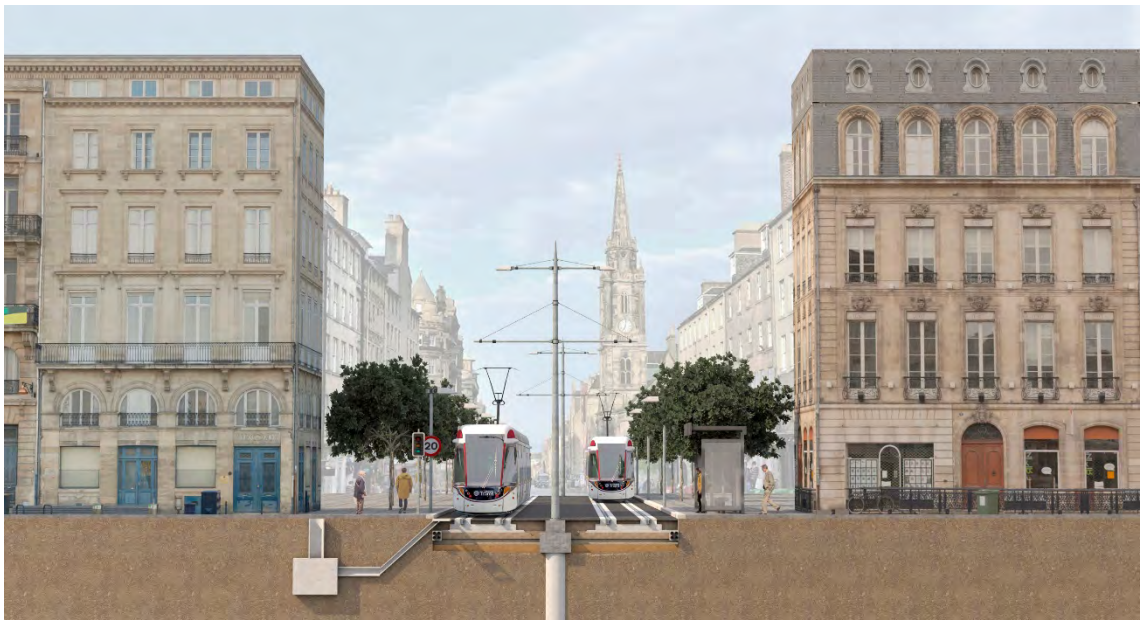

# EDINBURGH TRAM YORK PLACE TO NEWHAVEN

# DETAILED DESIGN

# STAGE 2 Road Safety Audit – DESIGNERS RESPONSE

| PROJECT | | | | ORIGIN | | | VOLUME | | | LEVEL | | TYPE | | ROLE | NUMBER | | | | REV | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| E | T | Y | N | S | E | F | X | X | X | 0 | 3 | R | P | D | 0 | 0 | 0 | 1 | P | 0 | 4 |

April 2021

GENERATED BY:

| | Name: | Signature/Initials: | Date: |
|---|---|---|---|
| Author | [redacted] | [redacted] | 02/04/2021 |
| Review | [redacted] | [redacted] | 02/04/2021 |
| Approval | [redacted] | [redacted] | 02/04/2021 |

DISTRIBUTION LIST:

| | Function: | Name: | Organisation: |
|---|---|---|---|
| 1 | Project Director | [redacted] | SFN |
| 2 | Project Manager | | SFN |
| 3 | Planning & Stakeholder Manager | | SFN |
| 4 | Const. Manager | | SFN |
| 5 | Design Manager | | SFN |
| 6 | Design Co-Ordinator | | SFN |
| 7 | Design Co-Ordinator | | SFN |
| 8 | BIM Manager | | SFN |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

OVERVIEW OF CHANGES:

| Revision: | Author | Description of changes: | Date: |
|---|---|---|---|
| P01 | [redacted] | First Issue | 02/04/2021 |
| P02 | | Second Issue | 11/05/2021 |
| P03 | | Update following DRN comments | 09/07/2021 |
| P04 | | CEC Accepted report | 14/10/22021 |

# Contents

# 1 INTRODUCTION

This Road Safety Audit Response Report relates to the Stage 2 Road Safety Audit Report for the Trams Extension Ocean Terminal to Newhaven, Edinburgh. The Stage 2 Road Safety Audit Brief comprised of a set of scheme drawings assembled by Sacyr Farrans Neopul on behalf of the Overseeing Organisation (the City of Edinburgh Council) for examination.

In addition to the above the audit team have reviewed the Stage 1 (preliminary design) Road Safety Audit which was carried out in September to October 2017 and a separate Stage 1 Road Safety audit undertaken on the proposed bus facilities at Ocean Terminal in June 2020.

The Road Safety Audit Report was prepared by Aecom and issued to SFN. The stage 2 RSA raised possible problems relevant to the stage 2 Road Safety Audit Brief and Supporting Information and any residual problems identified in the Stage 1 RSA that the Auditor felt has not been addressed in the detailed design.

The Design Team have carefully considered the problems and recommendations in the Stage 2 Road Safety Audit Report. This Road Safety Audit Response Report includes all of the problems and recommendations raised by the Road Safety Audit Team, in addition to the Design Team's response to these issues.

## 2 NOT USED

# 3 ITEMS OUTSTANDING FROM PREVIOUS AUDITS

## 3.1 TRAM EXTENSION – STAGE 1 ROAD SAFETY AUDIT

### 3.1.1 Scheme Extents

#### Summary

Excess surface water increases the risk of vehicles skidding, particularly during periods of cold / freezing weather

#### Description

During the site investigation, areas of standing water were observed on the carriageway. Excess surface water increases the risk of vehicles skidding, resulting in loss-of-control collisions and personal injury. This is particularly pertinent during periods of cold / freezing weather when standing water could form ice.

#### Recommendation

It is recommended that drainage is appropriate throughout the scheme extents.

#### Stage 1 Designers Response

This element of the works will be addressed in the detailed design and subject to a Stage 2 Road Safety Audit

#### Stage 2 Comment

Standing water was observed at various locations during the site investigation where no drainage improvements appear to be proposed as part of the scheme. This included Lindsay Road at Great Michael Rise, Lindsay Road at Annfield, and at Melrose Drive at the access to Chancelot Mill.
It is recommended that drainage is appropriate throughout the scheme extents.

#### Design Team Response

Please refer to drawing ETYN-SEF-XXX-14-DR-0001 and 0002 which details the new drainage along Lindsay Road including increased gully spacing and kerb drain units in areas where the longitudinal gradient is below the minimum. The access to Chancelot Mill and Melrose Drive are out with the defined extents of the permanent works.

### 3.1.2 North-west of Ocean Drive, to the north-east of the junction of Melrose Drive, Ocean Drive, and Victoria Quay

#### Summary

Risk of vehicles undertaking unsafe manoeuvres and colliding with a non-motorised user or another vehicle.

#### Description

No details have been provided to the Audit Team regarding swept path analyses of the movements of vehicles accessing and egressing the loading area on Ocean Drive. It is unclear as to how vehicles access and egress the loading bays and whether they can do so without the need to reverse or overhang the adjacent footways.
If vehicles are required to reverse to access or egress the loading area, there is a risk that collisions could occur between vehicles reversing in or out of the loading area and those accessing the Ocean Terminal car park. If vehicles need to overhang the adjacent footways in order to carry out turning movements, there is a risk that pedestrians could be struck by vehicles and sustain a personal injury.

#### Recommendation

It is recommended that swept path analyses with appropriately sized vehicles are undertaken of the turning movements in the proposed loading area, and that the design is modified as appropriate to reduce the risk of conflict between vehicles and other users.

#### Stage 1 Designers Response

Noted. Swept path analysis carried out.

#### Stage 2 Comment

Swept path drawings have not been provided to the Audit Team. From the plans provided, it is unclear whether there is sufficient space for a vehicle to safely manoeuvre in this area without overhanging a footway or undertaking an unsafe manoeuvre.
It is recommended that there is sufficient space provided for vehicles to access and egress from this area safely.

#### Design Team Response

The designer assumes the comment is the stage 1 and stage 2 RSA in relation to a taxi rank positioned to the east of the Ocean Terminal western carpark entrance. The designer has reviewed the swept path and confirm that the existing arrangement will be amended to accommodate the swept path requirements for the taxi rank see Figure 1.


*Figure 1 - Ocean Terminal Taxi Rank*

### 3.1.3 Ocean Drive, at Ocean Terminal tram stop.

#### Summary

Risk of vehicles overshooting the stop line due to limited visibility to the signals and colliding with pedestrians

#### Description

A pedestrian crossing is located downstream of the tram stop and a series of bus stops. There is a risk when both buses and trams occupy their respective stops sightlines to the traffic signals will be significantly reduced. This increases the risk of vehicles overshooting the stop line and colliding with pedestrians.

#### Recommendation

It is recommended that the signalling equipment is adjusted to provide full visibility when both tram and bus stops are occupied.

#### Stage 1 Designers Response

This element of the works will be addressed in the detailed design and subject to a Stage 2 Road Safety Audit. Detailed traffic signal and highways design will be fully co-ordinated.

#### Stage 2 Comment

The Audit Team are concerned that visibility to the signal heads would be obstructed if buses were to stop at the bus stops and / or trams were stopped at the tram stop.
It is recommended that suitable forward visibility is provided to the traffic signal heads on both approaches.

### Design Team Response

A pedestrian crossing may be sited near a bus stop. Generally a bus stop is better suited on the downstream side of the crossing however there is nothing preventing the bus box and stop location ipstream of the crossing.
The speed limit of this section is 20mph therefore relatively low speed. The bus and tram position when stationary are some 20m back from the stop line with zig zag road markings promoting a clear zone between the bus box and the stop line. Equally the full height tram platform position is positioned 13m back from the stop line again providing visibility to the traffic signal heads which is a further 4m from the stop line.
Stopping distance for a 20mph road is 12 metres (40 feet) in accordance with the Highway Code therefore the visibility to the signal heads is sufficient. Furthermore near and offside traffic signal heads have been provided at the crossing increasing visibility for vehicles approaching the crossing.

## 3.1.4 Melrose Drive, south side.

### Summary

Risk of westbound vehicles colliding with vehicles stopped at the gated access on the south side of Melrose Drive.

### Description

The eastern-most access on the south side of Melrose Drive is fenced off, with access being via a gate, as shown in the photograph above. Whilst the proposals include moving the kerb line on the south side of Melrose Drive northwards, the distance between the edge of the carriageway and the gate appears to be around 3.5 metres. It is likely that a vehicle accessing this area would overhang the carriageway when stopped at the gate. This could lead to westbound vehicles colliding with a vehicle stopped at the access gate.

### Recommendation

It is recommended that sufficient space is provided to allow vehicles to stop off the carriageway while the gate is opened.

### Stage 1 Designers Response

Private means of access. This will require third party agreement to formalise access arrangements and will be considered at detailed design stage.

### Stage 2 Comment

From the plans provided to the Audit Team it appears that a 2.5-metre-wide footway is proposed at this location. It is unclear to the Audit Team what size of vehicle would be accessing this facility. There is a risk that the space provided may not be suitable for large vehicles to safely wait off the carriageway, which could lead to vehicles overhanging the carriageway and being struck by passing vehicles.

### Design Team Response

The access to the pumping station is outside the works extents. It is understood that the pumping station is owned and operated by Scottish Water. Vehicles would not be permitted to wait on the carriageway due to the presence of the parking and waiting restrictions.

### 3.1.5 Melrose Drive, south side.

#### Summary

Risk of vehicles emerging from gated access when it is not safe to do so, resulting in side-impact collisions with vehicles travelling westbound.

#### Description

During the site investigation it was observed that there is a risk that visibility could be constrained at the eastern-most access on the south side of Melrose Drive. Whilst the proposals include moving the kerb line on the south side of Melrose Drive northwards, it is unclear as to whether a vehicle stopped at the access would have sufficient visibility to vehicles travelling westbound on Melrose Drive.
If visibility was constrained, vehicles may emerge from the access when it is not safe to do so, resulting in side-impact collisions with vehicles travelling westbound on Melrose Drive.

#### Recommendation

It is recommended that an appropriate visibility splay is provided at this access.

#### Stage 1 Designers Response

Private means of access. This will require third party agreement to formalise access arrangements and will be considered at detailed design stage.

#### Stage 2 Comment

From the plans provided to the Audit Team it appears that a 2.5-metre-wide footway is proposed at this location, widened northwards from the existing kerb line. However, it is likely that the drivers of vehicles exiting from this facility are unlikely to have appropriate visibility to pedestrians on the new footway and to oncoming vehicles. This could lead to emerging vehicles striking and injuring crossing pedestrians or striking passing vehicles.

#### Design Team Response

Precast tactile paving will be provided to advise pedestrians of the presence of a commercial access in accordance with Roads for All: Good Practice Guide for Roads. Any vehicle exiting the private property are likely to be travelling at very low speed. The presence of a raised table with ramps on both sides of the footway will encourage vehicles entering and exiting the private facility to do so at a slow speed.

### 3.1.6 Junction of Melrose Drive, Ocean Drive and Victoria Quay.

#### Summary

Risk of large vehicles colliding with pedestrians or other vehicles, due to the geometry of the road.

#### Description

The proposals include removing the existing roundabout at the junction of Melrose Drive / Ocean Drive / Victoria Quay and replacing it with a signalised crossroads. No details have been provided to the Audit Team regarding swept path analyses of large vehicles carrying out turning movements at this junction. It is unclear as to whether a large vehicle could carry out turning movements at this junction without overhanging the traffic islands.
If a vehicle was to overhang a central traffic island, there is a risk that it could collide with a pedestrian, resulting in them sustaining a personal injury.

#### Recommendation

It is recommended that swept path analyses are undertaken of a large vehicle carrying out the turning movements at this junction, and that the design is modified as necessary to ensure all turning movements can be safely accommodated.

#### Stage 1 Designers Response

Agreed, design amended to take account of comment

#### Stage 2 Comment

No details of the swept paths have been provided to the Audit Team.
From the plans provided, it is unclear if a large vehicle travelling ahead and turning right on Ocean Drive (west) could undertake these movements without colliding with another vehicle or overhanging an island. It appears that the lanes on Ocean Drive (west) would each be around 3 metres wide.
It is recommended that swept path analyses are undertaken of a large vehicle carrying out the turning movements at this junction, and that the design is modified as necessary to ensure all turning movements can be safely accommodated.

#### Design Team Response

Swept path information provided to the RSA team demonstrating manoeuvrability of vehicles at the junction. Refer to ETYN-SEF-XXX-12DR-H-1306_P02 see Figure 2


*Figure 2 - Swept Path Junction 5 Melrose Drive/Ocean Drive*

## 3.1.7 Scheme Extents

### Summary

Risk of cyclists falling and being struck by a vehicle, due to crossing tram tracks at an acute angle.

### Description

There is concern that the introduction of tram lines throughout the scheme could lead to problems for cyclists at the various junctions and accesses on these roads. The proposals do not include any new infrastructure for cyclists turning across the cycle tracks, other than the two stage right turn infrastructure at the junction of Constitution Street and Queen Charlotte Street.
"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 60º, consideration should be given to alternative crossing layouts and other measures that mitigate the risks faced by cyclists".
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 won't always be possible, but by crossing as close to a right angle as you can you'll avoid slipping on the tracks."
At many of the junctions along the route, the angle at the intersection between the tram tracks and the general traffic lanes, or the crossing angle that a vehicle would take across the tram tracks, would be 45° or less. An example is shown in the figure above.
Without the provision of any measures at junctions and accesses along the route, there is a risk that cyclists could cross the tram tracks at acute angles, resulting in them slipping on the tram tracks and falling, or getting their wheel(s) stuck and falling. If a cyclist was to fall from their bicycle, there is a risk that they could be struck by a passing vehicle.

### Recommendation

It is recommended that appropriate measures are provided for turning cyclists, so that:
• the angle that cyclists cross the tram tracks is 90°, or close to 90°; and
• the risk of cyclists slipping or getting their wheel(s) stuck in the tram tracks is minimised.

### Stage 1 Designers Response

Cycling interventions being considered in line with current Council project between York Place and Haymarket.

### Stage 2 Comment

There are several locations between Ocean Terminal and Newhaven where cyclists would have to cross the tram tracks at an angle less than 90 degrees. This includes at the Toucan crossing north of the new junction between Melrose Drive and Lindsay Road and at each of the junctions within this section of the scheme.
It is recommended that appropriate measures are provided for turning cyclists, so that:
• the angle that cyclists cross the tram tracks is 90°, or close to 90°; and
• the risk of cyclists slipping or getting their wheel(s) stuck in the tram tracks is minimised.

### Design Team Response

The angle of cycle crossing tram tracks should be measured relevant to the rail. The crossing example referred to in this stage 2 RSA when measured relevant to the rail is 60 deg therefore compliant with Guidance on Tramways - Railway Safety Publication 2" by the Office of Rail Regulation (2006).

Throughout the scheme extents the design team have assessed the cycle crossings and confirm at no point do the cycle ways or cycle lanes, where provided, cross at an angle below 60 deg as per Figure 3.

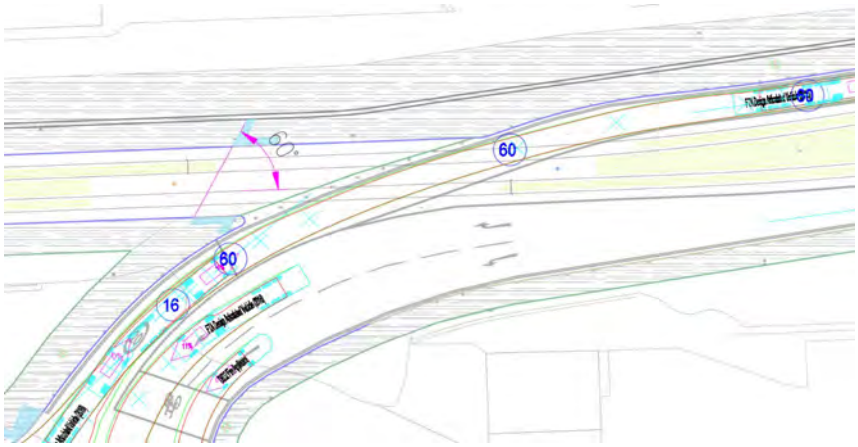


*Figure 3 - Cycle Crossing at Newhaven*

### 3.1.8 Scheme Extents

#### Summary

Risk of cyclists falling and being struck by a vehicle, due to crossing tram tracks at an acute angle.

#### Description

There is concern that the introduction of tram lines throughout the scheme could lead to problems for cyclists, particularly at locations where a single lane is provided for general traffic and the trams. Such locations include Ocean Drive, Ocean Way and Constitution Street. Cyclists travelling parallel to the tram tracks may have to cross the tracks in order to overtake a vehicle stopped along the kerb line or to bypass an obstacle such as a pedestrian, gully or pothole, and they may to do so suddenly and at an acute angle.
Carrying out such manoeuvres could result in cyclists slipping on the tram tracks and falling or getting their wheel(s) stuck and falling. If a cyclist was to fall from their bicycle, there is a risk that they could be struck by a passing vehicle.

#### Recommendation

It is recommended that appropriate measures are provided to minimise the risk of cyclists slipping or falling on the tram tracks, such as provision of alternative infrastructure or cycle routes.

#### Stage 1 Designers Response

Cycling interventions being considered in line with current Council project between York Place and Haymarket.

#### Stage 2 Comment

On Ocean Drive, cyclists would have to cycle in the same lane as the tram lines. It is unclear to the Audit Team if an alternative route is provided.
It is recommended that appropriate measures are provided to minimise the risk of cyclists slipping or falling on the tram tracks, such as provision of alternative infrastructure or cycle routes.

### Design Team Response

No provision for cyclists are required at Ocean Drive. The City of Edinburgh Council have confirmed that a new cycleway will be provided, connecting Leith with NCN75, as part of the Leith Connections scheme.

## 3.1.9 Scheme Extents

### Summary

Risk of pedestrians and cyclists colliding on shared-use footways, resulting in personal injury.

### Description

The proposals include several new sections of shared use footway. From the plans provided it is unclear as to whether any signage is to be provided to inform pedestrians and cyclists as to the location and extents of the areas that are determined as shared use, and as to whether any corduroy tactile paving is proposed.
If signage to Diagram 956 (TSRGD 2016) and corduroy paving is not provided, there is a risk that collisions could occur between cyclists and pedestrians, resulting in personal injury.

### Recommendation

It is recommended that appropriate corduroy paving is provided where areas are determined as shared use, and these areas are appropriately signed to Diagram 956 (TSRGD 2016).

### Stage 1 Designers Response

This element of the works will be addressed in the detailed design, meet the requirements of the Edinburgh Street Design Guide and subject to a Stage 2 Road Safety Audit

### Stage 2 Comment

From the plans provided to the Audit Team it is unclear as to the extents of any areas that are to be determined as shared use. Two of the crossings between Ocean Terminal and Newhaven are defined as Toucans (across Lindsay Road at its junction with Melrose Drive and the crossing of the tram lines immediately north of this point). No corduroy tactile paving appears to be proposed to inform visually impaired pedestrians of the extents of the shared use area(s) and no facilities appear to be proposed to enable and direct cyclists where and when to transition between the shared use footway and the carriageway. Limited shared use signage is proposed.
It is recommended that appropriate corduroy paving is provided where areas are determined as shared use, and that these areas are appropriately signed to Diagram 956 (TSRGD 2016). It is also recommended that suitable infrastructure is provided to enable cyclists to transition between the carriageway and shared use facilities.

### Design Team Response

The shared cycleway has been designed in accordance with Cycling by Design and the Edinburgh Street Design Guidance. Diagram 956 and appropriate road markings will be provided along sections of footway designated for shared use. No tactile paving is required as route is not segregated.

## 3.1.10 Scheme Extents

### Summary

Risk of collisions occurring between vehicles and pedestrians due to long crossing lengths.

### Description

There are several locations within the extents of the scheme where long crossings widths are provided. In some cases, no pedestrian refuges are proposed, and in others the refuges do not appear wide enough for a pedestrian to safely wait in the centre of the road. An example is shown in the figure above. There is a risk that the long crossing length and the lack of a suitable refuge could lead to an increased risk of collisions between vehicles and pedestrians, particularly those with visual or mobility impairments.

### Recommendation

It is recommended that crossing lengths are minimised, refuges are provided where appropriate, and that pedestrians are given an appropriate length of time to cross.

### Stage 1 Designers Response

It is the client's preference that two stage crossings were minimised where possible. For the location highlighted as an example, the junction is signalised and shall provide a single staged crossing. Can the auditor please provide further detail on crossings this comment is appropriate?

### Stage 2 Comment

Several of the crossings within the extents of the scheme appear to be long, including across Melrose Drive at Lindsay Road, on Melrose Drive at the access to the Cruise Terminal parking and across the car park access on Ocean Drive.
It is recommended that crossing lengths are minimised, refuges are provided where appropriate, and that pedestrians are given an appropriate length of time to cross.

### Design Team Response

The traffic signal design is based on the junction layouts and therefore the time provided by the signal controller is sufficient.
The approach adopted for the layout of signalised junctions is in accordance with the Edinburgh Street Design Guide G4 Crossings - Signalised Crossings. In each case the intention is to avoid staggered crossings as single stage is preferred. While the guidance indicates that wider single phase crossings > 15m are often acceptable at signalised junctions.
Linsig data can be provided to support the junction phasing and provide the appropriate crossing time information.

## 3.1.11 Lindsay Road at Sandpiper Drive

### Summary

Risk of pedestrians inadvertently leaving the footway and entering the tram tracks, resulting in personal injury.

### Description

From the plans provided it is unclear as to whether any measures are proposed to prevent pedestrians from inadvertently walking onto the tram tracks. If a pedestrian was to enter this area, there is a risk that they could be struck by a tram.
Furthermore, no details have been provided to the Audit Team regarding whether there is a level difference between the footway and the tram tracks. If there is a level difference and no measures are provided to prevent or warn pedestrians from entering this area, there is a risk that a pedestrian could inadvertently step off the carriageway, fall and sustain a personal injury.

### Recommendation

It is recommended that appropriate measures are provided to warn or prevent pedestrians from entering this area, such as guardrail, a change of level or appropriate tactile paving.

### Stage 1 Designers Response

This element of the works will be addressed in the detailed design, meet the requirements of the Edinburgh Street Design Guide and subject to a Stage 2 Road Safety Audit

### Stage 2 Comment

From the plans provided to the Audit Team, it is unclear whether measures are proposed to warn or prevent pedestrians from entering this area, such as guardrail, a change of level or appropriate tactile paving. It is recommended that suitable measures are provided.

### Design Team Response

From Sandpiper Drive, the access to the stabling area has no level difference. Moreover, a hedge will be provided to prevent pedestrian crossing over the tracks at the stabling area. There is also a guardrail and a provision for a palisade fence. See detail at ETYN-SEF-XXX-12-DR-H-1101_P02

## 3.1.12 Lindsay Road at Sandpiper Drive

### Summary

Risk of pedestrians inadvertently leaving the footway and entering the tram tracks, resulting in personal injury.

### Description

From the plans provided it is unclear as to whether any measures are proposed to prevent pedestrians from inadvertently walking onto the tram tracks. If a pedestrian was to enter this area, there is a risk that they could be struck by a tram.
Furthermore, no details have been provided to the Audit Team regarding whether there is a level difference between the footway and the tram tracks. If there is a level difference and no measures are provided to prevent or warn pedestrians from entering this area, there is a risk that a pedestrian could inadvertently step off the carriageway, fall and sustain a personal injury.

### Recommendation

It is recommended that appropriate measures are provided to warn or prevent pedestrians from entering this area, such as guardrail, a change of level or appropriate tactile paving.

### Stage 1 Designers Response

This element of the works will be addressed in the detailed design, meet the requirements of the Edinburgh Street Design Guide and subject to a Stage 2 Road Safety Audit

### Stage 2 Comment

From the plans provided to the Audit Team, it is unclear whether measures are proposed to warn or prevent pedestrians from entering this area, such as guardrail, a change of level or appropriate tactile paving. It is recommended that suitable measures are provided.

### Design Team Response

This is out with the limits of the scheme and while the RSA has identified this as a risk this needs to be instructed by the MDU.

## 3.1.13 Lindsay Road at Annfield

### Summary

Risk of pedestrians tripping and falling and sustaining a personal injury.

### Description

To the east of the bus stop and the wall on the south side of Lindsay Road there is a level difference where the footway on Annfield meets the footway on Lindsay Road, as shown in the photograph above. There is a risk that pedestrians, particularly those with visual impairments, could trip and fall due to the level difference, and sustain a personal injury.

### Recommendation

It is recommended that appropriate tactile paving is provided along the length of the section of footway where there is a level difference, in order to warn pedestrians of the difference in levels.

### Stage 1 Designers Response

Out with the limits of this scheme.

### Stage 2 Comment

It is acknowledged that the Designer's Response indicates that it is considered that this is out-with the extents of the scheme. However, the Audit Team retain their belief that there is a risk of pedestrians tripping or falling due to the level difference, and that the increased volume of pedestrians that could be expected in this area due to the introduction of the tram stop could lead to a pedestrian sustaining an injury.

### Design Team Response

Out with the limits of this project. Should the MDU require to extend the works to include additional works this will require to be instructed.

## 3.1.14 Junction of Lindsay Road and Hawthornvale

### Summary

Risk of crossing pedestrians being struck by vehicles.

### Description

On Hawthornvale at its junction with Lindsay Road, several issues were noted with the uncontrolled crossing layout:

- the tactile paving does not extend across the full width of the dropped kerbs on the west side of the road;
- the colour of the tactile paving is not consistent on each side of the road; and
- the crossing is not on the desire line for pedestrians.

Under the current arrangement, there is a risk that visually impaired pedestrians could be confused by the layout of the uncontrolled crossing or could have problems identifying the existence or location of the crossing. This could lead to them inadvertently entering the carriageway when it is not safe to do so, being struck by a passing vehicle and sustaining a personal injury.

### Recommendation

The following measures are recommended:

- An appropriate upstand is provided to the kerbs out-with the extents of the crossing;
- The colour of the tactile paving is contrasting, and is consistent on both sides of the road;
- The crossing is on the desire line for pedestrians.

### Stage 1 Designers Response

Out with the limits of this scheme.

### Stage 2 Comment

During the site investigation it was observed that these issues were still present on site. Whilst it is acknowledged that the Designer's Response indicates that it is considered that this is out-with the extents of the scheme, the Audit Team retain their belief that the arrangement poses a risk to pedestrians, particularly those with visual impairments.

### Design Team Response

Out with the limits of this project. Should the MDU require to extend the works to include additional works this will require to be instructed.

## 3.1.15 Lindsay Road, south side

### Summary

Risk of vehicles leaving the carriageway and colliding with street furniture or vegetation or falling into the ditch or the park below.

### Description

From the plans provided, it is unclear as to whether the existing vehicle restraint system is to be retained in the proposals. During the site investigation it was observed that it is likely that this vehicle restraint system prevents vehicles that leave the carriageway from falling into the ditch to the rear of the southern footway on Lindsay Road, as shown in the photograph above, or from falling down the slope to the pedestrian and cycle path (the Hawthornvale Path).
In the proposals Lindsay Road is realigned and moved southwards, meaning that both the carriageway and footway are moved closer to the slope. If the vehicle restraint system is to be removed, there is a risk that vehicles leaving the carriageway could collide with street furniture or trees, or that they could fall into the park below. This could result in an increased severity of collision.

### Recommendation

If the vehicle restraint system is to be retained, it is recommended that it is appropriately relocated to reflect the new road layout. If it is proposed that the vehicle restraint system is to be removed, it is recommended that an appropriate review of the provision of the road restraint system is carried out prior to its removal.

### Stage 1 Designers Response

No comments at stage 1

### Stage 2 Comment

From the plans provided to the Audit Team, it is unclear whether the existing vehicle restraint system is due to be removed as part of the works. Furthermore, it is unclear on the plans if there is a significant change in level or if the existing retaining wall will remain in place.
There is a risk that motorised road users leaving the carriageway could collide with street furniture or trees, or that they could fall into the park below.
It is recommended that the vehicle restraint system be retained, if the existing change in level is being retained.

### Design Team Response

As part of the detailed design the vertical alignment of Lindsay Road is lowered by 1.4m to improve the Melrose Drive junction tie-in. As a result of the change to the Lindsay Road level the existing wall is removed.

## 3.1.16 Melrose Drive, on approach to junction with Lindsay Road

### Summary

Risk of errant vehicles leaving the carriageway and falling down a slope, resulting in an increased collision severity.

### Description

During the site investigation it was observed that there appears to be a large level difference between the proposed alignment of Melrose Drive and the surrounding land. From the plans provided it is unclear as to what the proposed gradients are of the carriageway on Melrose Drive and of any slopes adjacent to the carriageway.
If the land slopes to the rear of the footway on Melrose Drive, there is a risk that errant vehicles leaving the carriageway could fall down the slope resulting in an increased severity of collision.

### Recommendation

It is recommended that an appropriate review of the provision of the road restraint system is carried out prior to its removal.

### Stage 1 Designers Response

No comments at stage 1

### Stage 2 Comment

From the plans provided to the Audit Team, the gradient of the slopes at the junction are unclear. If the slopes have a significant gradient, the Audit Team have concerns that the proposed pedestrian barrier would not provide the required level of protection to arrest a vehicle leaving the carriageway.
If the gradients are significant, it is recommended that a suitable vehicle restraint system be provided.

### Design Team Response

The recommendation from "The Provision of Road Restraint Systems on Local Authority Roads" is that no Road Restraint System is required at this location. However, the suggestion of considering the provision of low cost measures that could reduce the risk has been considered and a Pedestrian Guard Rail has been proposed, which will provide a visual boundary definition for the vehicles as well as guiding pedestrians.

## 3.1.17 Ocean Drive at junction with parking / loading area at Ocean Terminal

### Summary

Risk of right turning vehicles being struck by trams whilst waiting for a gap in the north-eastbound traffic to complete their manoeuvre.

### Description

It is unclear as to whether the right turn movement from Ocean Drive to the parking / loading area at Ocean Terminal is permitted. There is a risk that a vehicle attempting this manoeuvre could be forced to wait across the tram tracks whilst waiting for a gap in the north-eastbound traffic. This could lead to them being struck by a tram whilst waiting for a gap to complete their turning manoeuvre.

### Recommendation

It is recommended that it is made clear to drivers / riders as to whether this movement is permitted, and that an appropriate safe area is provided for turning vehicles, if the movement is permitted.

### Stage 1 Designers Response

No comments at stage 1

### Stage 2 Comment

From the plans provided to the Audit Team, it is unclear whether this movement is permitted. The proposed arrangement could lead drivers / riders to think that it is permitted due to the provision of a right turn arrow immediately after the pedestrian crossing.
It is recommended that it is made clear to drivers / riders as to whether this movement is permitted, and that an appropriate safe area is provided for turning vehicles, if the movement is permitted.

### Design Team Response

The use of a solid white line is used along the route to segregate carriageway/Tram Lane and signage and markings are provided to make drivers aware that they should not enter the Tram Lane. The surfacing of the area between the tram tracks at this location is grasscrete which should inform drivers that this should not be traversed. A movement prohibition would require to be promoted by the Client through a TRO

## 3.1.18 Scheme extents

### Summary

Risk of waiting pedestrians spilling onto the carriageway and being struck by a passing vehicle due to inadequately sized waiting areas.

### Description

There are several locations throughout the extents of the scheme where central reservations / islands are provided, including at the tram stops. An example is shown in the figure above. There is a risk that there may be insufficient space for pedestrians to wait to cross the road, particularly during periods that there are large numbers of passengers alighting simultaneously. If there is not sufficient space for pedestrians to wait, there is a risk that pedestrians may spill onto the carriageway and be struck by a passing vehicle.
In the example in the figure above, at the Bernard Street tram stop, the crossing at the northern end of the central reserve / island appears to be around 2.5 metres wide.

### Recommendation

It is recommended that waiting areas are appropriately sized to reduce the risk of pedestrians spilling onto the carriageway.

### Stage 1 Designers Response

No comments at stage 1

### Stage 2 Comment

From the plans provided to the Audit Team, it appears that the effective width of several of the islands would be restricted due to the provision of the traffic signal equipment. This includes at the Ocean Terminal and Newhaven tram stops, the junction of Ocean Drive and the Ocean Terminal car park access and the junction of Ocean Drive, Victoria Quay and Melrose Drive.
There is a risk that pedestrians may have to step out onto the carriageway if passing a vulnerable road user in a wheelchair, a pedestrian pushing a pram, or a cyclist. This could lead to them being struck and injured by passing motorists.
It is recommended that the islands are suitably wide to accommodate vulnerable road users and the anticipated level of use.

### Design Team Response

The design of the crossings is in accordance with Edinburgh Street Design Guide Part C – Detailed Design Manual G4 Crossings – Designing Crossings. While the desire is to provide single stage crossings in all locations due to the traffic signal sequencing at the Melrose drive/Ocean Drive (western) junction, Ocean Drive (eastern) junction and crossings at Ocean Terminal tram stop a two stage pedestrian movement is required. All other crossings are a single stage crossing in accordance with the design guide.
All new crossings provided as part of the works have been checked to ensure the minimum clear width between obstacles is 2.4m. The Island width is a minimum of 3.5m which allows for a 450mm offset from kerb to traffic signal pole and a 100mm pole width.

### 3.1.19 Ocean Terminal Bus Facility

#### Summary

Risk of buses either colliding with one another or mounting the kerbs and potentially colliding with pedestrians.

#### Description

The Audit Team have been provided swept path analyses showing buses accessing / egressing the bus bays. These are based on a 12m standard single deck bus; however, the main service provider Lothian Buses operates double deck buses in excess of 13m. The longer buses have wider swept paths and potentially require more space. The swept path analyses show that a bus entering bay 4 mounts the kerb with the body of the bus overhanging the footway area, increasing the risk of collision with pedestrians.
In addition, a bus entering bay 1 almost mounts the kerb, therefore a larger bus is likely to mount the kerb.

#### Recommendation

It is recommended that the swept path analyses are based on the largest vehicle likely to access the facility and an appropriate size of bay is provided to accommodate this.

#### Stage 1 Designers Response

No comments at stage 1

#### Stage 2 Comment

Swept path drawings have not been provided to the Audit Team. From the plans provided, it is unclear whether there is sufficient space for a vehicle to safely manoeuvre in this area without entering the carriageway or undertaking an unsafe manoeuvre.
It is recommended that there is sufficient space provided for vehicles to access and egress from this area safely.

## Design Team Response

The swept path analysis undertaken for the Ocean Terminal Bus facility indicates sufficient width to allow vehicles to access and egress the Ocean Terminal bus facility. See Figure 4

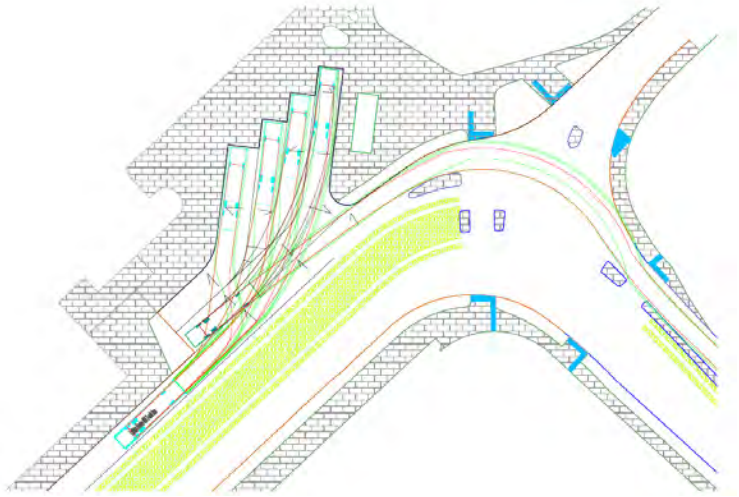

*Figure 4 - Ocean Terminal Bus Facility Swept Path*

# 4 ITEMS RAISED IN THE STAGE 2 ROAD SAFETY AUDIT

## 4.1 General

### 4.1.1 Newhaven and Ocean Terminal Tram Stops

#### Summary

Risk of pedestrians slipping, falling and sustaining personal injuries, due to excess surface water on platforms.

#### Description

The Audit Team have concerns that surface water may pool at the interfaces between the platform pavement and drainage, as slot drains can be easily blocked.
If surface water was to pool in this location, there is a risk of pedestrians slipping, falling and sustaining personal injuries. This risk is heightened during periods of cold / freezing weather when the water could freeze and form ice.

#### Recommendation

It is recommended that appropriate drainage, which will minimise the likelihood of surface water pooling, is provided at these locations.

#### Design Team Response

Aco channels are provided set back from the platform edge Figure 5. Maintenance of the platform drainage will be undertaken by the Tram operator to prevent blockage.

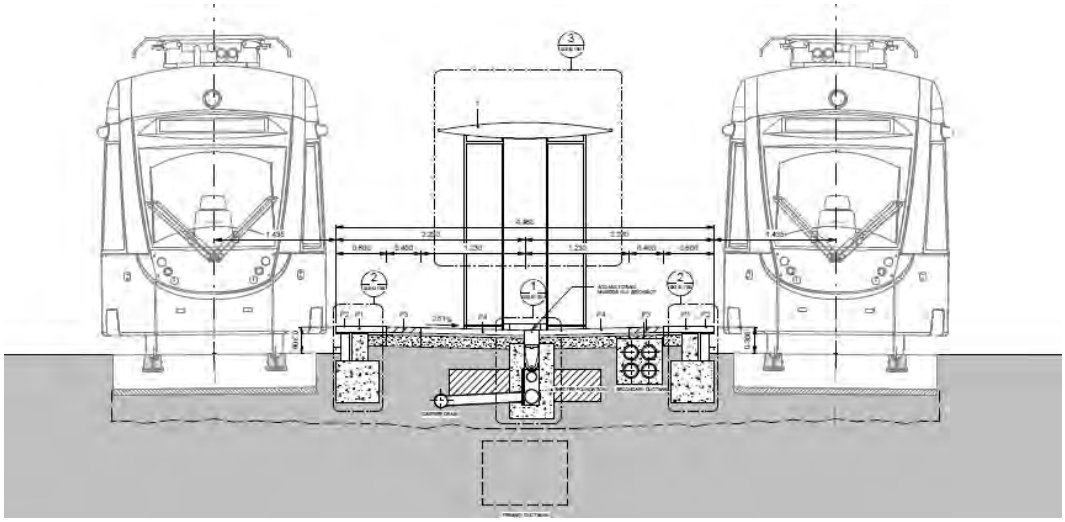

*Figure 5 - Platform Drainage Arrangement*

### 4.1.2 Cruise Terminal Drop-off point

#### Summary

Risk of vehicles skidding and losing control and of pedestrians slipping, falling and sustaining personal injuries, due to excess surface water on carriageway.

#### Description

From the plans provided it is not clear if the existing drainage at the Cruise Terminal Drop-off point is being changed. The Audit Team have concerns that surface water may pool at interface between the new surface and existing drainage lines at the location shown above.
If surface water was to pool in this location, there is a risk of vehicles skidding and losing control and of pedestrians slipping, falling and sustaining personal injuries. This risk is heightened during periods of cold / freezing weather when the water could freeze and form ice.

#### Recommendation

It is recommended that appropriate drainage is provided at this location.

#### Design Team Response

The observed photograph included in the stage 2 road safety audit report is a picture off the existing Forth Ports drop off layout and not the proposed works.

However the existing layout of the Forth Ports drop off is to be altered such that the hardstanding area will drain from the building towards Melrose Drive Figure 6. New gullies are located on the hardstanding side of the shared footway/cycleway providing a positive drainage connection to the new carrier drain in Melrose Drive.

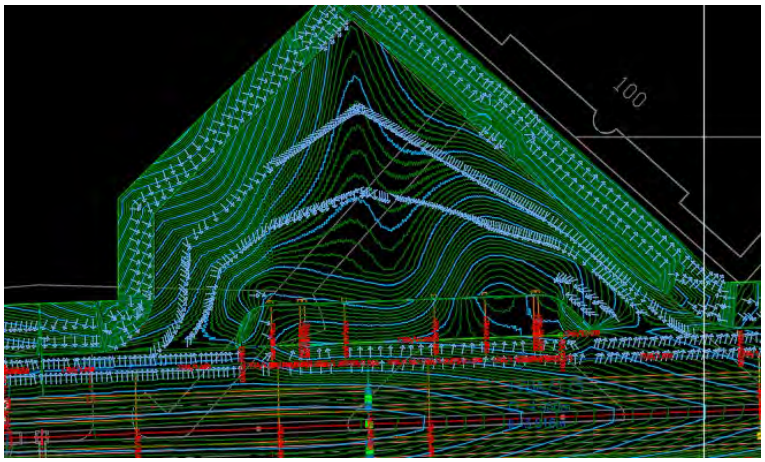


*Figure 6 - Forth Ports Drop-Off Area Contours*

### 4.1.3 Lindsay Road

#### Summary

Risk that pocketing may occur if the parapet is struck, resulting in the vehicle occupant(s) / rider(s) sustaining personal injuries.

#### Description

From the plans provided, it is unclear if the existing parapets are the same containment level and working width as the new proposed parapets.
There is a risk that pocketing may occur if an errant vehicle were to strike and slide along the parapet, removing all the force from the collision and bringing the vehicle to a rapid stop. This could result in the vehicle occupant(s) / rider(s) sustaining personal injuries.

#### Recommendation

It is recommended that appropriate transitions between performance classes of barrier are provided.

#### Design Team Response

The outcome of the risk assessment was to provide a normal containment parapet on the new wall. A review of the existing parapet indicated that it was classified as a N1 W2 parapet it is therefore proposed to create a single parapet N1 W2 for the full length of the Lindsay Road wall mirroring the existing wall.

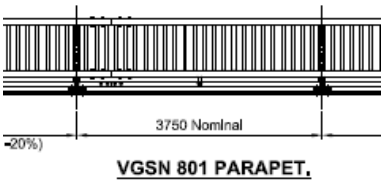


*Figure 7 - N1 W2 Parapet Lindsay Road Wall*

### 4.1.4 Lindsay Road

#### Summary

Risk of errant vehicles striking and penetrating the parapet, resulting in the vehicle occupant(s) / rider(s) sustaining personal injuries.

#### Description

The Audit Team have concerns that the containment levels of the proposed parapets may be less than advisable to provide suitable protection to the tram line, overhead lines and given the change in levels. The performance levels selected have been designed to protect against a car or similar sized vehicle from penetrating, however, there may be a larger percentage of heavy goods vehicle utilising this route.
There is a risk of to any errant vehicles striking and penetrating the parapet, resulting in vehicle occupant(s) / rider(s) sustaining personal injuries.

### Recommendation

It is recommended that the performance levels of the proposed parapet provide suitable protection for the vehicles utilising the route.

### Design Team Response

The outcome of the risk assessment was to provide a Normal containment parapet on the new wall. A review of the existing parapet indicated that it was classified as a N1 W2 parapet it is therefore proposed to create a single parapet N1 W2 for the full length of the Lindsay Road wall mirroring the existing wall and parapet.

## 4.1.5 Lindsay Road, on westbound approach to junction with Sandpiper Drive

### Summary

Risk of vehicles losing control due to uneven surface on carriageway surface, resulting in vehicle occupant(s) / rider(s) sustaining personal injuries.

### Description

During the site investigation it was observed that the existing carriageway surface is uneven on the approach to the signalised junction on Sandpiper Drive. There is a risk that the uneven surface could lead to drivers / riders losing control of their vehicles (both motorised and non-motorised). This could result in vehicle occupant(s) / rider(s) sustaining personal injuries.

### Recommendation

It is recommended that the carriageway surfacing is made good.

### Design Team Response

This is the existing road prior to the construction of the works and should not be included in the stage 2 audit.

## 4.1.6 Lindsay Road, at junction with Sandpiper Drive

### Summary

Risk of rear end shunts and / or late braking due to position of, and visibility to, the proposed bus stop on Lindsay Road.

### Description

The Audit Team have concern that visibility to the bus stop on Lindsay Road eastbound for drivers / riders turning onto Lindsay Road from Sandpiper Drive may be restricted by the proposed landscaping, building line and the position of the stop line
There is a risk that the lack of visibility to the bus stop may mean that the drivers / riders of left turning vehicles are not aware of the location of the bus stop, which could lead to rear end shunts and late braking.

### Recommendation

It is recommended that the visibility to the bus stop is maximised.

### Design Team Response

No visibility issue has been found for the vehicles turning left to Lindsay Road once the vehicle has advanced over the cycle box. From the stop line the trees are within the visibility splay however the

trees specified there will have a clear stem of 2m as a minimum with the canopy above that being a compact and uniform shape reducing significantly the obstruction to visibility. The building on the left is not blocking the visibility envelope.

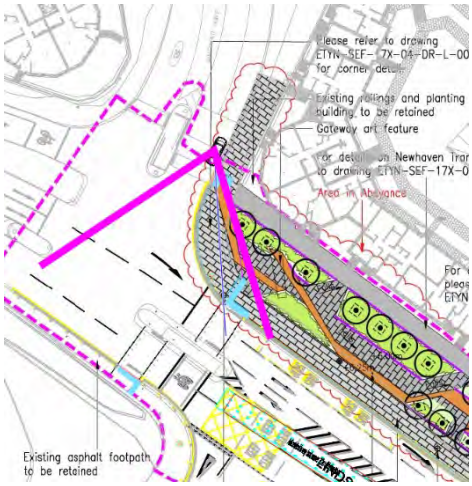


*Figure 8 - visibility envelope at Sandpiper Drive junction*

*Figure 9 - Tree Species at Newhaven public realm works*

### 4.1.7 Melrose Drive at access to Chancelot Mill

#### Summary

Risk that vehicles could collide with proposed kerb line due to 'see-through', resulting in loss-of-control collisions.
Secondary risk of non-motorised users tripping or striking the kerb and sustaining personal injuries.

#### Description

In the plans provided to the Audit Team, it is unclear what is being proposed at the access to Chancelot Mill from Melrose Drive. As shown in the image on the left above, a new kerb line is proposed, extending from the south-western kerb line on Melrose Drive to the south-east side of the access to Chancelot Mill. It appears that no measures are to be proposed on the existing carriageway immediately south-east of the proposed new kerb line and it is unclear what the proposed levels are to be.
There is a risk that the drivers / riders of vehicles approaching from the north-west may experience 'see-through', where they see a facility ahead and believe that they can continue in the eastbound direction. This risk is heightened if drivers / riders were to be unaware that the road layout has changed. This could lead to them striking the kerb line and losing control, and potentially colliding with a non-motorised user.
There is also a risk that non-motorised users could trip on or collide with the kerb line, resulting in them falling and sustaining personal injuries.

#### Recommendation

It is recommended that suitable measures are provided to prevent potential see through to the carriageway / path ahead and that the boundary of the path and carriageway is appropriately delineated. It also recommended that appropriate signage is provided to warn drivers / riders of the change in the road layout ahead.

### Design Team Response

The existing Melrose Drive section between Sandpiper Drive and Chancelot Mill is a dead end with no through access to Ocean Terminal. The route has only been opened for temporary traffic management during the delivery of the Edinburgh Trams York Place to Newhaven project and particularly the works associated with Lindsay Road. Following the completion of the Lindsay Road works the section of road between Sandpiper Drive and Chancelot Mill will revert back to a dead end including the reinstatement of traffic sign 816 No through road for vehicular traffic.

## 4.1.8 Melrose Drive and Ocean Drive

### Summary

Risk of motorised road users undertaking unsafe manoeuvres across the tram tracks resulting in side-swipe collisions.

### Description

From the plans provided to the Audit Team, it is unclear if motorised road users are restricted in turning right and crossing the tram tracks to access junctions and accesses located along the route. The existing roundabouts on Ocean Drive are proposed to be removed, meaning that turning across the tram lines could be more attractive for some road users, as opposed to undertaking a lengthy diversion.
There is a risk of motorised road users undertaking unsafe manoeuvres across the tram tracks resulting in side-swipe collisions.

### Recommendation

It is recommended that suitable measures be provided to restrict vehicles making unsafe manoeuvres across the tram lines.

### Design Team Response

This movement is prohibited by the use of a 'No Right Turn' sign to Diagram 612

*Figure 10 - No right turn for vehicular traffic*

### 4.1.9 Scheme Extents

#### Summary

Risk that the utility covers could collapse, causing motorised road users to lose control or pedestrians and vulnerable road users to trip and fall, resulting in personal injury.

#### Description

During the site investigation it was observed that there are a number of locations where existing utility covers are being relocated from the footway to the carriageway or vice versa. It is not clear from the plans provided if these covers are to be replaced to reflect the change of location. If the utility covers remain the same class as the existing covers, they are unlikely to be able to support the increased loads that they will be subjected to.
There is a risk that the utility covers could collapse, developing a void in the carriageway / footway which could cause motorised road users to lose control or pedestrians and vulnerable road users to trip and fall, resulting in personal injury.

#### Recommendation

It is recommended that the utility covers are of a suitable class for the proposed locations.

#### Design Team Response

The observed photograph is off the existing roads and footpaths and not the proposed works. The provision of any new utility covers as part of the works will be constructed in accordance with the specification.

### 4.1.10 Signalised crossing on Lindsay Road near to Newhaven Tram Stop

#### Summary

Risk that vehicles may cross the stop line when it is not safe to do and strike and injure crossing pedestrians, due to there being no secondary signal heads provided.

#### Description

From the plans provided, it appears that no secondary traffic signals are proposed at the signalised pedestrian crossing on Lindsay Road. With two lanes of traffic approaching the signals, there is a possibility that the primary signal head and / or duplicate primary could be obscured by large vehicles. There is also a risk that a signal head could fail, meaning that approaching drivers / riders may not be able to see a signal head on approach to the crossing.
There is a risk of vehicles striking and injuring crossing pedestrians due to drivers / riders not being able to see a signal head on the approach to the crossing

#### Recommendation

It is recommended that appropriate secondary signal heads are provided.

#### Design Team Response

Secondary signals have been added to the design. See Figure 11

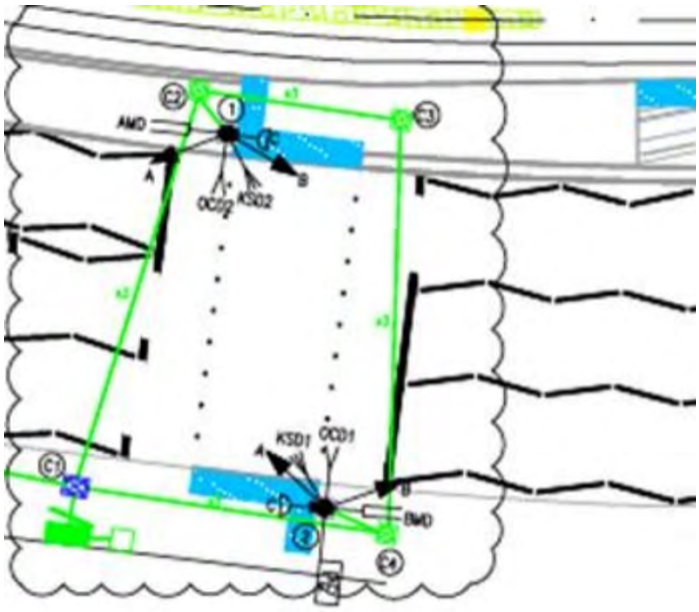


*Figure 11 - Lindsay Road Pedestrian Crossing*

### 4.1.11 Scheme extents

#### Summary

Risk that vehicles could lose control when travelling over utility covers, especially in wet / damp conditions, and strike pedestrians and / or street furniture resulting in personal injuries.

#### Description

From the plans provided it is not clear if the existing ironwork is being raised / lowered to match the proposed surface course level and / or replaced due to being worn. If the existing ironwork is not appropriately flush with the adjacent carriageway surface and / or the cover is not suitably skid resistant, there is a risk that vehicles could lose control, especially in wet / damp conditions, and strike pedestrians and / or street furniture resulting in personal injuries.

#### Recommendation

It is recommended that ironwork is flush with the adjacent carriageway and that suitably skid-resistant covers are provided.

#### Design Team Response

All works undertaken in accordance with the MCHW and the specification.

### 4.1.12 Melrose Drive

#### Summary

Risk of pedestrians slipping and falling, resulting in them sustaining personal injuries, due to surface water pooling on footway at interface between existing and new footways.

### Description

There are existing sections of footway on the south side of Melrose Drive. The proposals show a new 2.5-metre-wide footway on the south side of the road, offset from the existing kerb line. From the plans provided to the Audit Team, it is unclear if the existing sections of footway are to be retained.
If the existing sections of footway are to be retained, there is a risk that a channel could form between the existing footway and the proposed footway, in which surface water could pool. This could lead to pedestrians slipping and falling and sustaining personal injuries. This risk is heightened during periods of cold / freezing weather when the surface water could freeze and form ice.

### Recommendation

If the existing sections of footway are to be retained, it is recommended that appropriate measures are provided to prevent surface water from pooling at the interface between the new and existing facilities.

### Design Team Response

The existing footway is to be removed and landscaped as indicated in Figure 12

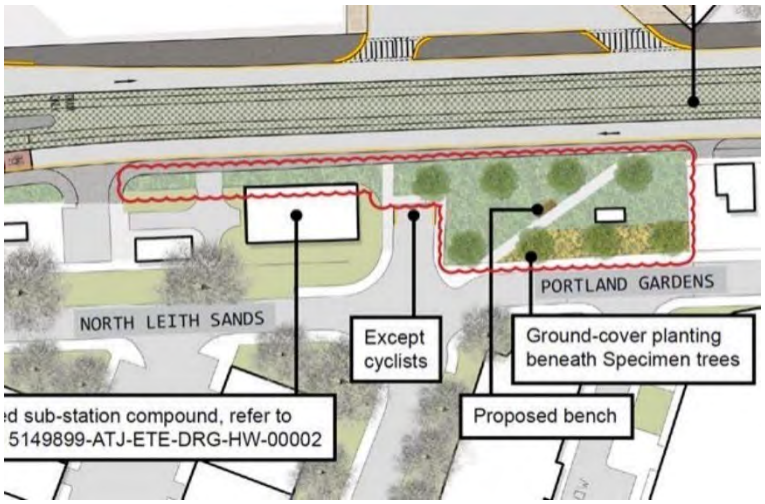


*Figure 12 - Leith Sands Landscaping*

## 4.2 Local Alignment

No problems identified at this Stage 2 Road Safety Audit.

## 4.3 Junctions

### 4.3.1 Melrose Drive / Lindsay Road, Melrose Drive / Melrose Drive Turnout, Melrose Drive / Royal Yacht Entrance, Ocean Drive / Melrose Drive, Ocean Terminal Tram Stop and Ocean Terminal / Carpark junctions

#### Summary

Risk that pedestrians could step out onto the carriageway and be struck and injured by passing vehicles, due to effective footway widths being restricted by the position of traffic signal equipment.

#### Description

From the plans provided to the Audit Team, it appears that the effective width of the footways will be restricted at several locations by the position of traffic signal equipment. Some examples are shown in the figures above.
There is a risk that the narrow effective width of the footways could mean that pedestrians have to step out onto the carriageway to bypass the signal equipment or other non-motorised users. This could lead to them being struck and injured by passing vehicles.

#### Recommendation

It is recommended that the effective widths of the footways are maximised.

#### Design Team Response

In accordance with Edinburgh Street Design Guidance : Part C – Detailed Design Guide, P3 – Footways: Footway Widths, Footways may have reduced widths, over short lengths not exceeding 3m in long profile, to negotiate mature trees and other obstructions e.g. bus stops, but they should at no point be less than 1.5m.
The detailed design has been reviewed and the only locations where there are reduced footway widths below the desirable minimum is where the new traffic signals are located on existing footpaths however at no point does the available footway width fall less than 1.5m.

### 4.3.2 Leith Sands Substation, Melrose Drive

#### Summary

Risk of pedestrians being struck and injured by turning vehicles due to large vehicles overrunning footway.

#### Description

An uncontrolled crossing is currently provided across the access to the Leith Sands Substation. From the plans provided to the Audit Team, it appears that the existing arrangement at this location is to be formalised by providing a new section of footway, tactile paving, and a dropped kerb around the full extent of the new footway.
The vehicle tracking drawings that were provided to the Audit Team show a DB32 Fire Appliance overrunning the new area of footway when making a left turn into the access.
If large vehicles have to overrun the footway to turn left, there is a risk that they could strike and injure a non-motorised user whilst doing so.

### Recommendation

It is recommended that the layout is amended so that large vehicles do not overrun the footway whilst turning left into the access.

### Design Team Response

The swept path analysis provided clearly indicate adequate available road width at the entrance to accommodate the design vehicle

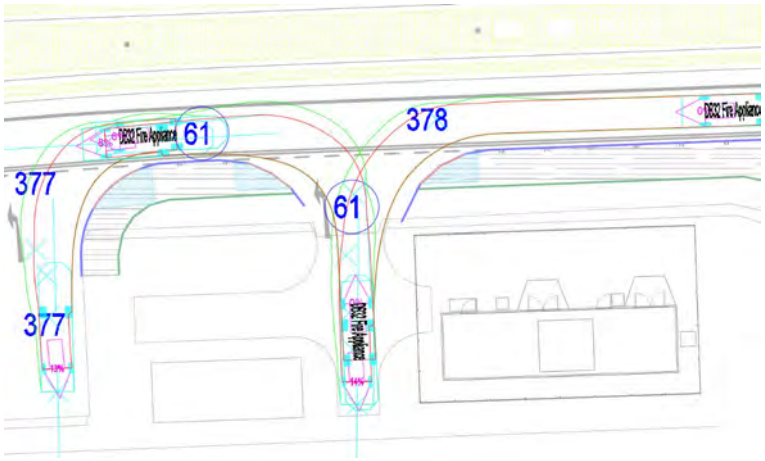


*Figure 13 - Swept Path Leith Sands Substation*

## 4.3.3 Junction of Lindsay Road and Melrose Drive

### Summary

Risk of large vehicles colliding with a stopped tram at the junction of Lindsay Road and Melrose Drive, resulting in vehicle occupants sustaining personal injuries.

### Description

No details regarding vehicle swept paths have been provided to the Audit Team for this junction. The layout at the signalised junction includes trams stopping on either side of the carriageway, as shown in the image above. It is unclear if a large vehicle turning from Lindsay Road onto Melrose Drive could travel around the bend in the road without colliding with a stopped tram.

### Recommendation

It is recommended that swept path analysis is undertaken and that the tram stop lines are sufficiently set back from the carriageway to ensure that a large vehicle can undertake this manoeuvre without colliding with a stopped tram.

### Design Team Response

The swept path analysis carried out on this junction confirms that the stop lines are sufficiently set back to accommodate the movement of a larger vehicle.


*Figure 14 - Swept Path Melrose Drive Tram Crossing*

### 4.3.4 Junction of Melrose Drive and Melrose Drive Turnout

#### Summary

Risk of stopped vehicles being struck by trams due to vehicles queuing back across tram tracks.

#### Description

There are two signalised junctions located in close proximity on Melrose Drive: one at its junction with Melrose Drive Turnout and one at its junction with Lindsay Road. From the plans provided to the Audit Team it is unclear how these junctions are to operate with respect to one another.
When the Melrose Drive eastbound movement has a red signal at the Melrose Drive Turnout junction, there could still be traffic approaching from the south-west at the junction with Lindsay Road. This could lead to a queue building back from the stop line, and this could extend back across the tram tracks. No measures appear to be proposed to discourage vehicles from waiting in this area.
If vehicles were to queue across the tram tracks, there is a risk that a tram could collide with a stopped vehicle.

#### Recommendation

It is recommended that suitable measures are provided to discourage vehicles from queueing across the tram tracks and / or that the operation of the traffic signals is coordinated to prevent the possibility of queues extending across the tram tracks.

#### Design Team Response

The Melrose Drive Junction SJ5A, SJ5B and SJ5C are coordinated and include a queue management system preventing vehicles queuing across the tram tracks.

### 4.3.5 Melrose Drive, at junction with Lindsay Road

#### Summary

Risk of vehicles overshooting the stop line and striking and injuring non-motorised users.

### Description

At the junction of Lindsay Road and Melrose Drive, the proposed stop line on the Melrose Drive approach is not perpendicular to the kerb. This could result in approaching drivers / riders being unsure where to stop their vehicle or failing to recognise the presence of the stop line. There is a risk that motorised road users could overshoot the stop line and collide with cyclists at the advanced stop line or with crossing pedestrians.

### Recommendation

It is recommended that the stop lines are aligned as close to perpendicular to the kerb as possible.

### Design Team Response

The traffic Signs Manual Chapter 6 clause 4.2 Stop Lines and clause 4.2.2 states that the stop line will normally be at right angles to the centre line of the road to which it applies, even at skew junctions. The Melrose Drive and Lindsay Road junction is a skewed junction. The design team acknowledge the comments raised and will adjust the stop line and advanced stop line for cyclists.

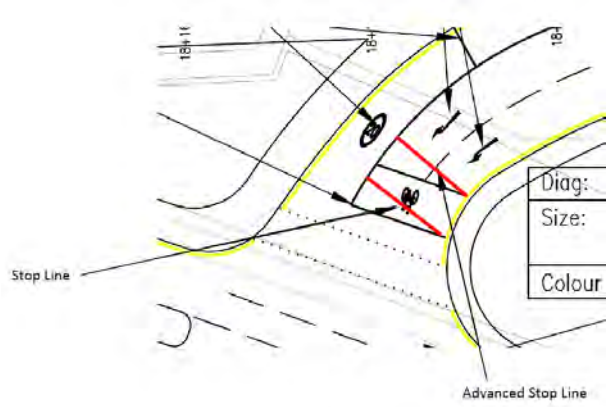


*Figure 15 - Lindsay Road/Melrose Drive Stop Line*

## 4.3.6 Junction of Ocean Drive, Melrose Drive and Victoria Quay

### Summary

Risk of side-impact collisions occurring due to complex junction layout.

### Description

The existing roundabout at the junction of Ocean Drive, Melrose Drive and Victoria Quay is proposed to be changed to a signalised crossroads. Splitter islands are proposed, and the tram tracks run between the northern and eastern arms of the junction, as shown in the image above. Road markings are proposed to define where right turners from the northern and southern arms should wait in the centre of the junction, as the proposed staging operation includes these arms running together.

There is a risk that drivers / riders could be confused by the junction layout and be unsure about where to wait when turning right, due to the complex layout of the junction. This could lead to vehicles encroaching into the centre of the junction, potentially into conflict with traffic travelling ahead from the northern and southern arms. Vehicles could also encroach into the centre of the junction due to the visibility to ahead traffic being obscured by a right turning vehicle from the opposite direction and / or the signalling equipment on the splitter islands.

### Recommendation

It is recommended that the layout and / or staging of the junction are altered to simplify the arrangement and reduce the risk of right turning drivers / riders being confused where to wait within the junction.

### Design Team Response

The layout presented is defined in the employer's requirements and is constrained by the existing geometry and buildings. The layout and staging also caters for all movements including road traffic, pedestrian and the tram movement from Ocean Drive to/from Melrose Drive. Consideration has been given to run the approach roads in separate stages however this was rejected by CEC.

Refinement of the road markings and splitter islands have improved the arrangement such that clear guidance is provided to road users.

## 4.3.7 Ocean Terminal Car Park Exit, Melrose Drive

### Summary

Risk of side swipe collisions between vehicles exiting the car park, due to the reduced length of the merging lane.
Secondary risk of vehicles exiting the Ocean Terminal car park failing to stop due to the short distance between the car park exit and the stop line, resulting in vehicles striking and injuring crossing pedestrians or side-impact collisions occurring with vehicles on Melrose Drive.

### Description

During the site investigation it was observed that two lanes are provided at the exit to Ocean Terminal car park, as shown in the photograph on the right above. These lanes merge into a single lane at the junction to Melrose Drive. In the proposed arrangement, the space provided for vehicles to merge in advance of the stop line is reduced, as the stop line is proposed to be moved eastwards, closer to the car park exit.
There is a risk of side swipe collisions between vehicles exiting the car park, due to the requirement for vehicles to merge and the lack of space to do so.
There is a secondary risk of vehicles exiting the Ocean Terminal car park failing to stop due to the short distance between the car park exit and the stop line. This could result in vehicles striking and injuring crossing pedestrians or side-impact collisions occurring between vehicles exiting the car park and vehicles on Melrose Drive.

### Recommendation

It is recommended that the exit to the car park be reduced to a single lane or that suitable measures be provided to allow vehicles to safely merge. It is also recommended that suitable measures are provided so that drivers / riders of vehicles exiting the car park are aware of the traffic signals immediately downstream.

### Design Team Response

This is out with the extents of the works. Any additional works will require to be instructed by the employer.

### 4.3.8 Ocean Drive (east) approach to junction of Ocean Drive, Melrose Drive and Victoria Quay

#### Summary

Risk of vehicles failing to stop at traffic signals due to visibility to signal heads being obscured by vegetation.

#### Description

As shown in the image above, vegetation is proposed on the south side of Ocean Drive (east) on the approach to its junction with Melrose Drive and Victoria Quay. Seven 'Acer Campestre 'Elegant'' trees are proposed, which reach a height of 5.5 to 6 metres according to the specification provided. There is a risk that this vegetation could obscure forward visibility to the nearside signal head on Ocean Drive. This could result in drivers / riders failing to observe the signal heads, failing to stop and colliding with a passing vehicle or a crossing pedestrian.

#### Recommendation

It is recommended that the vegetation is positioned where it will not obstruct visibility to the signal heads and / or that the type of vegetation is changed to a species that will not reach a height that will obstruct visibility to the signal heads.

#### Design Team Response

Signal heads provided on the left hand side are duplicated on the right hand side, so the risk is mitigated. Trees not anticipated to be an issue. They are parallel to the road in line with the arrow markings on the road, not on the corner or near the signalling elements, and are set back behind the footway. Trees are to have a minimum 2m clear stem and will have a compact and uniform shape canopy.

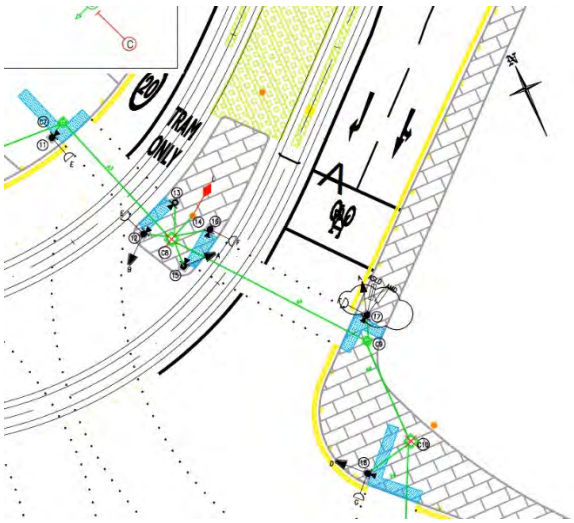


*Figure 16 - Ocean Drive Signal Arrangement*

## 4.3.9 Junction of Lindsay Road and Melrose Drive

### Summary

Risk of vehicles queuing across junctions, leading to collisions with turning vehicles.

### Description

The junction of Lindsay Road and Melrose Drive appears to have two streams, with one stream operating the main junction of Melrose Drive and Lindsay Road and the second operating the Toucan crossing across the tram tracks and the tram signals.
From the plans provided to the Audit Team, it is unclear how these two streams are to operate with respect to one another. If the timing of the streams is not appropriately coordinated, there is a risk that vehicles could queue back across pedestrian crossings and across junctions. For example, if the north-eastbound movement on Melrose Drive has a red signal, traffic on Lindsay Road could still be turning onto Melrose Drive, leading to a queue building back across the junction and pedestrian crossing.
This could lead to vehicles colliding with vehicles queuing across junctions, or vehicles colliding with pedestrians crossing between stopped vehicles.
It is acknowledged that a queue detector is provided on Melrose Drive north eastbound, but it is unclear how this junction is to operate.

### Recommendation

It is recommended that the two streams are appropriately linked so as to reduce the risk of vehicles queuing back across the junction or across the pedestrian crossing.

### Design Team Response

The Melrose Drive Junction SJ5A, SJ5B and SJ5C are coordinated and include a queue management system.

## 4.3.10 Junction of Lindsay Road and Melrose Drive

### Summary

Risk of vehicles colliding with Overhead Line Equipment (OLE) pole, resulting in vehicle occupants sustaining injuries.

### Description

An Overhead Line Electrification (OLE) pole appears to be in close vicinity to the carriageway on Melrose Drive, north-east of the junction with Lindsay Road. Drivers / Riders may not be aware of the presence of the OLE pole during the hours of darkness and it is not clear if the OLE pole will be appropriately conspicuous to all motorised road users.
There is a risk of vehicles colliding with the OLE pole, resulting in vehicle occupants sustaining injuries.

### Recommendation

It is recommended that the OLE equipment be appropriately located to reduce the risk of it being struck by vehicles and that it is clearly visible during the hours of darkness by use of reflective banding or similar.

### Design Team Response

The OLE poles have been adjusted to provide sufficient clearance to vehicle paths. It is proposed to position a protective bollard in front of OLE pole P13.3 Figure 17 and Figure 18. The remaining OLE's are positioned between the tram tracks in the grasscrete area.

*Figure 17 - OLE protection Haymarket*

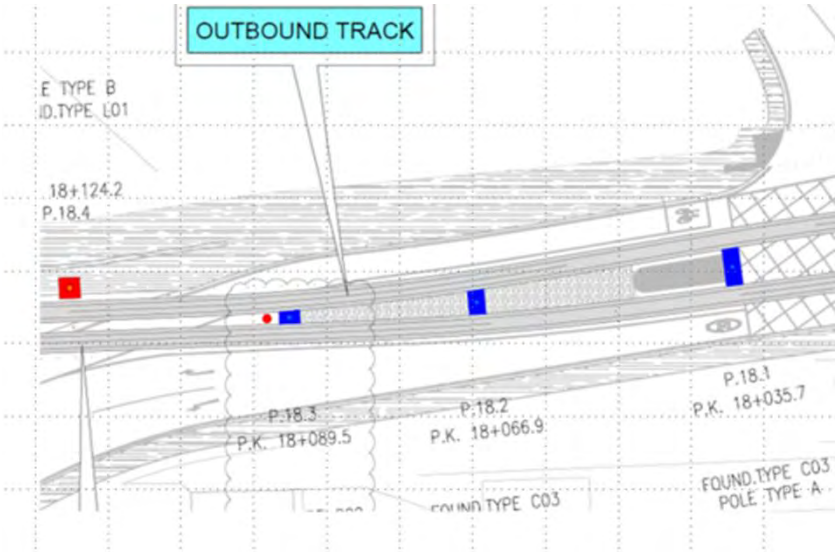


*Figure 18 - OLE positions Melrose Drive*

## 4.4 Non-Motorised Users

### 4.4.1 Scheme extents

### Summary

Risk of users in mobility chairs overturning due to gradient, resulting in personal injury.

### Description

From the plans provided to the Audit Team, it is unclear what the gradient of the footway at vehicle crossovers is to be at the any proposed location.
If the gradient of the footway is too great, there is a risk that a vulnerable road user, for example one in a mobility chair, could overturn and sustain a personal injury. It should be noted that the typical detail provided shows a gradient that is unlikely to be appropriate for all users.

### Recommendation

It is recommended that the gradient of the footway is appropriate for use by all pedestrians.

### Design Team Response

The footway gradients at vehicle crossovers are to be in accordance with Edinburgh Street Design Guidance Part C – Detailed Design Manual.

## 4.4.2 Lindsay Road (east) at junction with Sandpiper Drive

### Summary

Risk of pedestrians with visual impairments being unable to locate crossing point, becoming confused or disorientated and being struck and injured by passing vehicles, due to lack of provision of tactile paving.

### Description

The plans provided to the Audit Team do not show any tactile paving on the refuge island or southern footway on Lindsay Road at its junction with Sandpiper Drive.
If no tactile paving is provided, there is a risk that visually impaired pedestrians could be unable to locate the crossing point and that they could become confused or disorientated. This could lead to them stepping onto the carriageway when it is not safe to do so and being struck by passing vehicles.
Tactile paving informs visually impaired pedestrians of the boundary between the footway and carriageway, and informs them of the presence, type and alignment of the crossing

### Recommendation

It is recommended that appropriate tactile paving is provided at this location.

### Design Team Response

The splitter island as part of the Lindsay Road/Sandpiper Drive is retained. Minor adjustments will be made to the existing crossings and tactile paving however in principal the junction will be retained as per Figure 19 below which the island and southern footway include tactile paving.

*Figure 19 - Lindsay Road/Sandpiper Drive Traffic Signals*

### 4.4.3 East side of Sandpiper Drive at junction with Lindsay Road

#### Summary

Risk of pedestrians with visual impairments being unable to locate crossing point and becoming confused or disorientated.

#### Description

The proposed tactile paving on the east side of Sandpiper Drive does not extend to the rear of the footway. There is a risk that visually impaired pedestrians may not be able to locate the crossing point as a result, which could lead to them becoming confused or disorientated.

#### Recommendation

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

#### Design Team Response

Tactile paving will be provided in accordance with the Edinburgh Street Design Guidance: Part C M4 - Tactile Paving. The tactile paving shown extend to the existing boundary and will be amended to suit Landscaping proposals as recommended in the Audit Report.

### 4.4.4 South side of Lindsay Road (east) on approach to junction with Sandpiper Drive

#### Summary

Risk of a visually impaired pedestrian becoming stuck on the carriageway and being struck and injured by a passing vehicle, due to existing tactile paving and dropped kerb not being removed.

#### Description

During the site investigation it was noted that there are the remnants of an uncontrolled crossing point on the south side of Lindsay Road, east of its junction with Sandpiper Drive. The crossing infrastructure appears to have been removed on the north side of the road, but tactile paving and dropped kerbs remain on the south side.
From the plans provided to the Audit Team it is unclear if this arrangement is to be removed. If the arrangement is not removed, there is a risk of visually impaired pedestrians attempting to cross at this location, becoming stuck on the carriageway and being struck and injured by passing vehicles.

### Recommendation

It is recommended that the dropped kerbs and tactile paving at this location are removed.

### Design Team Response

Works to the westbound kerb and footway are outside the extent of the permanent works. Removal of the dropped kerb and tactile paving would require to be instructed by the employer.

## 4.4.5 Footway between North Fort Street and Lindsay Road

### Summary

Risk of pedestrians tripping and falling, resulting in them sustaining personal injuries, due to uneven footway surfacing and lack of tactile paving at step.

### Description

During the site investigation it was noted that the existing footway surface between North Fort Street and Lindsay Road is very uneven. Several issues were observed on site, including:

- Objects protruding from the footway surface;
- Uneven paving slabs;
- No warning paving being provided at the steps; and
- The steps generally being in poor condition.

Whilst it is acknowledged that this is not directly within the extents of the scheme, pedestrians will likely walk this route to access the tram stop and crossing facilities on Lindsay Road.
The poor condition of the footway surface could lead to pedestrians tripping, falling and sustaining personal injuries.

### Recommendation

It is recommended that:

- The paving slabs are re-laid so as to provide an uneven surface;
- The steps are appropriately repaired;
- Appropriate warning paving is provided at the steps; and
- Any trip hazards are appropriately removed.

### Design Team Response

Footway between North Fort Street and Lindsay Road is out with the extents of the required works. Should the employer wish for the Contractor to repair existing damaged assets out with the extents of the specified works an instruction would be required in accordance with the contract.

## 4.4.6 Proposed link between Hawthornvale Path and southern footway on Lindsay Road

### Summary

Risk of non-motorised users sustaining injuries when using this facility due to falling down the slope or colliding with other non-motorised users

### Description

A link is proposed between the southern footway on Lindsay Road and the Hawthornvale shared use path to the south, as shown in the image above. This link comprises a switch-back ramp, that appears to be around 3 metres wide.

Whilst on site the Audit Team noted that there is a significant level difference between the southern footway on Lindsay Road and the Hawthornvale Path. No details regarding the gradient of the path have been provided to the Audit Team, nor whether any landings are provided. Furthermore, from the plans provided it is unclear if any measures are proposed to prevent users from falling from the ramp down the slope.
The ramp appears to be a consistent width along its entire length. There is a risk that collisions could occur between non-motorised users, particularly on the curved section where users are likely to be turning.
If no measures are provided to prevent a non-motorised user from falling down the slope, there is also a risk that a non-motorised user could fall and sustain a personal injury.
If the gradient of the ramp is not appropriate, there is a risk that users in mobility chairs could overturn whilst attempting to use the facility.

### Recommendation

It is recommended that:
• The gradient is appropriate for use by all users;
• Suitable measures are provided to prevent users from falling down the slope; and
• The ramp is suitably wide for the anticipated level of use.

### Design Team Response

The design of the shared use link between Lindsay Road and the Hawthornvale Path has been designed in accordance with the National Roads Development Guide (SCOTS) - Part 3 Steps or Ramps on Footway and the Geometric Standards for Cycle Routes.

## 4.4.7 Access and exit at Cruise Terminal drop-off

### Summary

Risk of crossing pedestrians being struck and injured by vehicles due to road users being unclear who has priority.

### Description

As shown in the image above, informal Zebra crossing type markings are proposed across the access and exit from the Cruise Terminal drop-off facility on Melrose Drive.
The Audit Team are concerned that road users could be confused as to who has priority at these locations, which could lead to crossing pedestrians being struck and injured by passing vehicles. Pedestrians may believe that the black and white markings mean that they have priority, while motorised vehicles may think that they do not need to give way to pedestrians since the crossing points are not formal Zebra crossings.

### Recommendation

It is recommended that the design of these crossings is amended so that it can be readily understood by all users.

### Design Team Response

The Cruise terminal drop off area has very occasional use and therefore it is proposed to remove the zebra crossing type markings to form a conventional uncontrolled crossing providing priority to motorised vehicles and therefore removing any confusion. This arrangement would mirror the existing priority junction arrangement.

The Edinburgh Street Design guidance suggests that the maximum width of an uncontrolled crossing is 10.5m without the need for a refuge island ESDG Part C Detailed Design Manual G4 - Crossings. The width of the proposed entrance to the Cruise Terminal drop-off area is 9.5m and the exit is 11.8m. It is considered that due to the occasional use of the Cruise Terminal drop-off area and the volume of pedestrians the exit width which exceeds the maximum would not be an issue.

### 4.4.8 North side of Ocean Drive, at entrance to Ocean Terminal car park

#### Summary

Risk of pedestrians sustaining personal injuries whilst crossing the access to the Ocean Terminal car park as a result of tripping and falling or being struck by a passing vehicle, due to lack of crossing provision.

#### Description

From the plans provided to the Audit Team it is unclear what pedestrian infrastructure is proposed across the entry to the Ocean Terminal car park on Ocean Drive.
If a suitable crossing facility is not provided, there is a risk that a pedestrian could trip on a kerb and sustain a personal injury. There is also a risk that a pedestrian could inadvertently step onto the carriageway and be struck by a passing vehicle.

#### Recommendation

It is recommended that an appropriate pedestrian crossing facility is provided.

#### Design Team Response

The Ocean Terminal Hard Landscaping arrangement includes an uncontrolled crossing at the car park entrance including tactile paving and pedestrian bollards.

### 4.4.9 North-west side of Ocean Drive, adjacent to outside Ocean Terminal car parking facility

#### Summary

Risk of pedestrians tripping and falling when attempting to transition between the footway and carriageway, resulting in them sustaining a personal injury, due to lack of pedestrian crossing facility and abrupt end of footway.

#### Description

As shown in the image above, the proposed footway on the north-west side of Ocean Drive does not lead anywhere. No crossing facility appears to be provided at the access to the Ocean Terminal outside car parking facility and no further pedestrian infrastructure appears to be proposed.
There is a risk that a pedestrian could attempt to cross at this location and could trip and fall whilst attempting to transition between the carriageway and footway.

#### Recommendation

It is recommended that suitable infrastructure is provided to allow pedestrians to continue their journey, such as an appropriate crossing point.

#### Design Team Response

This is out with the extents of the works. Any additional works will require to be instructed by the employer.

### 4.4.10 South-east side of Ocean Drive, at staggered pedestrian crossing adjacent to main entrance to Ocean Terminal

#### Summary

Risk of crossing pedestrians being struck and injured by vehicles due to intervisibility and forward visibility to signal heads being obscured by vegetation.

#### Description

As shown in the image above, vegetation is proposed on the south-east side of Ocean Drive on the approach to the staggered pedestrian crossing facility.
The Audit Team are concerned that intervisibility between pedestrians and the drivers / riders of approaching vehicles, and the forward visibility of the drivers / riders to the signal heads, could be obscured by this vegetation. There is a risk that this could lead to a driver / rider failing to stop and striking and injuring a crossing pedestrian.

#### Recommendation

It is recommended that appropriate forward visibility is provided to the traffic signal heads and that appropriate intervisibility is provided between pedestrians waiting to cross and the drivers / riders of approaching vehicles.

### Design Team Response

Signal heads provided on the left hand side are duplicated on the right hand side, so the risk is mitigated. Lighting / signals are next to the road on the footpath. Trees are behind the footpath. Proposed trees have a minimum 2m clear stem with a compact canopy above this height, therefore pedestrians will be able to see the signals / crossing while walking along the footpath. There are no intervisibility issues for vehicles / tram drivers due to the tree planting parallel to the road set behind the footway.

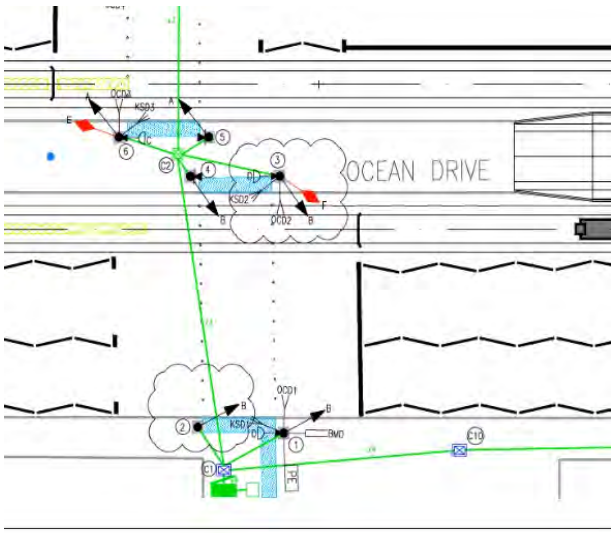


*Figure 20 - Traffic Signals at Ocean Terminal Tram Stop*

## 4.4.11 Junction of Melrose Drive, Ocean Drive and Victoria Quay

### Summary

Risk that pedestrians may step out onto the carriageway when it is not safe to do so and be struck and injured by passing vehicles.

### Description

The Audit Team are concerned that there is a risk of 'see-through' at this junction. Staggered crossings are provided across each arm of the junction and far-side pedestrian aspects appear to be proposed.

Pedestrians waiting to cross the carriageway could become confused, as the far-side signals for both sides of the crossings may be able to be seen simultaneously from both sides of the road. The proposed staging arrangement uses a 'walk-with' pedestrian arrangement, meaning the crossing on one side of the road may be on green when the crossing on the opposite side of the road is on red. There is a risk that pedestrians could see a green signal on the opposite side of the road and may begin to cross in the mistaken belief that oncoming traffic has been stopped. This could lead to them being struck and injured by passing motorists.

### Recommendation

It is recommended that visibility to the pedestrian aspects from the opposite sides of the various arms should be appropriately obscured.

### Design Team Response

The possibility of see-through has been taken into account in the design by positioning the pedestrian signals such that they are only visible for users of specific crossings.

## 4.5 Road Signs, Carriageway Markings and Lighting

### 4.5.1 Portland Place

### Summary

Risk that traffic signs may be struck by passing motorised road users leading to sections of sign face falling on to the footway, causing personal injuries to any pedestrians in the vicinity.

### Description

From the plans provided to the Audit Team it is unclear what the offset is proposed to be to the new traffic signs on Portland Place. If the signs are not suitably positioned, there is a risk that they may be struck by passing vehicles, leading to sections of sign face falling on to the footway and causing personal injuries to any pedestrians in the vicinity.

### Recommendation

It is recommended that the traffic signs be located in a location where there is a suitable offset from the edge of carriageway.

### Design Team Response

ADS 103-44 & 46 replace existing signs at the same location. ADS 103-45, which is new, will be positioned opposite the exit road from the Ocean Terminal in front of the shop fronts but still maintaining access.

### 4.5.2 Scheme Extents

### Summary

Risk of pedestrians or cyclists colliding with street furniture, resulting in personal injury.

### Description

New traffic signs, street lighting columns and other street furniture are proposed throughout the project extents. Due to the apparent lack of colour contrasting banding on the traffic signal posts, traffic sign posts, pedestrian guardrail, street furniture and street lighting columns, visually impaired non-motorised users may not be able to differentiate the safest route and could collide with these, resulting in personal injury.

### Recommendation

It is recommended that suitable contrast banding is applied to all street furniture.

### Design Team Response

All street furniture provided as part of the Edinburgh Trams York Place to Newhaven project has been designed in accordance with the Edinburgh Street Design Guidance – Detailed Design Manual and the works specifications.

### 4.5.3 Melrose Drive, on footway to north of retaining wall

#### Summary

Risk that reduced visibility could lead to pedestrians and vulnerable road users tripping and falling, resulting in personal injury, due to lack of provision of lighting.

#### Description

From the plans provided to the Audit Team it is unclear if the footway at the base of the retaining wall is to be illuminated by lighting columns.
There is a risk that pedestrians and vulnerable road users will suffer from decreased visibility in the dark, which could lead to them tripping and falling, resulting in personal injury.

#### Recommendation

It is recommended that suitable illumination is provided.

#### Design Team Response

The lighting along the footway on the upper level is installed along the back edge of the footway. This lighting will provide back spill light to illuminate the footpath. The lighting levels being achieved are consistent with the requirements of BS5489-1:2013 Lighting class P4, and, as such, are consistent with BS5489 recommendations. Noting that this footpath is separated from the main tram route at this point. The upper footpath, which is immediately adjacent to the tramway, is illuminated to BS5489-1:2013 lighting class P1, as is required within the particular specification for the tram route itself.

### 4.5.4 Sandpiper Drive southbound at junction with Lindsay Road

#### Summary

Risk of vehicles crossing the stop line when it is not safe to do so and striking and injuring crossing pedestrians or striking passing vehicles, due to stop lines on Sandpiper Drive southbound not being visible.

#### Description

During the site investigation it was observed that the existing stop lines on Sandpiper Drive are very worn, as shown in the photograph above. From the plans provided to the Audit Team, it does not appear that these are to be refreshed / renewed.
There is a risk that the driver / rider of a vehicle approaching the junction may not appreciate the need to stop or where to stop. This could lead to them proceeding across the stop line when on a red signal and colliding with a crossing pedestrian or a passing vehicle on Lindsay Road.

#### Recommendation

It is recommended that the stop lines are suitable refreshed/renewed.

### Design Team Response

This is out with the extents of the works. Any additional works will require to be instructed by the employer.

## 4.5.5 Exit from Cruise Terminal drop-off facility on Melrose Drive

### Summary

Risk of vehicles failing to give way and colliding with passing vehicles on Melrose Drive.

### Description

As shown in the image above, no give way markings appear to be proposed at the exit from the Cruise Terminal drop-off point onto Melrose Drive. The drivers / riders of vehicles approaching this junction may not appreciate that they have to give way to traffic on Melrose Drive. This could lead to vehicles emerging onto Melrose Drive when it is not safe to do so and colliding with passing vehicles.

### Recommendation

It is recommended that appropriate road markings and / or signage is provided to inform drivers / riders that they have to give way to traffic on Melrose Drive.

### Design Team Response

The provision of the 'No Right Turn Sign' at this exit should alert drivers of the junction, however, Road Markings to 1003A will be provided on the north side of the crossing to inform drivers to give way to vehicles on Melrose Drive.

## 4.5.6 Ocean Drive north-eastbound, north-east of junction with Victoria Quay and Melrose Drive

### Summary

Risk of vehicles undertaking a sudden lane change upon inadvertently entering tram lane, resulting in side-swipe collisions occurring.

### Description

A dedicated lane for trams is provided in the offside lane on Ocean Drive at this location. The Audit Team are concerned that vehicles turning onto Ocean Drive from Victoria Quay or Ocean Drive (west) could inadvertently enter the tram lane due to the alignment of the longitudinal line to Diag. 1012.1 (TSRGD 2016), the position of the tram lane sign and the fact that the tram lane will look like a traffic lane at this point (i.e. it will not be surfaced with Grasscrete).
The drivers / riders of vehicles turning onto Ocean Drive, particularly those from Victoria Quay, could inadvertently enter the tram lane and make a lane change upon realising that they are in the wrong lane, leading to side-swipe collisions occurring with vehicles in the nearside lane.

### Recommendation

It is recommended that the design is appropriately amended so that it is clear to the drivers / riders of approaching vehicles which lanes they can travel in and which they cannot.

### Design Team Response

The provision of road markings through the junction will assist to guide vehicles from Victoria Quay into the correct lane. 'Tram Only' road markings have also been provided to make drivers aware of the lane arrangement.

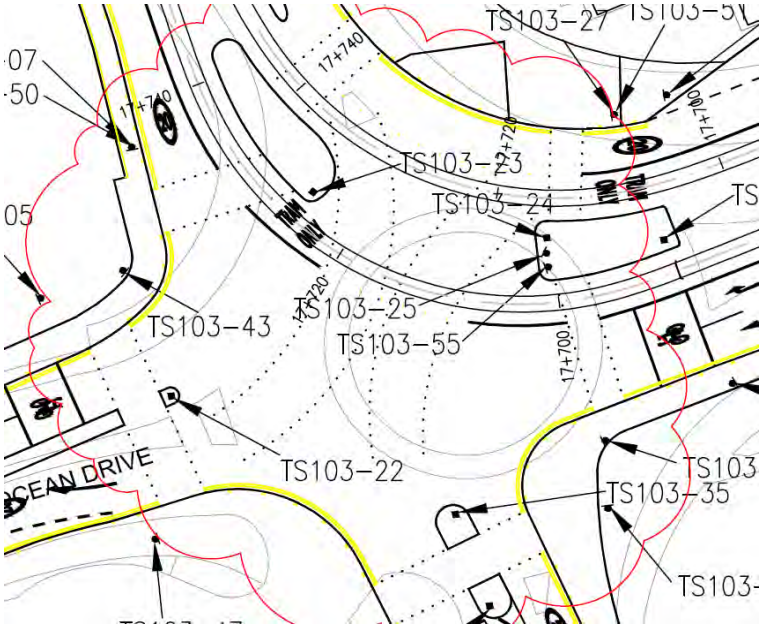


*Figure 21 - Ocean Drive Road Markings*

### 4.5.7 Junction of Ocean Drive and Cala Homes residential access

#### Summary

Risk of vehicles colliding with traffic islands, resulting in vehicle occupant(s) / rider(s) sustaining personal injuries.

#### Description

No keep left bollards (to Diag. 610, TSRGD 2016) appear to be proposed on the traffic islands at the junction of Ocean Drive and the Cala Homes residential access.
If no bollards are provided on the islands, there is a risk of vehicles colliding with them, resulting in the vehicle occupant(s) / rider(s) sustaining personal injuries.

#### Recommendation

It is recommended that suitable bollards (to Diag. 610, TSRGD 2016) are provided on the traffic islands at this location.

#### Design Team Response

Acknowledged. Bollards incorporating Diag 610 will be provided on the Traffic Islands.

# 5 ROAD SAFETY AUDIT DECISION LOG

## 5.1 Stage 1 Decision Log

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 3.1.1 | Excess surface water increases the risk of vehicles skidding, particularly during periods of cold /freezing weather | It is recommended that drainage is appropriate throughout the scheme extents. | Please refer to drawing ETYN-SEF-XXX-14-DR-0001 and 0002 which details the new drainage along Lindsay Road including increased gully spacing and kerb drain units in areas where the longitudinal gradient is below the minimum. The access to Chancelot Mill and Melrose Drive are out with the defined extents of the permanent works. | | No action |
| 3.1.2 | Risk of vehicles undertaking unsafe manoeuvres and colliding with a non-motorised user or another vehicle. | It is recommended that swept path analyses with appropriately sized vehicles are undertaken of the turning movements in the proposed loading area, and that the design is modified as appropriate to reduce the risk of conflict between vehicles and other users. | The designer assumes the comment is the stage 1 and stage 2 RSA in relation to a taxi rank positioned to the east of the Ocean Terminal western carpark entrance. The designer has reviewed the swept path and confirm that the existing arrangement will be amended to accommodate the swept path requirements for the taxi rank. | | Design to be amended to allow for vehicle swept path |
| 3.1.3 | Risk of vehicles overshooting the stop line due to limited visibility to the signals and colliding with pedestrians. | It is recommended that the signalling equipment is adjusted to provide full | A pedestrian crossing may be sited near a bus stop. Generally a bus stop is better suited on the downstream | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | visibility when both tram and bus stops are occupied. | side of the crossing however there is nothing preventing the bus box and stop location upstream of the crossing. The speed limit of this section is 20mph therefore relatively low speed. The bus and tram position when stationary are some 20m back from the stop line with zig zag road markings promoting a clear zone between the bus box and the stop line. Equally the full height tram platform position is positioned 13m back from the stop line again providing visibility to the traffic signal heads which is a further 4m from the stop line. Stopping distance for a 20mph road is 12 metres (40 feet) in accordance with the Highway Code therefore the visibility to the signal heads is sufficient. Furthermore near and offside traffic signal heads have been provided at the crossing increasing visibility for vehicles approaching the crossing. | | |
| 3.1.4 | Risk of westbound vehicles colliding with vehicles stopped at the gated access on the south side of Melrose Drive. | It is recommended that sufficient space is provided to allow vehicles to stop off the carriageway while the gate is opened. | The access to the pumping station is outside the works extents. It is understood that the pumping station is owned and operated by Scottish Water. Vehicles would not | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | | be permitted to wait on the carriageway due to the presence of the parking and waiting restrictions. | | |
| 3.1.5 | Risk of vehicles emerging from gated access when it is not safe to do so, resulting in side-impact collisions with vehicles travelling westbound. | It is recommended that an appropriate visibility splay is provided at this access. | Precast tactile paving will be provided to advise pedestrians of the presence of a commercial access in accordance with Roads for All: Good Practice Guide for Roads. Any vehicle exiting the private property are likely to be travelling at very low speed. The presence of a raised table with ramps on both sides of the footway will encourage vehicles entering and exiting the private facility to do so at a slow speed. | | No action |
| 3.1.6 | Risk of large vehicles colliding with pedestrians or other vehicles, due to the geometry of the road. | It is recommended that swept path analyses are undertaken of a large vehicle carrying out the turning movements at this junction, and that the design is modified as necessary to ensure all turning movements can be safely accommodated. | Swept path information provided to the RSA team demonstrating manoeuvrability of vehicles at the junction. Refer to ETYN-SEF-XXX-12DR-H-1306_P02 | | No action |
| 3.1.7 | Risk of cyclists falling and being struck by a vehicle, due to crossing tram tracks at an acute angle. | It is recommended that appropriate measures are provided for turning cyclists, so that: | The angle of cycle crossing tram tracks should be measured relevant to the rail. The crossing example referred to in this stage 2 RSA when measured relevant to the rail is 60 | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | • the angle that cyclists cross the tram tracks is 90°, or close to 90°; and<br>• the risk of cyclists slipping or getting their wheel(s) stuck in the tram tracks is minimised. | deg therefore compliant with Guidance on Tramways - Railway Safety Publication 2" by the Office of Rail Regulation (2006). | | |
| 3.1.8 | Risk of cyclists falling and being struck by a vehicle, due to crossing tram tracks at an acute angle. | It is recommended that appropriate measures are provided to minimise the risk of cyclists slipping or falling on the tram tracks, such as provision of alternative infrastructure or cycle routes. | No provision for cyclists are required at Ocean Drive. The City of Edinburgh Council have confirmed that a new cycleway will be provided, connecting Leith with NCN75, as part of the Leith Connections Scheme. | | No action |
| 3.1.9 | Risk of pedestrians and cyclists colliding on shared-use footways, resulting in personal injury. | It is recommended that appropriate corduroy paving is provided where areas are determined as shared use, and these areas are appropriately signed to Diagram 956 (TSRGD 2016). | The shared cycleway has been designed in accordance with Cycling by Design and the Edinburgh Street Design Guidance. Diagram 956 and appropriate road markings will be provided along sections of footway designated for shared use. No tactile paving is required as route is not segregated. | | No action |
| 3.1.10 | Risk of collisions occurring between vehicles and pedestrians due to long crossing lengths. | It is recommended that crossing lengths are minimised, refuges are provided where appropriate, and that pedestrians are given an | The traffic signal design is based on the junction layouts and therefore the time provided by the signal controller is sufficient. The approach adopted for the layout of signalised junctions is in accordance with the | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | appropriate length of time to cross. | Edinburgh Street Design Guide G4 Crossings - Signalised Crossings. In each case the intention is to avoid staggered crossings as single stage is preferred. While the guidance indicates that wider single phase crossings > 15m are often acceptable at signalised junctions. Linsig data can be provided to support the junction phasing and provide the appropriate crossing time information. | | |
| 3.1.11 | Risk of pedestrians inadvertently leaving the footway and entering the tram tracks, resulting in personal injury. | It is recommended that appropriate measures are provided to warn or prevent pedestrians from entering this area, such as guardrail, a change of level or appropriate tactile paving. | From Sandpiper Drive, the access to the stabling area has no level difference. Moreover, a hedge will be provided to prevent pedestrian crossing over the tracks at the stabling area. There is also a guardrail and a provision for a palisade fence. See detail at ETYN-SEF-XXX-12-DR-H-1101 | | No action |
| 3.1.12 | Risk of pedestrians inadvertently leaving the footway and entering the tram tracks, resulting in personal injury. | From the plans provided to the Audit Team, it is unclear whether measures are proposed to warn or prevent pedestrians from entering this area, such as guardrail, a change of level or appropriate tactile paving. It is recommended | This is out with the limits of the scheme and while the RSA has identified this as a risk this needs to be instructed by the MDU. | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | that suitable measures are provided. | | | |
| 3.1.13 | Risk of pedestrians tripping and falling and sustaining a personal injury. | It is recommended that appropriate tactile paving is provided along the length of the section of footway where there is a level difference, in order to warn pedestrians of the difference in levels. | Out with the limits of this project. Should the MDU require to extend the works to include additional works this will require to be instructed? | | No action |
| 3.1.14 | Risk of crossing pedestrians being struck by vehicles. | The following measures are recommended: □ An appropriate upstand is provided to the kerbs out-with the extents of the crossing; □ The colour of the tactile paving is contrasting, and is consistent on both sides of the road; □ The crossing is on the desire line for pedestrians. | Out with the limits of this project. Should the MDU require to extend the works to include additional works this will require to be instructed? | | No action |
| 3.1.15 | Risk of vehicles leaving the carriageway and colliding with street furniture or vegetation or falling into the ditch or the park below. | If the vehicle restraint system is to be retained, it is recommended that it is appropriately relocated to reflect the new road layout. If it is proposed that the vehicle restraint system is to be removed, it | As part of the detailed design the vertical alignment of Lindsay Road is lowered by 1.4m to improve the Melrose Drive junction tie-in. As a result of the change to the Lindsay Road level the existing wall is removed. | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | is recommended that an appropriate review of the provision of the road restraint system is carried out prior to its removal. | | | |
| 3.1.16 | Risk of errant vehicles leaving the carriageway and falling down a slope, resulting in an increased collision severity. | It is recommended that an appropriate review of the provision of the road restraint system is carried out prior to its removal. | The recommendation from "The Provision of Road Restraint Systems on Local Authority Roads" is that no Road Restraint System is required at this location. However, the suggestion of considering the provision of low cost measures that could reduce the risk has been considered and a Pedestrian Guard Rail has been proposed, which will provide a visual boundary definition for the vehicles as well as guiding pedestrians. | | No action |
| 3.1.17 | Risk of right turning vehicles being struck by trams whilst waiting for a gap in the north-eastbound traffic to complete their manoeuvre. | It is recommended that it is made clear to drivers / riders as to whether this movement is permitted, and that an appropriate safe area is provided for turning vehicles, if the movement is permitted. | The use of a solid white line is used along the route to segregate carriageway/Tram Lane and signage and markings are provided to make drivers aware that they should not enter the Tram Lane. The surfacing of the area between the tram tracks at this location is grasscrete which should inform drivers that this should not be traversed. A movement prohibition would | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | | require to be promoted by the Client through a TRO | | |
| 3.1.18 | Risk of waiting pedestrians spilling onto the carriageway and being struck by a passing vehicle due to inadequately sized waiting areas. | It is recommended that waiting areas are appropriately sized to reduce the risk of pedestrians spilling onto the carriageway. | The design of the crossings is in accordance with Edinburgh Street Design Guide Part C – Detailed Design Manual G4 Crossings – Designing Crossings. While the desire is to provide single stage crossings in all locations due to the traffic signal sequencing at the Melrose drive/Ocean Drive (western) junction, Ocean Drive (eastern) junction and crossings at Ocean Terminal tram stop a two stage pedestrian movement is required. All other crossings are a single stage crossing in accordance with the design guide. All new crossings provided as part of the works have been checked to ensure the minimum clear width between obstacles is 2.4m. The Island width is a minimum of 3.5m which allows for a 450mm offset from kerb to traffic signal pole and a 100mm pole width. | | No action |
| 3.1.19 | Risk of buses either colliding with one another or mounting the kerbs and potentially colliding with pedestrians. | It is recommended that the swept path analyses are based on the largest vehicle likely to access the facility and an appropriate | The swept path analysis undertaken for the Ocean Terminal Bus facility indicates sufficient width to allow vehicles to access and egress the Ocean Terminal bus facility. | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | size of bay is provided to accommodate this. | | | |

## 5.2 Stage 2 General Problems

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.1.1 | Risk of pedestrians slipping, falling and sustaining personal injuries, due to excess surface water on platforms. | It is recommended that appropriate drainage, which will minimise the likelihood of surface water pooling, is provided at these locations. | Aco channels are provided set back from the platform edge. Maintenance of the platform drainage will be undertaken by the Tram operator to prevent blockage. | | No action |
| 4.1.2 | Risk of vehicles skidding and losing control and of pedestrians slipping, falling and sustaining personal injuries, due to excess surface water on carriageway. | It is recommended that appropriate drainage is provided at this location. | The observed photograph included in the stage 2 road safety audit report is a picture off the existing Forth Ports drop off layout and not the proposed works. However the existing layout of the Forth Ports drop off is to be altered such that the hardstanding area will drain from the building towards Melrose Drive. New gullies are located on the hardstanding side of the shared footway/cycleway providing a positive drainage | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | | connection to the new carrier drain in Melrose Drive. | | |
| 4.1.3 | Risk that pocketing may occur if the parapet is struck, resulting in the vehicle occupant(s) / rider(s) sustaining personal injuries. | It is recommended that appropriate transitions between performance classes of barrier are provided. | The outcome of the risk assessment was to provide a normal containment parapet on the new wall. A review of the existing parapet indicated that it was classified as a N1 W2 parapet it is therefore proposed to create a single parapet N1 W2 for the full length of the Lindsay Road wall mirroring the existing wall. | | New single parapet N1 W2 to be installed for the full length of the Lindsay Road wall |
| 4.1.4 | Risk of errant vehicles striking and penetrating the parapet, resulting in the vehicle occupant(s) / rider(s) sustaining personal injuries. | It is recommended that the performance levels of the proposed parapet provide suitable protection for the vehicles utilising the route. | The outcome of the risk assessment was to provide a Normal containment parapet on the new wall. A review of the existing parapet indicated that it was classified as a N1 W2 parapet it is therefore proposed to create a single parapet N1 W2 for the full length of the Lindsay Road wall mirroring the existing wall and parapet. | | New single parapet N1 W2 to be installed for the full length of the Lindsay Road wall |
| 4.1.5 | Risk of vehicles losing control due to uneven surface on carriageway surface, resulting in vehicle occupant(s) / rider(s) sustaining personal injuries. | It is recommended that the carriageway surfacing is made good. | This is the existing road prior to the construction of the works and should not be included in the stage 2 audit. | | No action |

## DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.1.6 | Risk of rear end shunts and / or late braking due to position of, and visibility to, the proposed bus stop on Lindsay Road. | It is recommended that the visibility to the bus stop is maximised. | No visibility issue has been found for the vehicles turning left to Lindsay Road once the vehicle has advanced over the cycle box. From the stop line the trees are within the visibility splay however the trees specified there will have a clear stem of 2m as a minimum with the canopy above that being a compact and uniform shape reducing significantly the obstruction to visibility. The building on the left is not blocking the visibility envelope. | | No action |
| 4.1.7 | Risk that vehicles could collide with proposed kerb line due to 'see-through', resulting in loss-of control collisions. Secondary risk of non-motorised users tripping or striking the kerb and sustaining personal injuries. | It is recommended that suitable measures are provided to prevent potential see through to the carriageway / path ahead and that the boundary of the path and carriageway is appropriately delineated. It also recommended that appropriate signage is provided to warn drivers / riders of the<br>change in the road layout ahead. | The existing Melrose Drive section between Sandpiper Drive and Chancelot Mill is a dead end with no through access to Ocean Terminal. The route has only been opened for temporary traffic management during the delivery of the Edinburgh Trams York Place to Newhaven project and particularly the works associated with Lindsay Road. Following the completion of the Lindsay Road works the section of road between Sandpiper Drive and Chancelot Mill will revert back to a dead end including the reinstatement of traffic sign 816 No through road for vehicular traffic. | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.1.8 | Risk of motorised road users undertaking unsafe manoeuvres across the tram tracks resulting in side-swipe collisions. | It is recommended that suitable measures be provided to restrict vehicles making unsafe manoeuvres across the tram lines. | This movement is prohibited by the use of a 'No Right Turn' sign to Diagram 612 | | No action |
| 4.1.9 | Risk that the utility covers could collapse, causing motorised road users to lose control or pedestrians and vulnerable road users to trip and fall, resulting in personal injury. | It is recommended that the utility covers are of a suitable class for the proposed locations. | The observed photograph is off the existing roads and footpaths and not the proposed works. The provision of any new utility covers as part of the works will be constructed in accordance with the specification. | | No action |
| 4.1.10 | Risk that vehicles may cross the stop line when it is not safe to do and strike and injure crossing pedestrians, due to there being no secondary signal heads provided. | It is recommended that appropriate secondary signal heads are provided. | Secondary signals have been added to the design. | | Design amended to include secondary signal heads. |
| 4.1.11 | Risk that vehicles could lose control when travelling over utility covers, especially in wet / damp conditions, and strike pedestrians and / or street furniture resulting in personal injuries. | It is recommended that ironwork is flush with the adjacent carriageway and that suitably skid resistant covers are provided. | All works undertaken in accordance with the MCHW and the specification. | | No action |
| 4.1.12 | Risk of pedestrians slipping and falling, resulting in them sustaining personal injuries, due to surface water pooling on footway at interface between existing and new footways. | If the existing sections of footway are to be retained, it is recommended that appropriate measures are provided to prevent surface water from pooling at the interface between | The existing footway is to be removed and landscaped | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | the new and existing facilities. | | | |

## 5.3 Junctions

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.3.1 | Risk that pedestrians could step out onto the carriageway and be struck and injured by passing vehicles, due to effective footway widths being restricted by the position of traffic signal equipment. | It is recommended that the effective widths of the footways are maximised. | In accordance with Edinburgh Street Design Guidance : Part C – Detailed Design Guide, P3 – Footways: Footway Widths, Footways may have reduced widths, over short lengths not exceeding 3m in long profile, to negotiate mature trees and other obstructions e.g. bus stops, but they should at no point be less than 1.5m.<br>The detailed design has been reviewed and the only locations where there are reduced footway widths below the desirable minimum is where the new traffic signals are located on existing footpaths however at no point does the available footway width fall less than 1.5m. | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.3.2 | Risk of pedestrians being struck and injured by turning vehicles due to large vehicles overrunning footway. | It is recommended that the layout is amended so that large vehicles do not overrun the footway whilst turning left into the access. | The swept path analysis provided clearly indicate adequate available road width at the entrance to accommodate the design vehicle | | No action |
| 4.3.3 | Risk of large vehicles colliding with a stopped tram at the junction of Lindsay Road and Melrose Drive, resulting in vehicle occupants sustaining personal injuries. | It is recommended that swept path analysis is undertaken and that the tram stop lines are sufficiently set back from the carriageway to ensure that a large vehicle can undertake this manoeuvre without colliding with a stopped tram. | The swept path analysis carried out on this junction confirms that the stop lines are sufficiently set back to accommodate the movement of a larger vehicle. | | No action |
| 4.3.4 | Risk of stopped vehicles being struck by trams due to vehicles queuing back across tram tracks. | It is recommended that suitable measures are provided to discourage vehicles from queueing across the tram tracks and / or that the operation of the traffic signals is coordinated to prevent the possibility of queues extending across the tram tracks. | The Melrose Drive Junction SJ5A, SJ5B and SJ5C are coordinated and include a queue management system preventing vehicles queuing across the tram tracks. | | No action |
| 4.3.5 | Risk of vehicles overshooting the stop line and striking and injuring non-motorised users. | It is recommended that the stop lines are aligned | The traffic Signs Manual Chapter 6 clause 4.2 Stop Lines and clause 4.2.2 states that the stop line will | | Stop line and advanced stop line for cyclists to be |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | as close to perpendicular to the kerb as possible. | normally be at right angles to the centre line of the road to which it applies, even at skew junctions. The Melrose Drive and Lindsay Road junction is a skewed junction. The design team acknowledge the comments raised and will adjust the stop line and advanced stop line for cyclists. | | amended to be right angled to the centre line. |
| 4.3.6 | Risk of side-impact collisions occurring due to complex junction layout. | It is recommended that the layout and / or staging of the junction are altered to simplify the arrangement and reduce the risk of right turning drivers / riders being confused where to wait within the junction. | The layout presented is defined in the employer's requirements and is constrained by the existing geometry and buildings. The layout and staging also caters for all movements including road traffic, pedestrian and the tram movement from Ocean Drive to/from Melrose Drive. Consideration has been given to run the approach roads in separate stages however this was rejected by CEC. Refinement of the road markings and splitter islands have improved the arrangement such that clear guidance is provided to road users. | | No action |
| 4.3.7 | Risk of side swipe collisions between vehicles exiting the car park, due to the reduced length of the merging lane. Secondary risk of vehicles exiting the Ocean Terminal car park failing to stop | It is recommended that the exit to the car park be reduced to a single lane or that suitable measures be provided to allow vehicles | This is out with the extents of the works. Any additional works will require to be instructed by the employer. | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | due to the short distance between the car park exit and the stop line, resulting in vehicles striking and injuring crossing pedestrians or side-impact collisions occurring with vehicles on Melrose Drive. | to safely merge. It is also recommended that suitable measures are provided so that drivers / riders of vehicles exiting the car park are aware of the traffic signals immediately downstream. | | | |
| 4.3.8 | Risk of vehicles failing to stop at traffic signals due to visibility to signal heads being obscured by vegetation. | It is recommended that the vegetation is positioned where it will not obstruct visibility to the signal heads and / or that the type of vegetation is changed to a species that will not reach a height that will obstruct visibility to the signal heads. | Signal heads provided on the left hand side are duplicated on the right hand side, so the risk is mitigated. Trees not anticipated to be an issue. They are parallel to the road in line with the arrow markings on the road, not on the corner or near the signalling elements, and are set back behind the footway. Trees are to have a minimum 2m clear stem and will have a compact and uniform shape canopy. | | No action |
| 4.3.9 | Risk of vehicles queuing across junctions, leading to collisions with turning vehicles. | It is recommended that the two streams are appropriately linked so as to reduce the risk of vehicles queuing back across the junction or across the pedestrian crossing. | The Melrose Drive Junction SJ5A, SJ5B and SJ5C are coordinated and include a queue management system. | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.3.10 | Risk of vehicles colliding with Overhead Line Equipment (OLE) pole, resulting in vehicle occupants sustaining injuries. | It is recommended that the OLE equipment be appropriately located to reduce the risk of it being struck by vehicles and that it is clearly visible during the hours of darkness by use of reflective banding or similar. | The OLE poles have been adjusted to provide sufficient clearance to vehicle paths. It is proposed to position a protective bollard in front of OLE pole P13.3. The remaining OLE's are positioned between the tram track in the grasscrete area. | | Design altered to include repositioned OLE pole and protective bollard. |

## 5.4 Non-Motorised Users

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.4.1 | Risk of users in mobility chairs overturning due to gradient, resulting in personal injury. | It is recommended that the gradient of the footway is appropriate for use by all pedestrians. | The footway gradients at vehicle crossovers are to be in accordance with Edinburgh Street Design Guidance Part C – Detailed Design Manual. | | No action |
| 4.4.2 | Risk of pedestrians with visual impairments being unable to locate crossing point, becoming confused or disorientated and being struck and injured by passing vehicles, due to lack of provision of tactile paving. | It is recommended that appropriate tactile paving is provided at this location. | The splitter island as part of the Lindsay Road/Sandpiper Drive is retained. Some reconfiguration of the existing tactile paving and crossing point will be included as part of the works. | | No action |
| 4.4.3 | Risk of pedestrians with visual impairments being unable to locate | It is recommended that the tactile paving extends to the rear of the footway. | Tactile paving will be provided in accordance with the Edinburgh Street Design Guidance: Part C M4 - | | Acknowledged – tactile paving to be extended to the rear of the footway. |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | crossing point and becoming confused or disorientated. | | Tactile Paving. The tactile paving shown extend to the existing boundary and will be amended to suit Landscaping proposals and as recommended in the Audit Report. | | |
| 4.4.4 | Risk of a visually impaired pedestrian becoming stuck on the carriageway and being struck and injured by a passing vehicle, due to existing tactile paving and dropped kerb not being removed. | It is recommended that the dropped kerbs and tactile paving at this location are removed. | Acknowledged. Existing abandoned uncontrolled crossing will be removed as part of the works. | | Remove dropped kerbs and tactile paving and make good footway to abandoned uncontrolled crossing. |
| 4.4.5 | Risk of pedestrians tripping and falling, resulting in them sustaining personal injuries, due to uneven footway surfacing and lack of tactile paving at step. | It is recommended that:<br>• The paving slabs are re-laid so as to provide an uneven surface;<br>• The steps are appropriately repaired;<br>• Appropriate warning paving is provided at the steps; and<br>• Any trip hazards are appropriately removed. | Footway between North Fort Street and Lindsay Road is out with the extents of the required works. Should the employer wish for the Contractor to repair existing damaged assets out with the extents of the specified works an instruction would be required in accordance with the contract. | | No action |
| 4.4.6 | Risk of non-motorised users sustaining injuries when using this facility due to falling down the slope or colliding with other non-motorised users | It is recommended that:<br>• The gradient is appropriate for use by all users;<br>• Suitable measures are provided to prevent users from falling down the slope; and | The design of the shared use link between Lindsay Road and the Hawthornvale Path has been designed in accordance with the National Roads Development Guide (SCOTS) - Part 3 Steps or Ramps on Footway and the Geometric Standards for Cycle Routes. | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | • The ramp is suitably wide for the anticipated level of use. | | | |
| 4.4.7 | Risk of crossing pedestrians being struck and injured by vehicles due to road users being unclear who has priority. | It is recommended that the design of these crossings is amended so that it can be readily understood by all users. | The Cruise terminal drop off area has very occasional use and therefore it is proposed to remove the zebra crossing type markings to form a conventional uncontrolled crossing providing priority to motorised vehicles and therefore removing any confusion. This arrangement would mirror the existing priority junction arrangement.<br><br>The Edinburgh Street Design guidance suggests that the maximum width of an uncontrolled crossing is 10.5m without the need for a refuge island ESDG Part C Detailed Design Manual G4 - Crossings. The width of the proposed entrance to the Cruise Terminal drop-off area is 9.5m and the exit is 11.8m. It is considered that due to the occasional use of the Cruise Terminal drop-off area and the volume of pedestrians the exit width which exceeds the maximum would not be an issue. | | The design to be amended to remove the zebra crossing and new uncontrolled crossing including dropped kerbs and tactile paving to be installed. |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | | | | | |
| 4.4.8 | Risk of pedestrians sustaining personal injuries whilst crossing the access to the Ocean Terminal car park as a result of tripping and falling or being struck by a passing vehicle, due to lack of crossing provision. | It is recommended that an appropriate pedestrian crossing facility is provided. | The Ocean Terminal Hard Landscaping arrangement includes an uncontrolled crossing at the car park entrance including tactile paving and pedestrian bollards. | | No action |
| 4.4.9 | Risk of pedestrians tripping and falling when attempting to transition between the footway and carriageway, resulting in them sustaining a personal injury, due to lack of pedestrian crossing facility and abrupt end of footway. | It is recommended that suitable infrastructure is provided to allow pedestrians to continue their journey, such as an appropriate crossing point. | This is out with the extents of the works. Any additional works will require to be instructed by the employer. | | No action |
| 4.4.10 | Risk of crossing pedestrians being struck and injured by vehicles due to intervisibility and forward visibility to signal heads being obscured by vegetation. | It is recommended that appropriate forward visibility is provided to the traffic signal heads and that appropriate intervisibility is provided between pedestrians waiting to cross and the drivers / riders of approaching vehicles. | Signal heads provided on the left hand side are duplicated on the right hand side, so the risk is mitigated. Lighting / signals are next to the road on the footpath. Trees are behind the footpath. Proposed trees have a minimum 2m clear stem with a compact canopy above this height, therefore pedestrians will be able to see the signals / crossing while walking along the footpath. There are no intervisibility issues for vehicles / tram drivers due to the tree planting parallel to the road set behind the footway. | | No action |

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.4.11 | Risk that pedestrians may step out onto the carriageway when it is not safe to do so and be struck and injured by passing vehicles. | It is recommended that visibility to the pedestrian aspects from the opposite sides of the various arms should be appropriately obscured. | The possibility of see-through has been taken into account in the design by positioning the pedestrian signals such that they are only visible for users of specific crossings. | | No action |

## 5.5 Non-Motorised Users

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| 4.5.1 | Risk that traffic signs may be struck by passing motorised road users leading to sections of sign face falling on to the footway, causing personal injuries to any pedestrians in the vicinity. | It is recommended that the traffic signs be located in a location where there is a suitable offset from the edge of carriageway. | ADS 103-44 & 46 replace existing signs at the same location. ADS 103-45, which is new, will be positioned opposite the exit road from the Ocean Terminal in front of the shop fronts but still maintaining access. | | No action |
| 4.5.2 | Risk of pedestrians or cyclists colliding with street furniture, resulting in personal injury. | It is recommended that suitable contrast banding is applied to all street furniture. | All street furniture provided as part of the Edinburgh Trams York Place to Newhaven project has been designed in accordance with the Edinburgh Street Design Guidance – Detailed Design Manual and the works specifications. | | No action |
| 4.5.3 | Risk that reduced visibility could lead to pedestrians and vulnerable road users tripping and falling, resulting in | It is recommended that suitable illumination is provided. | The lighting along the footway on the upper level is installed along the back edge of the footway. This lighting will provide back spill light to | | No action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | personal injury, due to lack of provision of lighting. | | illuminate the footpath. The lighting levels being achieved are consistent with the requirements of BS5489-1:2013 Lighting class P4, and, as such, are consistent with BS5489 recommendations. Noting that this footpath is separated from the main tram route at this point. The upper footpath, which is immediately adjacent to the tramway, is illuminated to BS5489-1:2013 lighting class P1, as is required within the particular specification for the tram route itself. | | |
| 4.5.4 | Risk of vehicles crossing the stop line when it is not safe to do so and striking and injuring crossing pedestrians or striking passing vehicles, due to stop lines on Sandpiper Drive southbound not being visible. | It is recommended that the stop lines are suitable refreshed/renewed. | This is out with the extents of the works. Any additional works will require to be instructed by the employer. | | No action |
| 4.5.5 | Risk of vehicles failing to give way and colliding with passing vehicles on Melrose Drive. | It is recommended that appropriate road markings and / or signage is provided to inform drivers / riders that they have to give way to traffic on Melrose Drive. | The provision of the 'No Right Turn Sign' at this exit should alert drivers of the junction, however, Road Markings to 1003A will be provided on the north side of the crossing to inform drivers to give way to vehicles on Melrose Drive. | | No action |
| 4.5.6 | Risk of vehicles undertaking a sudden lane change upon inadvertently entering tram lane, resulting | It is recommended that the design is appropriately amended so that it is clear | The provision of road markings through the junction will assist to guide vehicles from Victoria Quay | | No Action |

**DETAILED DESIGN - STAGE 2 Road Safety Audit – Designers Response**

| Ref | RSA Problem | RSA Recommendation | Design Organisation Response | Overseeing Organisation Response | Agreed RSA Action |
|---|---|---|---|---|---|
| | in side-swipe collisions occurring. | to the drivers / riders of approaching vehicles which lanes they can travel in and which they cannot. | into the correct lane. 'Tram Only' road markings have also been provided to make drivers aware of the lane arrangement. | | |
| 4.5.7 | Risk of vehicles colliding with traffic islands, resulting in vehicle occupant(s) / rider(s) sustaining personal injuries. | It is recommended that suitable bollards (to Diag. 610, TSRGD 2016) are provided on the traffic islands at this location. | Acknowledged. Bollards incorporating Diag 610 will be provided on the Traffic Islands. | | Keep left bollards incorporating Diag 610 incorporated into the design |

# 6 DESIGN ORGANISATION AND OVERSEEING ORGANISATION STATEMENTS

Include the following statements to be signed by the design organisation and the Overseeing Organisation.

**Design organisation statement**

| | |
|---|---|
| On behalf of the design organisation I certify that:<br>1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the Overseeing Organisation. | |
| Name: | [redacted] |
| Signed: | |
| Position: | Partner |
| Organisation: | Fairhurst |
| Date: | 11/05/21 |

Overseeing Organisation statement

| | |
|---|---|
| On behalf of the Overseeing Organisation I certify that:<br>1) the RSA actions identified in response to the road safety audit problems in this road safety audit have been discussed and agreed with the design organisation; and<br>2) the agreed RSA actions will be progressed. | |
| Name: | Robert Armstrong |
| Signed: | [redacted] |
| Position: | Senior Interface Manager |
| Organisation: | City of Edinburgh Council |
| Date: | 27/10/2021 |