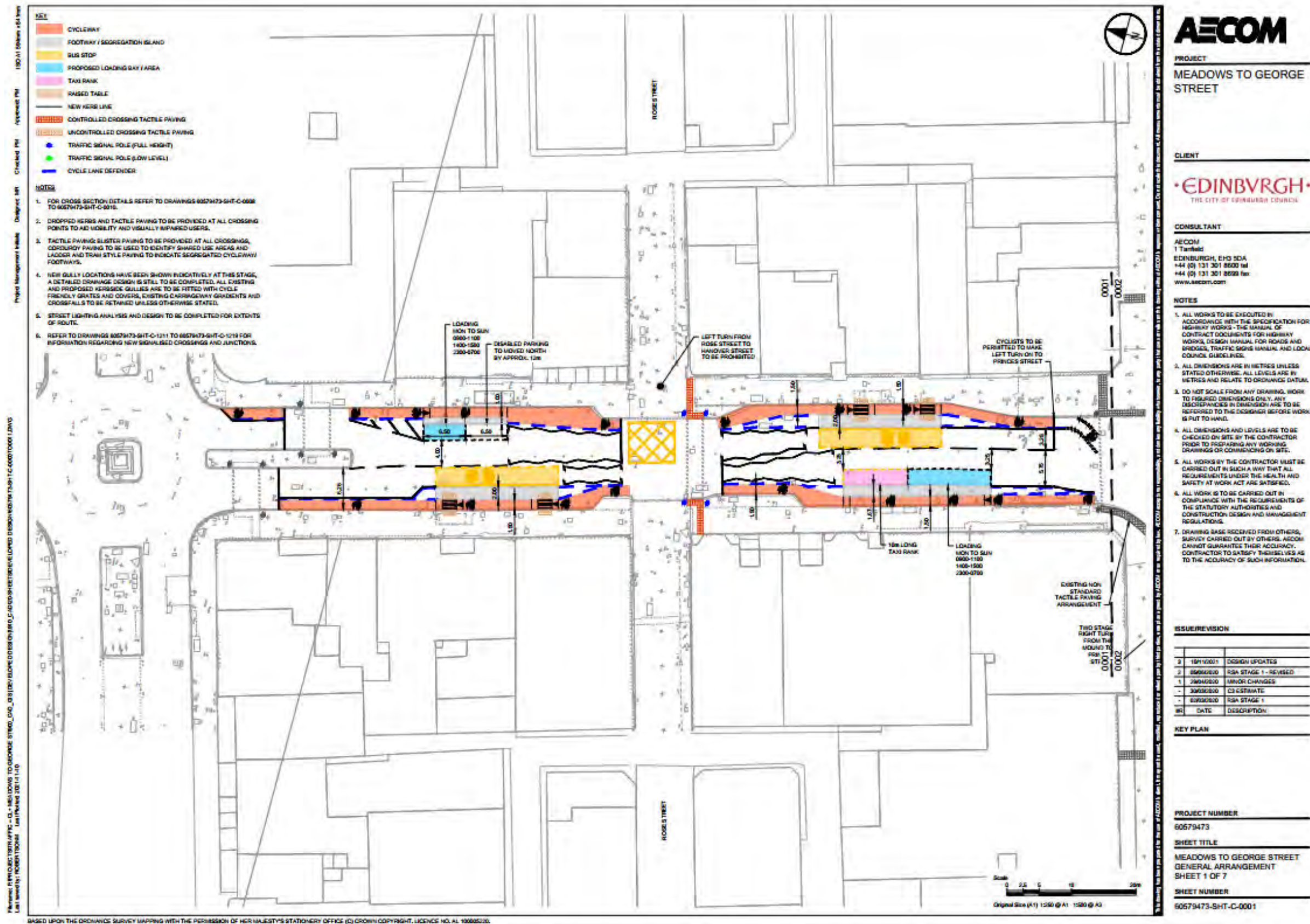
Wyllie Lodge Road Safety Consultants			T 08450 944512
	 @wyllielodge.co.uk	M	
	 @wyllielodge.co.uk	M	
WYLLIE LODGE Limited. 23 St Andrew's Street Ayr KA7 3BT.			

Appendix A. Location Plan of Problems

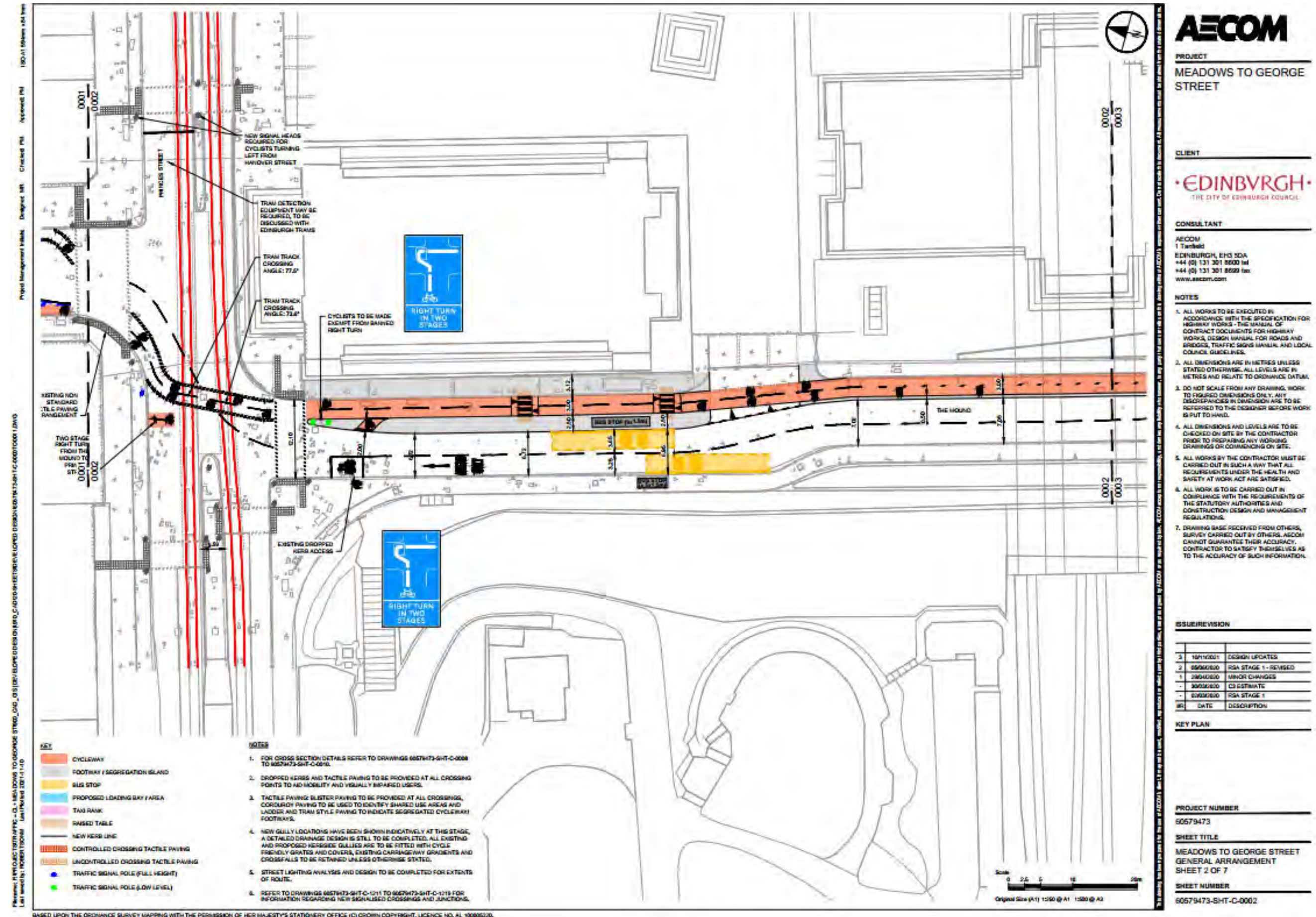


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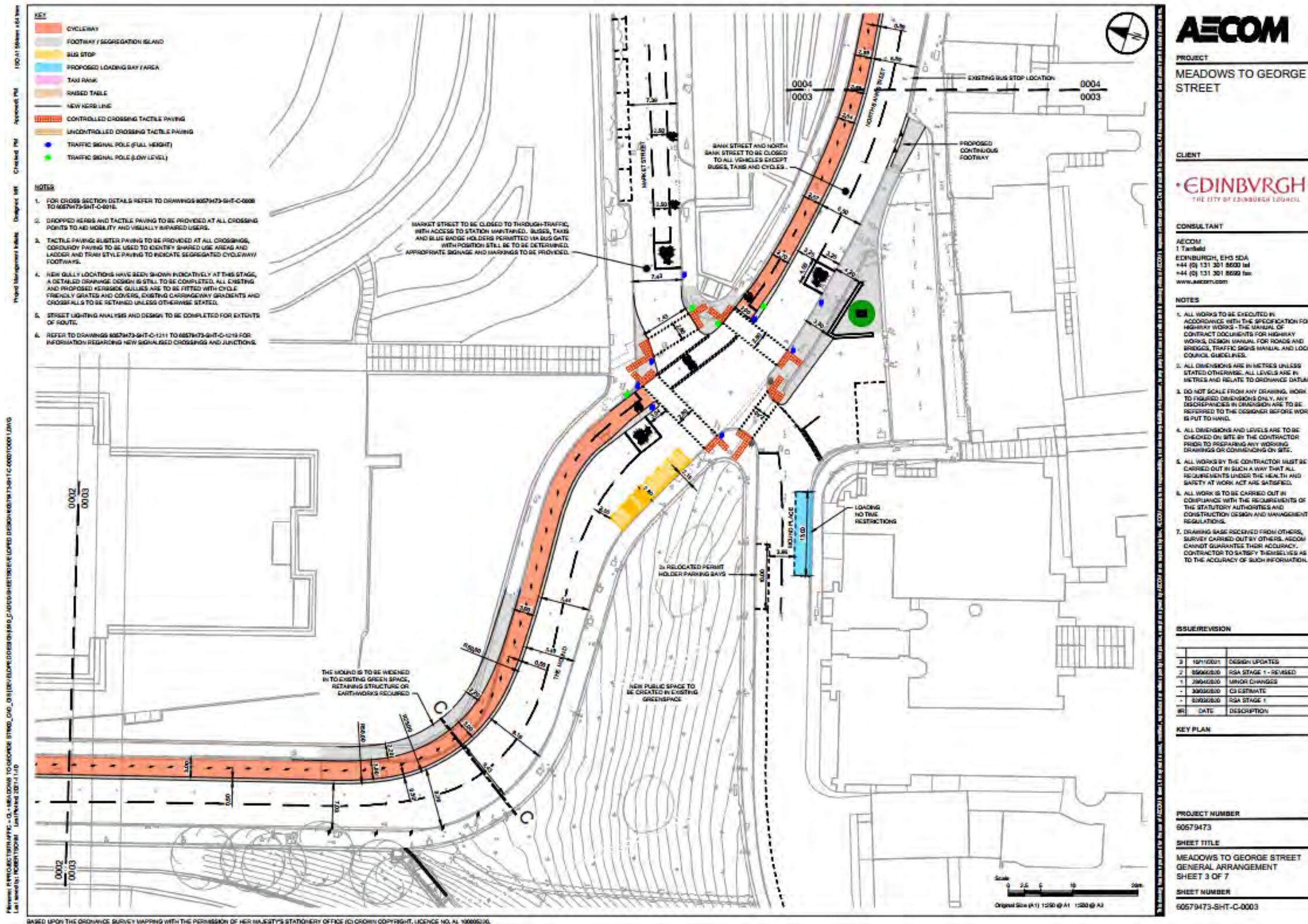
Appendix B. General Arrangement Drawings.



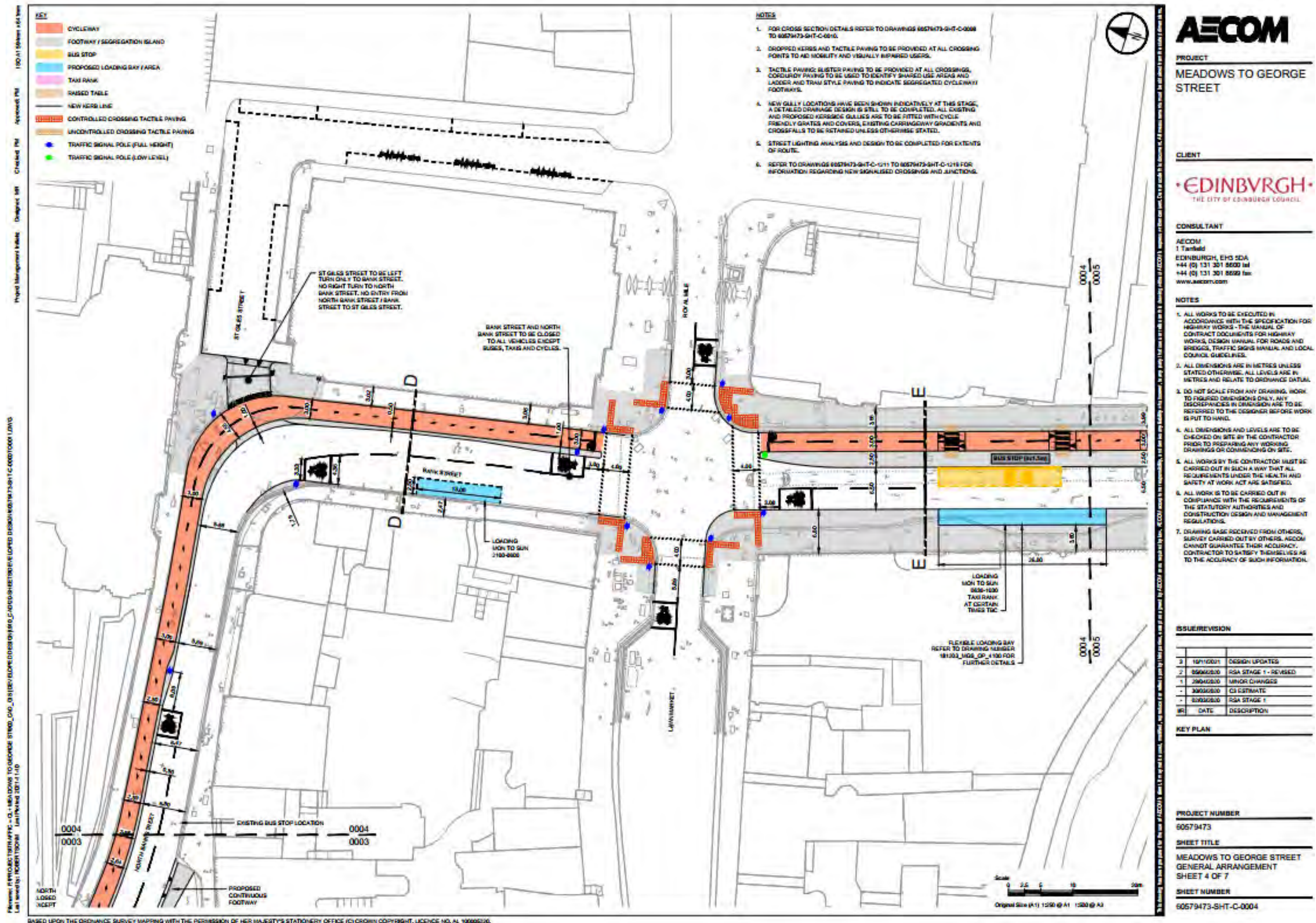
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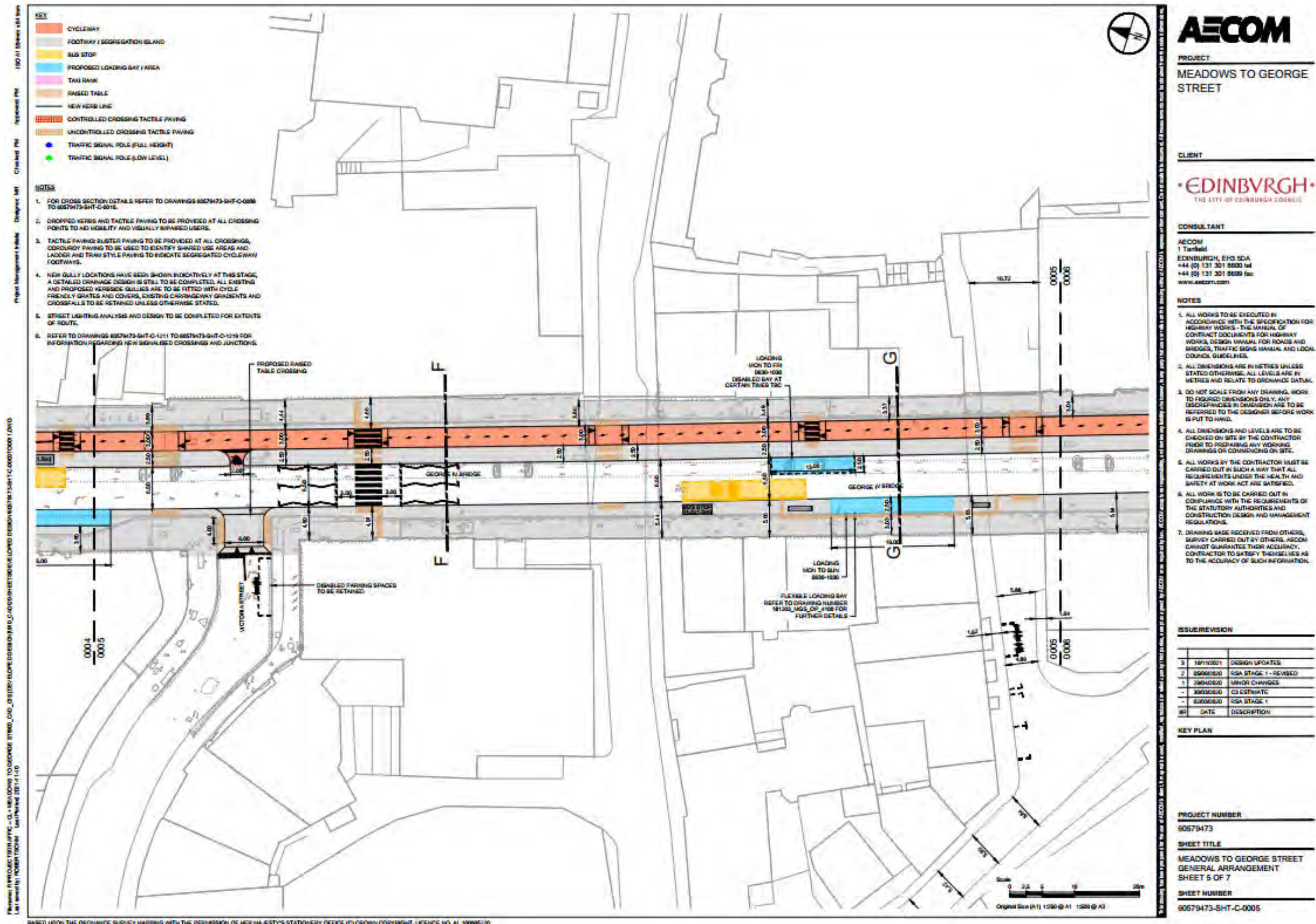
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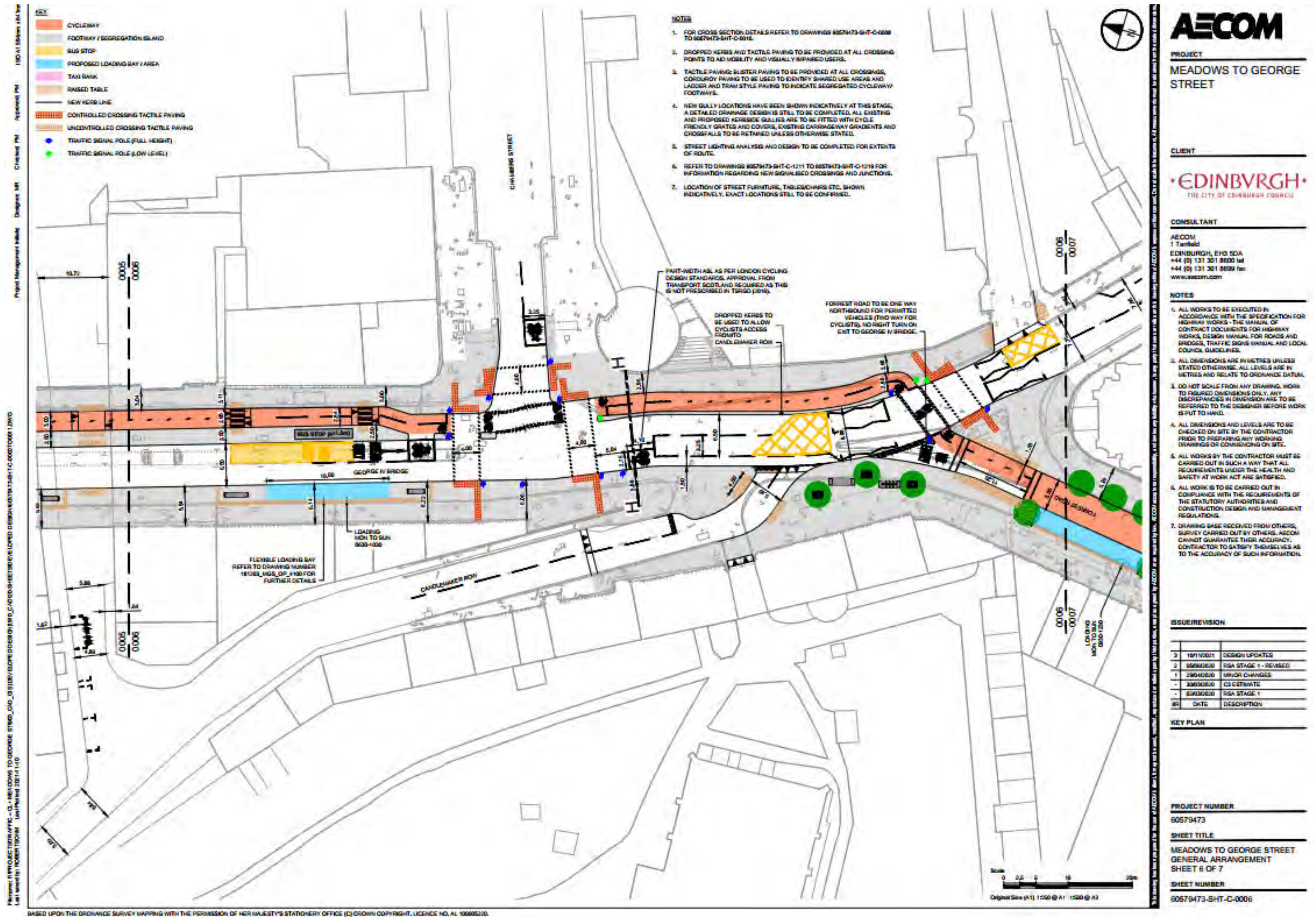
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