

IDOM Engineering (Dublin)

DART+ West Project
Section C: Barberstown to
Maynooth Depot

Stage 1 Road Safety Audit

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1 Introduction

1.1 General

This report results from a Stage 1 Road Safety Audit on Section C (Barberstown to Maynooth Depot) of the proposed DART+ West Project carried out at the request of Mr Gorka Corchete Zubiaurre of IDOM Engineering.

The members of the Road Safety Audit Team are independent of the design team, and include: -

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(BSc, MEng, MBA, RSACert, CEng, FIEI)
Road Safety Audit Team Leader

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(MSc, MIEI)
Road Safety Audit Team Member

The Road Safety Audit took place during March and April 2022 and comprised an examination of the documents provided by the designers (see Appendix B). In addition to examining the documents supplied the Road Safety Audit Team visited the site of the proposed measures on the 8th March 2022. Weather conditions during the site visit were dry and the road surface was dry. Traffic volumes during the site visit were moderate, pedestrian and cyclist volumes were low and traffic speeds were generally within the posted speed limit.

Where problems are relevant to specific locations these are shown on drawing extracts within the main body of the report and their locations are shown in Appendix D. Where problems are general to the proposals sample drawing extracts are within the main body of the report, where considered necessary.

This Stage 1 Road Safety Audit has been carried out in accordance with the requirements of GE-STY-01024 - Road Safety Audit (December 2017), contained on the Transport Infrastructure Ireland (TII) Publication's website.

The scheme has been examined and this report compiled in respect of the consideration of those matters that have an adverse effect on road safety and considers the perspective of all road users. It has not been examined or verified for compliance with any other standards or criteria. The problems identified in this report are considered to require action in order to improve the safety of the scheme and minimise collision occurrence.

If any of the recommendations within this road safety audit report are not accepted, a written response is required, stating reasons for non-acceptance. Comments made within the report under the heading of Observations are intended to be for information only. Written responses to Observations are not required.

1.2 Items Not Submitted for Auditing

Details of the following items were not submitted for audit; therefore no specific problems have been identified at this stage relating to these design elements, however where the absence of this information has given rise to a safety concern it has been commented upon in Section 3: -

- Vehicle swept paths
- Visibility splays

2 Project Description

2.1 General

The DART+ Programme is the DART expansion project within the Greater Dublin Area (GDA). The project is intended to improve the existing rail network within Dublin. It will provide a sustainable, electrified, faster, reliable, and more user-friendly rail system, which increases train frequencies and customer carrying capacity.

The overall DART+ Programme will be delivered in a number of separate projects to expand the heavy rail electrified commuter network in Dublin from the existing c.50 km to c.150km. The individual projects within the overall DART+ programme will consist of:

- DART+ West- c.40km from west of Maynooth to Connolly/Docklands in the City Centre. Including the M3 Parkway, connection to the Phoenix Park Tunnel and includes a new EMU Depot. It also includes upgrade and reconfiguration of existing railway infrastructure in the city centre.
- DART+ Kildare Line - c.20km from Hazelhatch into Heuston and the Phoenix Park Tunnel including 4-tracking from Parkwest to Heuston.
- DART+ Coastal Line comprising of:
 - DART+ Northern Line - c. 38km with electrification and related works from Malahide to Drogheda, also includes works from Connolly to Malahide & on the Howth Branch.
 - DART+ Southeast line - removal of level crossings and related works, construction

The DART+ West project will introduce electrified high-capacity trains at increased frequency for all stations between Maynooth/M3 Parkway and Dublin City Centre at Connolly Station and Docklands station (c.40km in length).

The project will increase services from the current 7 trains per hour per direction to 15 trains per hour per direction by 2027 increasing passenger capacity from 4,500 to 13,750 subject to passenger demand.

This will be achieved through modifications to the track, removal closure of level crossings and the purchase of a new fleet of trains.

The electrification of the rail line will predominantly follow the existing railway corridor. Interventions outside of Iarnród Éireann lands will be required at a number of locations for some of the scheme elements such as Level crossing replacements, proposed depot (including rail and road realignment), proposed new Spencer Dock Station, construction of substations (to facilitate the provision of power to the line) and the use of land for temporary construction/storage compounds and all ancillary works required for the project.

For the purposes of Audit the scheme has been divided into three sections as follows:

1. Section A: City Centre to M50
2. Section B: M50 to Barberstown
3. Section C: Barberstown to Maynooth Depot

The scope of this Road Safety Audit covers changes made to the road layout within Section C. This includes the Louisa Rail Bridge reconstruction, the Leixlip Confey Bridge reconstruction, Barberstown Road Level Crossing Replacement, and the L5041/R148 realignment.

The proposed changes at the four sites are as follow:

- Barberstown Road Level Crossing Replacement
- Louisa Rail Bridge reconstruction
- Leixlip Confey Bridge reconstruction
- L5041/R148 realignment

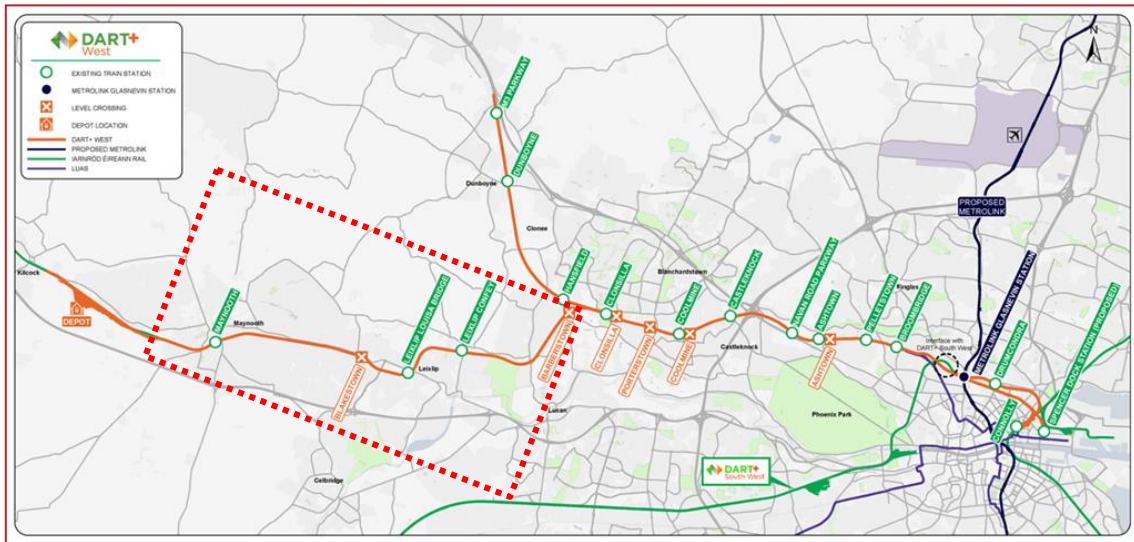


FIGURE 2-1: LOCATION PLAN

2.2 Collision History

The Road Safety Authority website (www.rsa.ie) was consulted to identify historical collisions in the vicinity of the proposed scheme. The website includes summary information on recorded collision occurrence for the period 2005 to 2016 (see Figure 2-2).

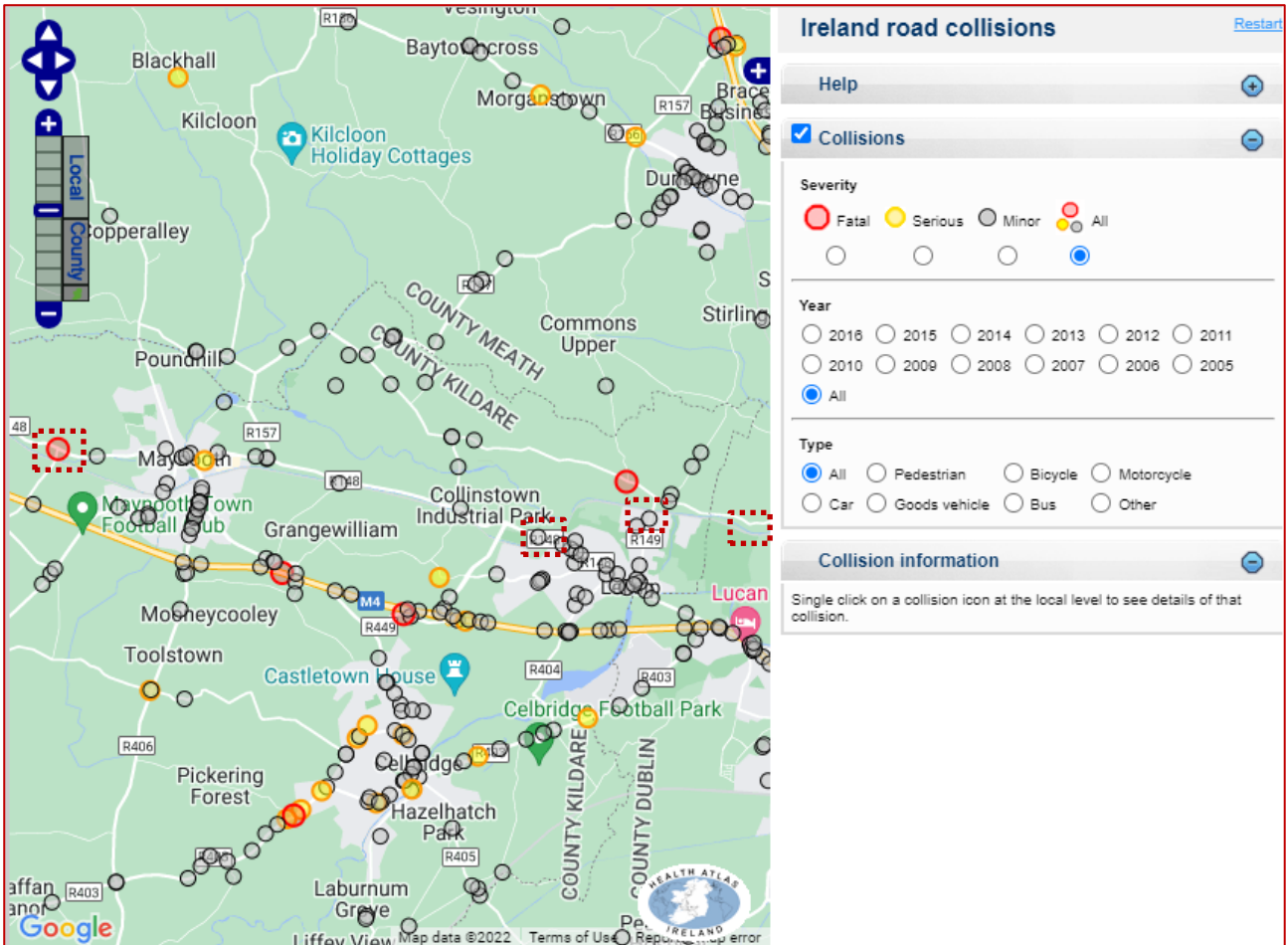


FIGURE 2-2: HISTORICAL COLLISIONS IN THE VICINITY OF THE SCHEME (SOURCE WWW.RSA.IE)

TABLE 2-1: DETAILS OF RECORDED COLLISIONS IN THE VICINITY OF THE SCHEME

Year	Vehicle	Circumstances	Day	Time	Speed Limit	Location	Severity
2016	Car	Head-on-conflict	Monday	19:00- 23:00	50kph	Leixlip Confey Bridge	Minor
2015	Car	Head-on conflict	Friday	19:00- 23:00	50kph	Leixlip Confey Bridge	Minor
2013	Car	Other	Friday	16:00- 19:00	30kph	East of Louisa Bridge	Minor
2011	undefined	Other	Saturday	10:00- 16:00	50kph	West of Louisa Bridge	Minor
2011	Car	Single Vehicle Only	Monday	07:00- 10:00	80kph	East of R148/L5041 Junction	Minor
2009	Car	Other	Friday	10:00- 16:00	80kph	R148/L5041 Junction	Minor
2008	Undefined	Head-on-conflict	Sunday	19:00- 23:00	80kph	East of R148/L5041 Junction	Fatal
2006	Undefined	Angle, both straight	Friday	07:00- 10:00	80kph	West of R148/L5041 Junction	Minor

3 Main Report

3.1 L5041/R148 Realignment

3.1.1 Problem

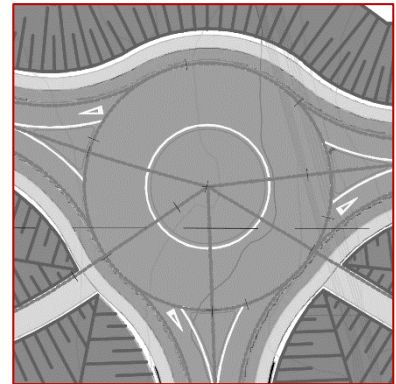
Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: Large vehicles travelling through the roundabout junction may overhang pedestrian footpaths.

Information regarding the swept path of vehicles has not been provided to the Audit Team. Large vehicles (e.g. buses) may overhang the footpath as they manoeuvre through the roundabout, which may increase the risk of a collision with a pedestrian or cyclist.

Recommendation

A swept analysis should be undertaken to ensure large vehicles do not overhang pedestrian and/or cyclist facilities as they manoeuvre through the roundabout junction.



3.1.2 Problem

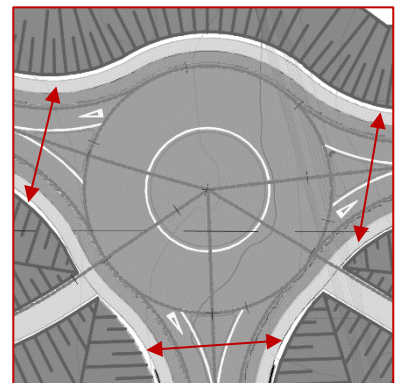
Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: No pedestrian crossing indicated at the approaches to the R148 roundabout.

No pedestrian crossings are indicated at the proposed R148 roundabout layout. The proposed scheme can be expected to attract pedestrians to the area, many of which may wish to travel towards the surrounding amenities. A failure to provide crossing facilities along expected pedestrian desire lines could result in pedestrians, particularly mobility and visually impaired pedestrians, being unable to safely and independently navigate the proposed road layout.

Recommendation

Provide safe crossing locations on pedestrian design lines.



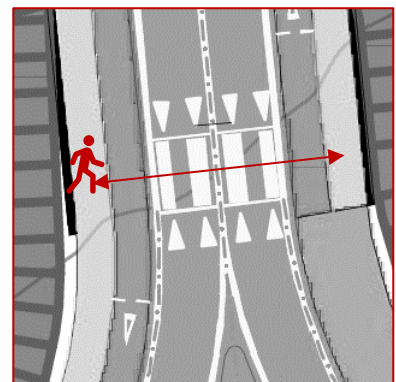
3.1.3 Problem

Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: No safe access route between footpaths at the proposed raised table location.

A raised table is indicated at the southbound approach of the L5041 roundabout. However, to access the opposite footpath, pedestrians would be required to cross the cycle track where no crossing has been indicated. A lack of a formal crossing facilities may lead to an increased risk of pedestrians being struck by cyclists when attempting to cross the carriageway.

Recommendation



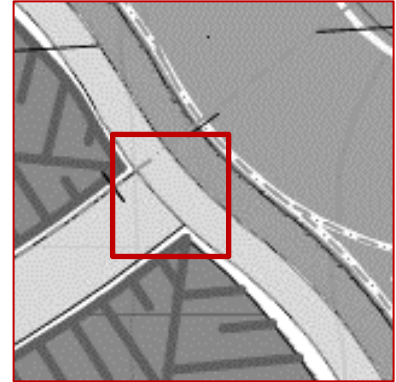
The segregated pedestrian /cycle track should transition into a shared use footway either side of the crossing. Additionally, tactile paving will be required at the pedestrian crossing.

3.1.4 Problem

Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: Visually impaired pedestrians may find it difficult to navigate the shared surfaces safely and independently.

A number of intersections between shared surfaces and segregated footpaths are shown. However, no tactile paving has been indicated at these intersections, resulting in visually impaired pedestrians not being advised/warned that they are entering a section of path which includes segregated pedestrian/cyclist facilities. This may increase the risk of visually impaired pedestrians inadvertently entering the cycle track, where they are at increased risk of being struck by a cyclist.



Recommendation

Tactile paving (e.g. “Ladder & Tramline”) should be provided at the interface between shared and segregated facilities.

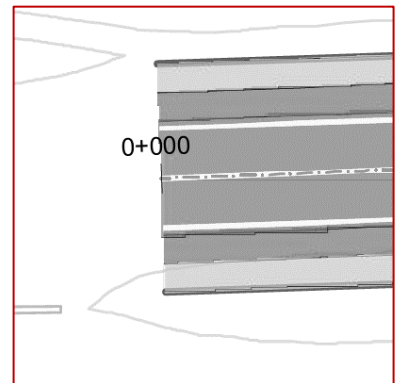
3.1.5 Problem

Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: It is unclear if the proposed upgrade works sufficiently tie-into the existing road network.

As part of the L5041/R148 realignment works, amendments to the existing road layout have been indicated. It is unclear how the segregated pedestrian footways and cycleway will be tied into the existing R148 and L5041.

If the proposed upgrades do not sufficiently tie-into the existing road layout there is a risk that drivers will be directed into adjacent, or opposing, traffic lanes where there is an increased risk of side swipe or head-on collisions respectively.



Additionally, if safe transitions between the new cross section and the existing cross section are not fully considered at this early stage, there is a risk that locked-in land and road constraints lead to unsafe road layouts being developed at the next design stage.

Recommendation

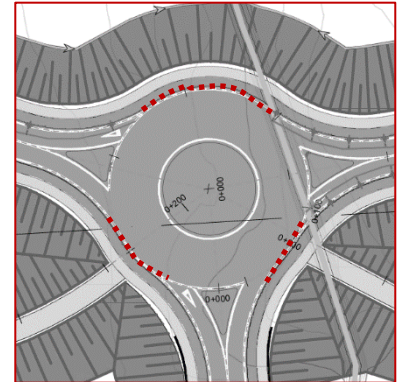
Ensure the amended sections of carriageway and NMU (Non-motorised User) facilities sufficiently align with the existing road layout at the scheme tie-ins ensuring a smooth transition between the upgraded sections of carriageway to the old sections of carriageway.

3.1.6 Problem

Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: Unclear if the circulating carriageway will sufficiently drain surface water.

Information regarding the proposed drainage measures within the circulating carriageway have not been indicated. It is therefore unclear if the carriageway will sufficiently shed surface water. A failure to provide sufficient drainage measures could lead to ponding on the carriageway resulting in loss of control type collisions during wet or icy weather.



Recommendation

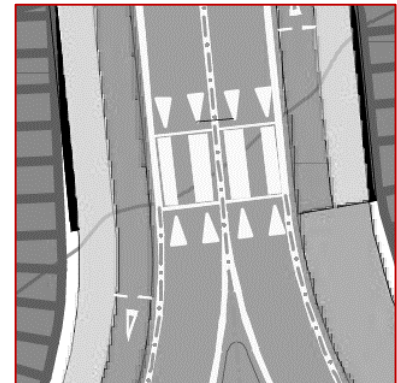
Ensure the circulating carriageway will be adequately drained.

3.1.7 Problem

Location: Drawing no. MAY-MDC-HRW-SC07-DR-Z-0001-C (Rev. V05)

Summary: Unclear if there is sufficient drainage provision at raised table locations.

Drainage provision has not been indicated at the raised table. Should inadequate drainage measures be provided, this could lead to ponding on the footpath or carriageway resulting in slips, trips and falls during wet or icy weather.



Recommendation

Ensure that the footpath and carriageway is adequately drained, particularly at locations where raised tables are provided and where any low spots may exist.

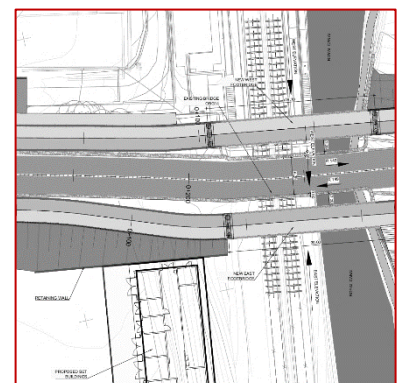
3.2 Leixlip Confey Bridge Reconstruction

3.2.1 Problem

Location: Drawing no. MAY-MDC-HRW-RS12-DR-C-0003-C (Rev.V01)

Summary: The vertical and horizontal alignment may lead to possible side-swipe collisions.

The combination of the steep vertical gradients, horizontal alignments and the narrow lanes may lead to poor lane discipline, and possible side-swipe and material damage collisions as opposing drivers cross the bridge.



Recommendation

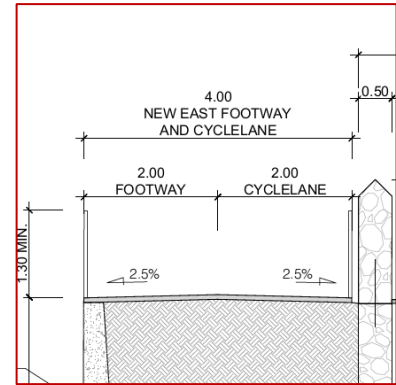
Swept path analysis should be undertaken to confirm that opposing HGVs can safely pass each other on the structure. Additionally, traffic calming measures should be provided to passively control vehicle speeds on approach to the Leixlip Confey Bridge, along with warning signs to be provided advising of steep gradients and road narrowing.

3.2.2 Problem

Location: Drawing no. MAY-MDC-STR-RS12-DR-C-0003-C (Rev. V01)

Summary: No difference in level is shown between the cycleway and footpath.

There is no difference in level between the cycleway and the footpath in the cross sections provided. This may result in visually impaired pedestrians inadvertently entering the cycleway resulting in conflicts with cyclists.



Recommendation

A level difference and kerbed upstand should be provided between the footpath and the cycleway.

Alternatively, contrasting materials should be used in the footway and cycleway to provide colour contrast, including a solid white line separating the two uses.

Ladder and tramline tactile paving should be provided at the start and end of the segregated facilities.

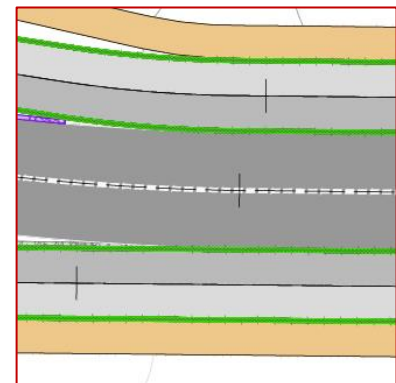
3.2.3 Problem

Location: Drawing no. MAY-MDC-HRW-RS12-DR-C-0003-C (Rev. V01)

Summary: It is unclear how the proposed upgrade works will tie-into the existing road network.

It is unclear how the segregated ped/cycle facilities will tie into the existing road network up and downstream of the bridge construction.

If safe transitions between the new cross section and the existing cross section are not fully considered at this early stage, there is a risk that locked-in land and road constraints lead to unsafe road layouts being developed at the next design stage.



Recommendation

Ensure the amended sections of carriageway and NMU facilities sufficiently align with the existing road layout at the scheme tie-ins, ensuring a smooth transition between the upgraded sections of carriageway to the old sections of carriageway.

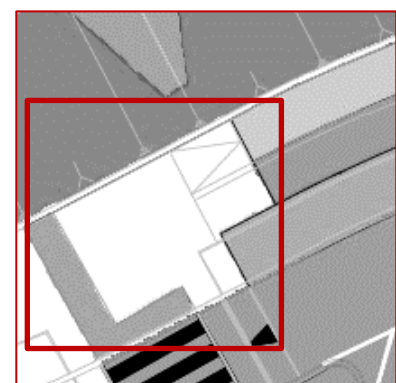
3.3 Barberstown Road Level Crossing Replacement

3.3.1 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev. V01)

Summary: Tactile paving has not been indicated at the transitions between shared surfaces and segregated footways.

Tactile paving (e.g. ladder and tram) has not been indicated at the start and end of shared and segregated surfaces. This could lead to visually impaired pedestrians inadvertently entering the cycle track, or approaching shared surfaces and being unaware of the presence of cyclists, which may increase the risk of pedestrian-cyclist collisions.



Recommendation

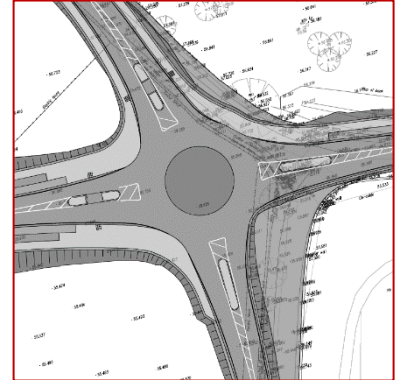
Tactile paving (e.g. ladder and tram) should be provided at the interfaces between shared and segregated surfaces.

3.3.2 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: Unclear if the proposed roundabout can safely accommodate the swept path of large vehicles.

Information regarding the swept path of vehicles turning at this roundabout has not been provided to the Audit Team and it is therefore unclear if these vehicles can safely undertake U-turn manoeuvres at these locations. If this roundabout cannot accommodate the swept path of large vehicles there is a risk that they may overhang the footpath as they manoeuvre through the roundabout which may lead to a collision with a pedestrian or cyclist or collisions with items of roadside furniture.



Recommendation

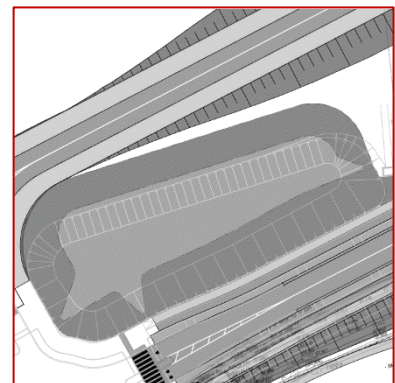
A swept analysis should be undertaken to ensure all vehicles can be safely accommodated at the roundabout junction.

3.3.3 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: Maintenance access to attenuation ponds may lead to operatives parking their vehicles at unsafe locations where they may present hazards to other road users.

An attenuation or stormwater pond has been indicated. It is unclear how maintenance operatives will access the pond, or where they will park when servicing the pond. Insufficient or inappropriate access may lead to maintenance operatives parking their vehicle at unsafe locations such as within the carriageway, at accesses or on the footpath or cycle track where it will present obstacles to other road users.



Recommendation

Safe access and parking for maintenance operatives should be provided at proposed pond.

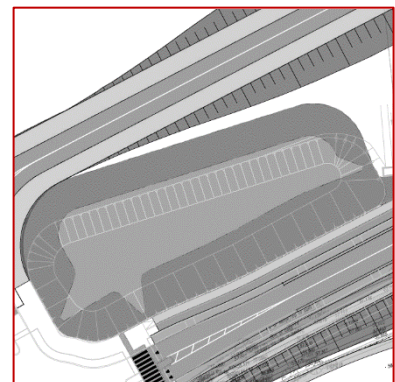
3.3.4 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: Edge protection has not been indicated at the proposed attenuation pond.

An attenuation or stormwater pond has been indicated within the proposed scheme. Edge protection has not been indicated at the pond. In some instances, this pond is located close to footpaths, which could increase the risk of pedestrians, especially small children, gaining access to the pond, where there is a risk of falling from height and possible drowning.

Additionally, a vehicle restraint system has not been indicated. The absence of a vehicle restraint system could result in an errant vehicle entering the pond, leading to increased injury severity for vehicle occupants.



Recommendation

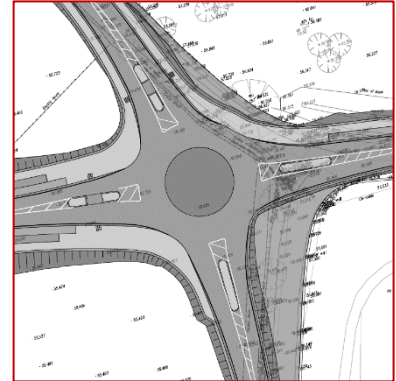
Edge protection and vehicle restrain systems should be provided at the pond.

3.3.5 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: The splitter island locations may lead to poor lane discipline and possible material damage collisions.

The splitter islands on the approach to the roundabout stop short of the circulating carriageway. As road markings may fade over time, the junction layout may become less defined, resulting in poor lane discipline, and turning traffic on the circulating carriageway possibly over-running the yield line, which may increase the risk of side-on collisions.



Recommendation

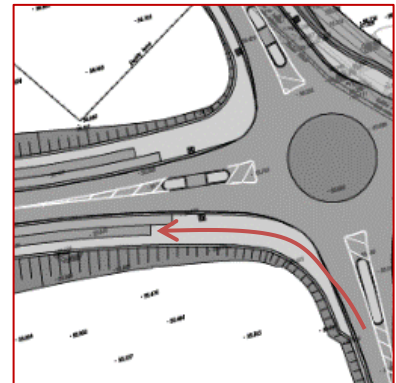
The physical splitter islands should be extended to the yield line on all four approaches.

3.3.6 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: Cyclists may attempt to mount/dismount a full height kerb when accessing the off-road cycle track.

An off-road cycle track is provided at the western arm of the Milestown Roundabout. However, it is unclear how northbound cyclists travelling within the carriageway at the southern arm of the roundabout will gain access to the off-road cycle track at the western arm. The absence of cycle facilities connecting the off-road cycle track with the carriageway may lead to personal injury collisions where cyclists attempt to mount/dismount a full height kerb.



Recommendation

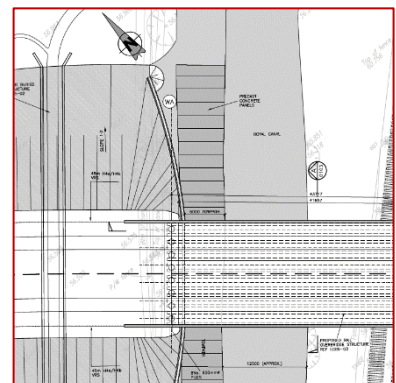
Cyclist facilities (e.g. ramp access) should be provided upstream of the roundabout, allowing cyclists to safely access the off-road cycle track in advance of the roundabout.

3.3.7 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0201-C (Rev.V01)

Summary: Risk of pedestrians and cyclists falling from height.

The shared pedestrian/cyclist track runs parallel to the canal edge. The RSA Team is concerned that a visually impaired pedestrian may be unaware of the canal towpath edge, and inadvertently fall into the canal, where there is a risk of drowning.



Recommendation

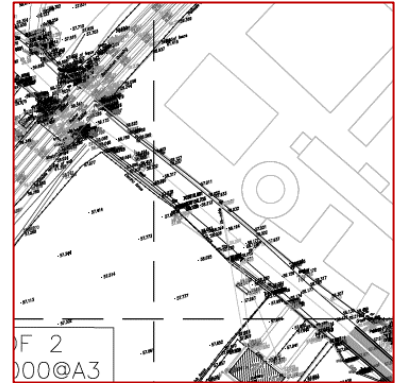
Ensure appropriate vegetation is placed along the edge of the canal to prevent pedestrians walking too near the edge, and that a safe minimum width is maintained at all points along the canal.

3.3.8 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: It is unclear how the carriageway will be terminated on the northern and southern side of the existing Barberstown level crossing after closure.

It is assumed that Milestown Road will be terminated on either side of the existing Barberstown level crossing. It is unclear if there is sufficient space to undertake U-turns at the end of each road. Insufficient space to safely turn a vehicle may increase the likelihood drivers reserving long distance to exit the cul de sac, leading to possible rear-end-shunt or material damage collisions.



Recommendation

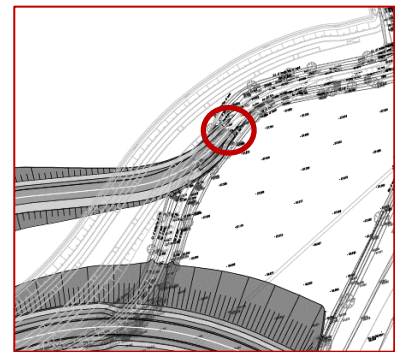
A turning head should be provided at the end of each road, ensuring drivers have sufficient space to turn and exit the cul de sac.

3.3.9 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: The proposed tie-in point between the new and old road cross sections is up-stream of a high demand bend.

The local road tie-in is at a high demand bend, where vehicles leave an improved cross section into an area with poor visibility and deficient cross section. Drivers leaving the new road may be unprepared to reduce their speed ahead of the narrow cross section/high demand bend, leading to possible loss of control and head-on collisions.



Recommendation

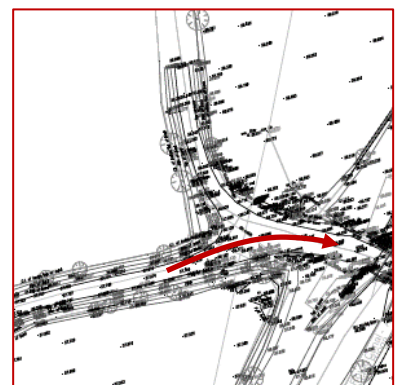
The new road tie-in should extent further east, to a point that is beyond the high demand bend, ensuring drivers have adequate visibility when transitioning between the new and old cross sections.

3.3.10 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: Poorly defined existing junction between Barberstown Lane North and Barberstown Lane South.

The existing junction between Barberstown Lane North and Barberstown Lane South is located northeast for the proposed Barberstown level crossing. The traffic at this junction is likely to increase due to the proposed works. However, the existing junction alignment and layout is substandard, and may increase the risk of eastbound drivers sighting into the primary road, which may contribute to overshoot collisions.



Recommendation

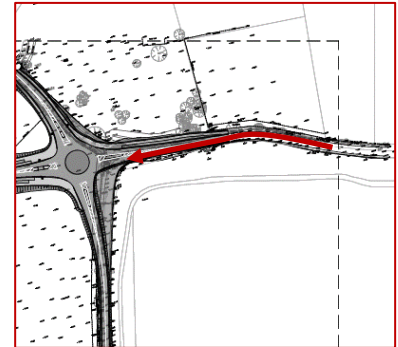
The existing junction should be revised to provide greater junction definition, and to passively slow vehicles turning into and out of the junction.

3.3.11 Problem

Location: Drawing no. MAY-MDC-HRW-LC05-DR-C-0100-C (Rev.V01)

Summary: Westbound drivers may be unaware of the roundabout junction due to the horizontal alignment upstream of the junction.

Westbound drivers may be unaware of the roundabout junction, or possible queues forming at the roundabout, as forward visibility is limited by the horizontal alignment. Insufficient visibility to the roundabout junction may result in drivers failing to reduce their speed accordingly, leading to rear-end-shunt collisions.



Recommendation

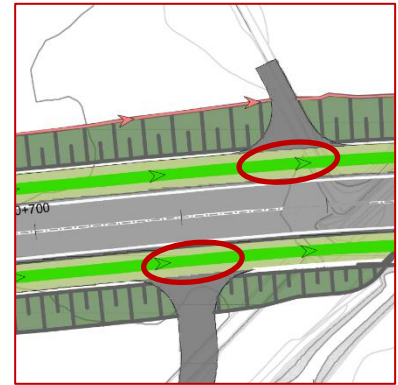
The horizontal alignment on the approach to the roundabout should be amended to maximise forward visibility to the junction. Additionally, advance warning signs and road markings should be provided to warn drivers of the junction.

3.4 Louisa Rail Bridge Reconstruction

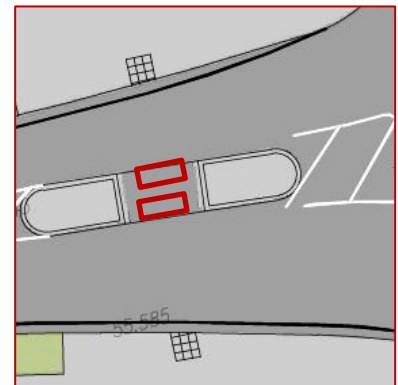
No road safety issues relating specifically to Louisa Rail Bridge have been identified.

4 Observations

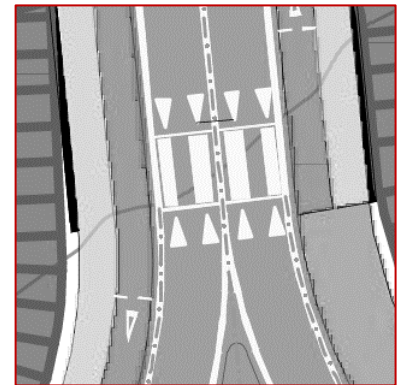
4.1 Grass verges are indicated between multiple side roads and the mainline carriageway at the L5041/R149 realignment works. It is assumed that this is a CAD error, however the drawing should be amended to correctly show the side road junctions connecting with the main road.



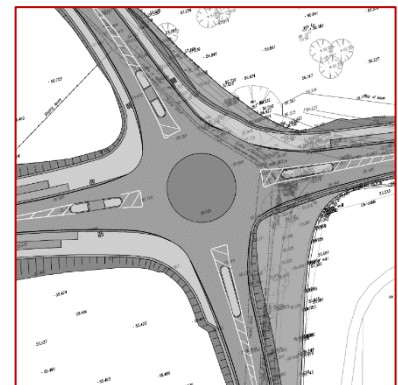
4.2 Tactile paving should be provided within the splitter island.



4.3 A raised table with a pedestrian crossing has been indicated across the L5041, however, the type of crossing proposed is unclear (appears to be a Zebra Crossing). An assessment should be undertaken to determine the most appropriate type of pedestrian crossing to use at this location.



4.4 The junction control has not been indicated at the proposed roundabouts as part of Barberstown level crossing replacement works. Yield road markings and signs should be provided at the entrance to the roundabout circulating carriageway on all arms to clearly advise drivers of the priority at the roundabout.



5 Road Safety Audit Team Statement

We certify that we have examined the drawings referred to in this report. The examination has been carried out with the sole purpose of identifying any features of the design that could be removed or modified in order to improve the safety of the scheme.


The problems identified have been noted in this report together with associated safety improvement suggestions, which we would recommend should be studied for implementation.

No one on the Road Safety Audit Team has been involved with the design of the scheme.

ROAD SAFETY AUDIT TEAM LEADER

Aly Gleeson

Signed:



Dated:

18th July 2022

ROAD SAFETY AUDIT TEAM MEMBER

Antonios Papadakis

Signed:



Dated:

18th July 2022

Appendix A – Road Safety Audit Brief Checklist

Have the following been included in the audit brief?: (if 'No', reasons should be given below)

	Yes	No
1. The Design Brief	<input checked="" type="checkbox"/>	<input type="checkbox"/>
2. Departures from Standard	<input type="checkbox"/>	<input checked="" type="checkbox"/>
3. Scheme Drawings	<input checked="" type="checkbox"/>	<input type="checkbox"/>
4. Scheme Details such as signs schedules, traffic signal staging	<input type="checkbox"/>	<input checked="" type="checkbox"/>
5. Collision data for existing roads affected by scheme	<input type="checkbox"/>	<input checked="" type="checkbox"/>
6. Traffic surveys	<input type="checkbox"/>	<input checked="" type="checkbox"/>
7. Previous Road Safety Audit Reports and Designer's Responses/Feedback Form	<input type="checkbox"/>	<input checked="" type="checkbox"/>
8. Previous Exception Reports	<input type="checkbox"/>	<input checked="" type="checkbox"/>
9. Start date for construction and expected opening date	<input type="checkbox"/>	<input checked="" type="checkbox"/>
10. Any elements to be excluded from audit	<input type="checkbox"/>	<input checked="" type="checkbox"/>

Any other information?

(if 'Yes', describe below)

Yes No

Appendix B – Documents Submitted to the Road Safety Audit Team

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
DESIGN- LC05: BARBERSTOWN GENERAL ARRANGEMENT- PLAN SHEET LAYOUT	MAY-MDC-HRW-LC05-DR-C-0100-C	V01
DESIGN- LC05: BARBERSTOWN GENERAL ARRANGEMENT- PLAN SHEET 1 OF 2	MAY-MDC-HRW-LC05-DR-C-0101-C	V01
DESIGN- LC05: BARBERSTOWN GENERAL ARRANGEMENT- PLAN SHEET 2 OF 2	MAY-MDC-HRW-LC05-DR-C-0102-C	V01
DESIGN- LC05: BARBERSTOWN TYPICAL CROSS SECTIONS SHEET 1 OF 1	MAY-MDC-HRW-LC05-DR-C-0103-C	V01
DESIGN- LC05: BARBERSTOWN BRIDGE GENERAL ARRANGEMENT- PLAN SHEET 1 OF 3	MAY-MDC-HRW-LC05-DR-C-0201-C	V01
DESIGN- LC05: BARBERSTOWN BRIDGE GENERAL ARRANGEMENT- PLAN SHEET 2 OF 3	MAY-MDC-HRW-LC05-DR-C-0202-C	V01
DESIGN- LC05: BARBERSTOWN BRIDGE GENERAL ARRANGEMENT- PLAN SHEET 3 OF 3	MAY-MDC-HRW-LC05-DR-C-0203-C	V01
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 1 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 2 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 3 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 4 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 5 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 6 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 7 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 8 OF 9	MAY-MDC-HRW-SC07-DR-Z-0006-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION DRAINAGE SHEET 9 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 1 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 1 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 2 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 3 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 4 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 5 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 6 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 7 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 8 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION OVERALL LAYOUT 9 OF 9	MAY-MDC-HRW-SC07-DR-Z-0001-C	V05
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 1 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 2 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 3 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 4 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04

DOCUMENT/DRAWING TITLE	DOCUMENT/DRAWING NO.	REVISION
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 5 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 6 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 7 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 8 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT 9 OF 9	MAY-MDC-HRW-SC07-DR-Z-0002-C	V04
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION PAVEMENT	MAY-MDC-HRW-SC07-DR-Z-0008-C	V02
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT TYPICAL CROSS SECTIONS SHEET 1 OF 2	MAY-MDC-HRW-SC07-DR-Z-0003-C	V03
PERMANENT WAT DESIGN L5041 AND R149 DIVERSION ROAD ALIGNMENT TYPICAL CROSS SECTIONS SHEET 2 OF 2	MAY-MDC-HRW-SC07-DR-Z-0003-C	V03
STRUCTURE DESIGN OBG14 BRIDGE WIDENING CURRENT STATE	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING OBG14 ROAD BRIDGE, FINAL STATE	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING FINAL LAYOUT	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING PROPOSED CONNECTION BETWEEN FOOTWAY/CYCLELANE AND EXISTING ROAD	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING FINAL STATE- EAST ELEVATION	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING FINAL STATE- WEST ELEVATION	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING FINAL STATE- CROSS SECTION (I)	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG14 BRIDGE WIDENING FINAL STATE- CROSS SECTION (II)	MAY-MDC-HRW-RS12-DR-C-0003-C	V01
STRUCTURE DESIGN OBG16 BRIDGE DECK HEAVY LIFTING CURRENT STATE	MAY-MDC-STR-RS13-DR-C-0002-C	V06
STRUCTURE DESIGN OBG16 BRIDGE DECK HEAVY LIFTING FINAL STATE	MAY-MDC-STR-RS13-DR-C-0002-C	V06
STRUCTURE DESIGN OBG16 BRIDGE DECK HEAVY LIFTING FINAL STATE DETAIL	MAY-MDC-STR-RS13-DR-C-0002-C	V06
STRUCTURE DESIGN OBG16 BRIDGE DECK HEAVY LIFTING STRUCTURAL DESIGN DETAIL	MAY-MDC-STR-RS13-DR-C-0002-C	V06

Appendix C – Feedback Form

Road Safety Audit Feedback Form

Scheme: DART+ West Project

Route No.: R148, and Local Roads

Audit Stage: 1 Date Audit Completed: 08.04.2022

To be Completed by Designer				To be Completed by Audit Team Leader
Paragraph No. in Safety Audit Report	Problem Accepted (Yes/No)	Recommended Measure(s) Accepted (Yes/No)	Describe Alternative Measure(s). Give reasons for not accepting recommended measure	Alternative Measures or Reasons Accepted by Auditors (Yes/No)
3.1.1	Yes	Yes		
3.1.2	Yes	Yes		
3.1.3	Yes	Yes		
3.1.4	Yes	Yes		
3.1.5	Yes	Yes		
3.1.6	Yes	Yes		
3.1.7	Yes	Yes		
3.2.1	Yes	Yes		
3.2.2	Yes	Yes		
3.2.3	Yes	Yes		
3.3.1	Yes	Yes		
3.3.2	Yes	Yes		
3.3.3	Yes	Yes		
3.3.4	Yes	Yes		
3.3.5	Yes	Yes		
3.3.6	Yes	Yes		
3.3.7	No	No	Introduction of a verge to the canal would reduce the navigable width of the canal. The design will include a pedestrian guardrail along the section where the verge is removed.	Yes
3.3.8	No	No	On the southern side, there are adequate existing opportunities for vehicle turn around in close proximity to the level crossing. All land either side of the roadway are in the ownership of one landowner, who intends to petition the LA to close the lane for local access only. Adequate signage indicating a cul de sac and local access only will be provided as part of the DART+ West Project. On the northern side, adequate existing opportunities for vehicle turn around are available.	Yes
3.3.9	Yes	No	The proposed design will be narrowed to the width of the existing	Yes

Appendix D – Problem Locations

