

Road Safety Audit – Stages, Brief, Reports

Bryan Kennedy
Fiona Bohane
16/06/2021

What is a Road Safety Audit?

“The evaluation of a road scheme during design, construction and early operation, to identify potential Safety hazards which may affect any type of road user and to suggest measures to eliminate or mitigate those problems” (GE-STY-01024)

- A systematic process for checking the safety of new road schemes
- Based on sound Road Safety principles
- A check from all road users’ perspectives...



Aims of a Road Safety Audit

- to help ensure all road schemes operate as safely as practicable;
 - to minimise collision numbers and severity;
 - to improve the awareness of safe design practices by design, construction and maintenance staff.
-

What an RSA is NOT

- an opportunity to re-design a scheme
 - a technical check of design elements
 - a check of compliance with design standards concerned with matters covered by Safety, Health & Welfare at Work Acts/Regulations check
 - a Quality Audit / Mobility Audit / Pedestrian or NMU Audit / Design Audit (DMURS)
 - a safety review of an existing road layout
-

When to Audit

- **Stage F** - Feasibility stage (Phase 2 may include a comparative assessment of options)
 - **Stage 1** - completion of preliminary design, before planning;
 - **Stage 2** - completion of detailed design;
 - **Stage 1&2** - combined for minor schemes;
 - **Stage 3** - completion of construction / prior to opening to traffic;
 - **Stage 4** – early operation 2-4 months post opening, live traffic.
-

When to Audit

No Audit is required on like-for-like repair or replacement of existing road infrastructure		
Example Scheme Description		
	Pavement repair such as patching, edge strengthening which does not result in widening the carriageway, inlay works with similar materials.	No Audit Required
	Pavement overlay which does not change the cross section, vertical alignment, camber or superelevation	No Audit Required
	Surface rejuvenation such as mechanical abrasion etc.	No Audit Required
	Surface dressing of an existing carriageway	No Audit Required
	Replacement of a worn road sign with a new road sign of the same type	No Audit Required
	Replacement of a damaged road sign with a new road sign of the same type	No Audit Required
	Refreshment of existing worn road markings	No Audit Required
	Replacement of worn or missing road studs	No Audit Required
	Replacement of a length of damaged safety barrier with barrier of the same or similar type.	No Audit Required

When to Audit

Audit is required on any piece of road infrastructure which requires a design							
	Example Scheme Description	Audit Stages Required					
		F	1	2	1 & 2	3	4
New Alignment	Off-line road scheme with multiple options.	X	X	X		X	X
	On-line road scheme – Minor land take required		X	X		X	
	On-line road scheme – No land take required				X	X	
	New junction or access onto the road		X	X	(X)	X	
Realignment	Realignment of bend				X	X	
	Realignment of junction				X	X	
	Alteration of type of junction control, such as traffic signals, mini roundabout etc.				X	X	
	Sight line Improvements				X	X	
Pavement Improvements	Change to the existing cross section, widening or narrowing the pavement				X	X	
	Change to the existing vertical alignment				X	X	
	Change to the existing pavement which affects the horizontal or vertical alignment of public or private entrances				X	X	
	Change to existing camber or superelevation				X	X	

When to Audit

Audit is required on any piece of road infrastructure which requires a design							
	Example Scheme Description	Audit Stages Required X – Required (X) – Alternative to St1 and St2					
		F	1	2	1 & 2	3	4
Signing & Road Markings	Installation of road signs: Single installation, multiple installations, or addition or amendment to sign on existing supports				X	X	
	Installation of road markings which results in a change to the existing road marking layout and/or its meaning				X	X	
Safety Barrier	Installation of new safety barrier				X	X	
	Upgrade to an existing safety barrier				X	X	
	Upgrade of an existing terminal				X	X	
	Replacement of an entire safety barrier installation				X	X	

When to Audit

Audit is required on any piece of road infrastructure which requires a design							
	Example Scheme Description	Audit Stages Required X – Required (X) – Alternative to St1 and St2					
	Replacement of an entire safety barrier installation				X	X	
Kerbing & Footpaths	Installation of kerbs in the verge and/or hard shoulder				X	X	
	Installation of kerbs in the centre of the pavement		X	X	(X)	X	
	Installation of kerbs and footpaths				X	X	
	Installation of pedestrian crossing, both informal and formal crossing points		X	X	(X)	X	
Lighting	Installation of traffic route lighting				X	X	
	Change to the lighting level and type of existing lighting				X	X	
Development	Major development, meeting the criteria in NRA Traffic and Transportation Assessment Guidelines Table 2.2	X	X	X		X	X
	Any development that is not a major development				X	X	

Future Changes to Appendix A

- No Audit Required :
 - Removal of an isolated roadside hazard - Boulder /Telecom pole
- No Stage 1/2 Audit Required -Lighting Type, Stage 3 only
- Audit Required
 - Roadside Feature – Installation of Artwork, Advertisement, Landscaping, Stages 1/2 & 3

Future Changes to Appendix A- Landscaping



Future Changes to Appendix A- Landscaping



Future Changes to Appendix A- Landscaping

Best safety performance is obtained – also regarding bicycles – when the central island has a height of 2,0 meters or more



Audit Team Independence

Extracts from **TII GE-STY-01024** Road Safety Audit:

- “**independent** of the scheme design”
- “for schemes designed by the Contractor (e.g. DBs) the Audit Team shall be from a **completely separate organisation** to the Contractor or Designer (employed by the Contractor)”

Extracts from **TII GE-STY-01027** Road Safety Audit Guidelines:

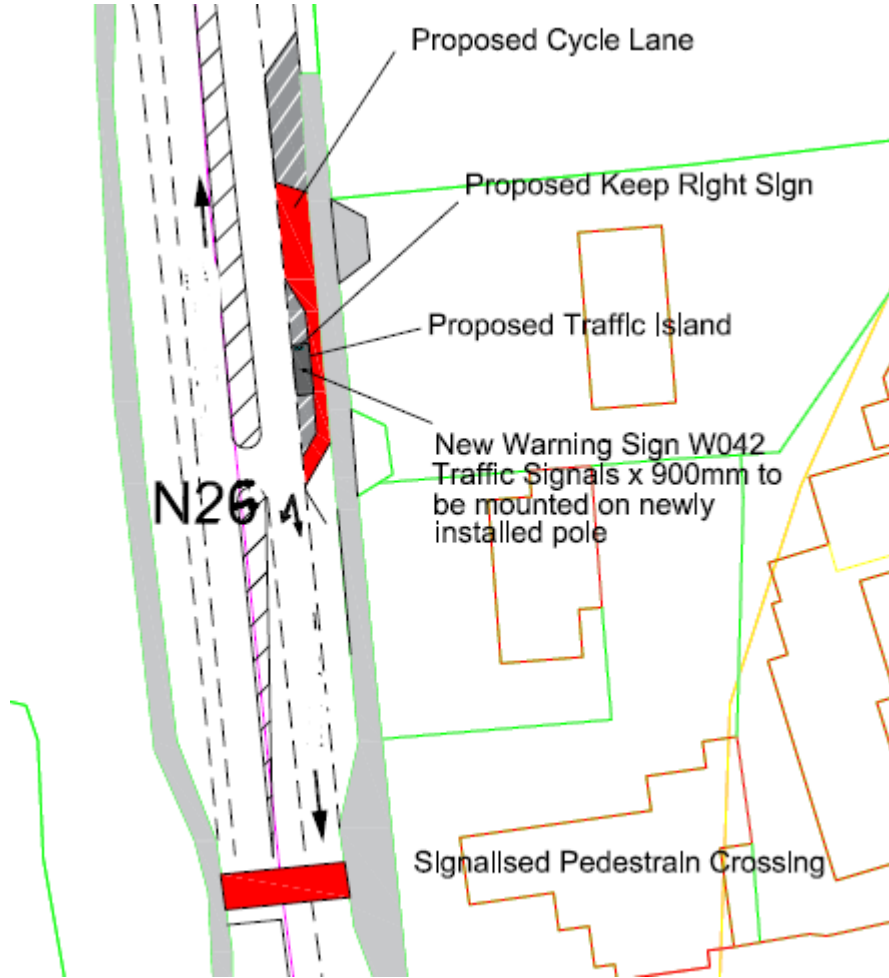
- A statement signed by the Audit Team members to certify that they have examined the scheme and that they are **independent** of the Designer;
-

Scope of the Audit

Only consider matters that have an adverse bearing on road safety (and under all operating conditions and for all road users)

- Identify potential safety hazards within the scheme design or construction as they could affect all road users
 - Not a check of compliance with design standards
 - Not concerned with structural safety
 - Design and Audit Team may change, but where possible the same Audit Team should be used for each stage of audit throughout the scheme delivery to ensure a consistent approach
-

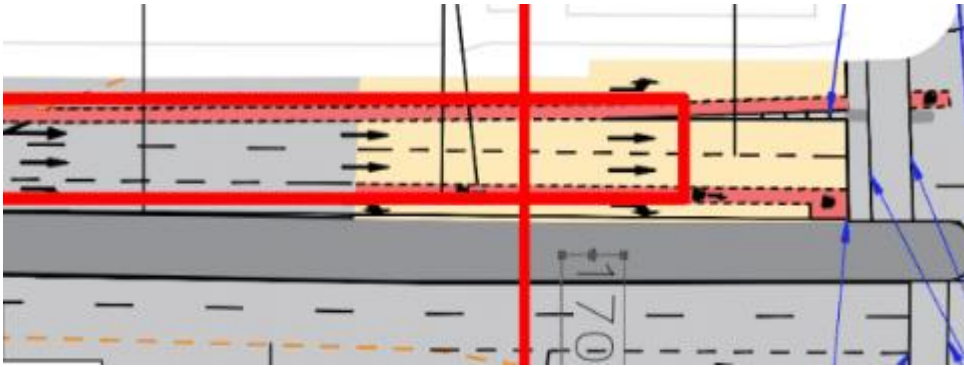
What is inside/outside the scope of an Audit



- Proposed VAS to highlight Pedestrian Crossing
- Audit of new sign, proposed buildout for it and a realigned cycle facility.
- Brief indicated concern at location as there had been reports of near missed at signals.
- On review of signals , fault with signal response identified.



What is inside/outside the scope of an Audit



- Changes proposed at traffic signals re signal mounting and lane markings through junction (not approach)
- Audit team noticed an extended weaving length on existing layout for traffic crossing the cycle lane.
- The layout there isn't a proposed change, could be considered outside scope of scheme?.
- Should the Auditor Comment/Observe or raise as a Problem?.

Audit Brief

“Shall be” prepared by the Project Manager

- Describes Audit required, what it will cover...
 - Design report describing scheme & objectives;
 - Departures from Standard;
 - Scheme Drawings; signs schedules, traffic signal staging;
 - Collision data for existing roads affected by the scheme;
 - Traffic surveys, including pedestrian and cycle movements;
 - Previous RSA Reports & Exception Reports;
 - Date Audit Report is required;
 - Any other relevant information.
-

Audit Brief Stage 1 RSA

Stage 1 Preliminary Design

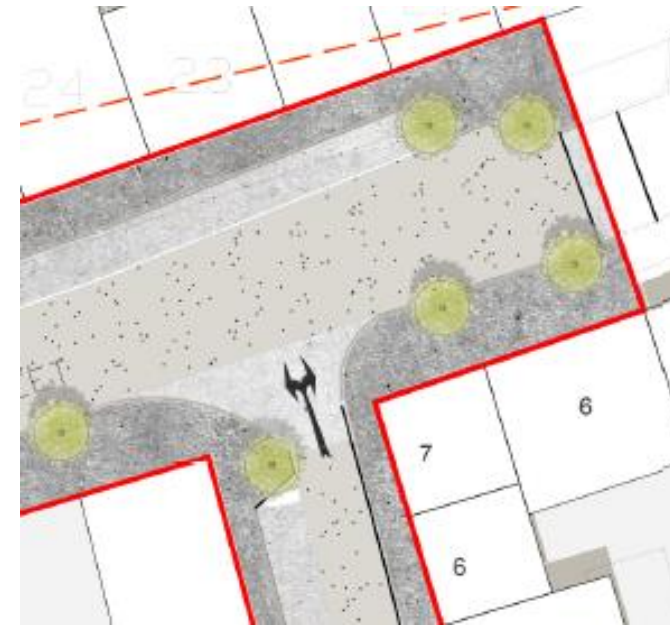
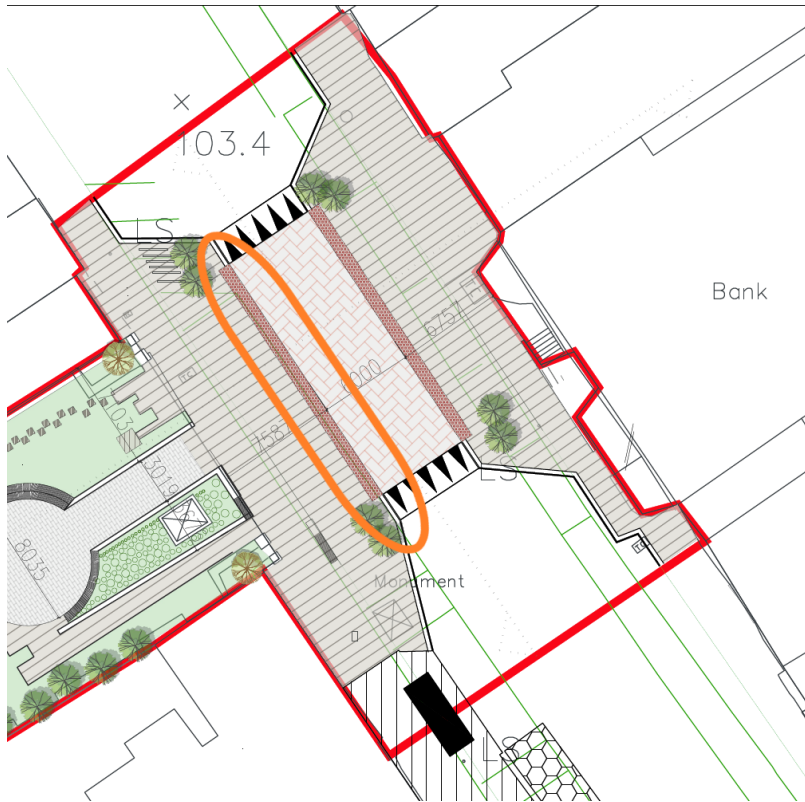
- Audit brief (reason for audit, background information, any departures from TII Publications);
- Location plan of site;
- General arrangement drawings;
- All other scheme drawings that are available;

Other Information

- A3 or A4 drawings of the scheme (to be marked up by the audit team to show locations of problems identified);
 - Collision data for existing roads affected by the scheme where available;
 - Traffic surveys, including pedestrian and cycle movements where available.
-

RSA Stage 1 – Limited Detail Provided

- Part 8 Planning
- Basic Concept Design
- Limited details;



Audit Brief Stage 2 RSA

Stage 2 (Detailed Design) or Stage ½ combined

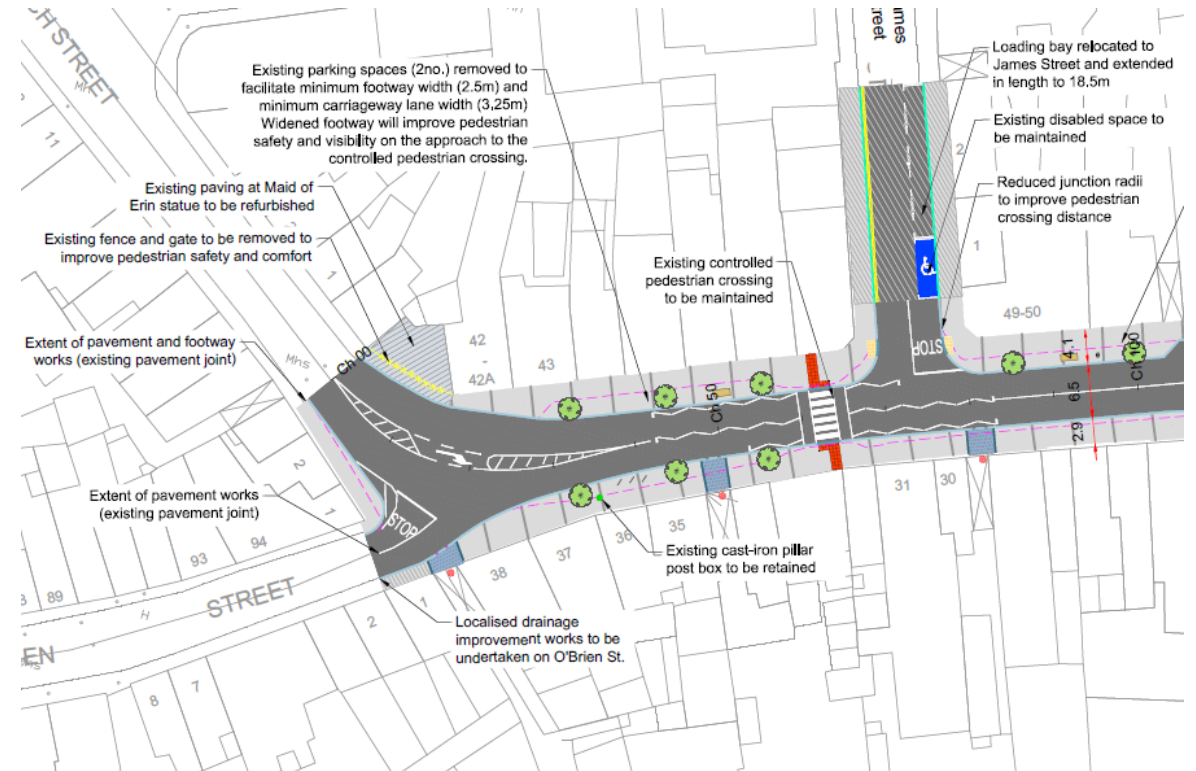
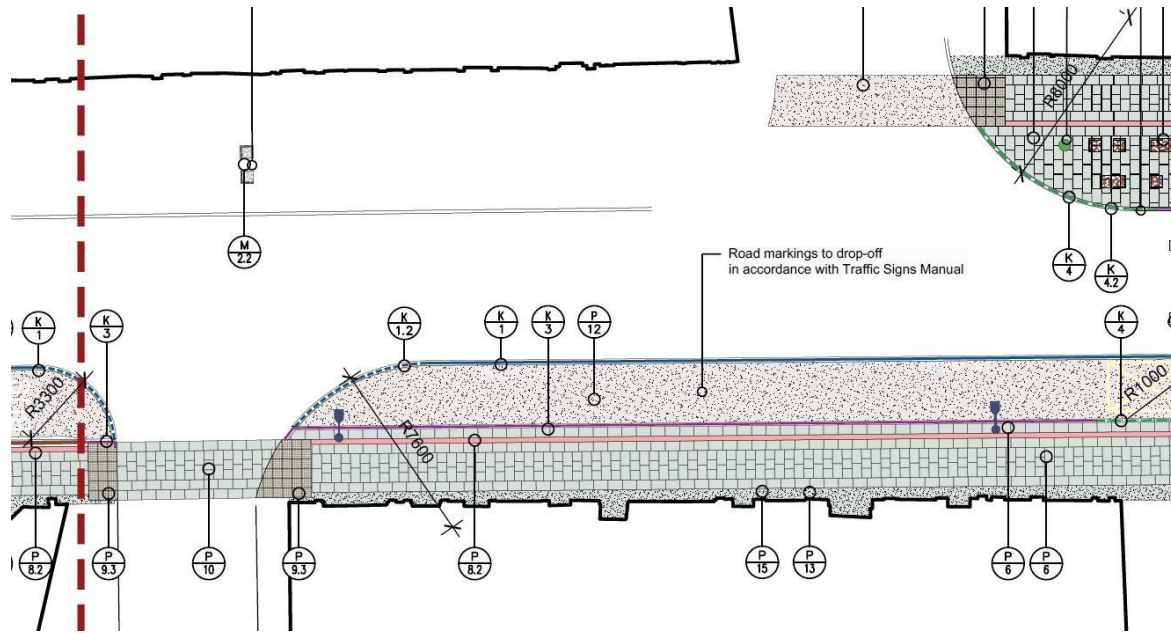
- Audit brief (reason for audit, background information, any departures from TII Publications);
 - Copy of Stage 1 Audit (if carried out) including designers response and exception report if applicable;
 - Location plan of site;
 - Detailed Drawings;
 - Geometry
 - Signage
 - Pavement
 - Any additional drawings
 - Drainage
 - Lighting
 - Landscaping
 - Road Markings
 - Kerbing
 - Construction Details
 - Other Information same as Stage 1
-

RSA Stage 1/2 – Full Detail Provided

- Generally on minor schemes such as junction improvements.
 - Part 8 may/may not be required.
 - What do you do as an auditor if adequate detail not provided?
 - If generally sufficient information provided – Stage 1/2
 - If insufficient information, Auditor indicate, can only do Stage 1 or request missing information.
 - If small portion of information missing –could write up as a problem or request information.
-

RSA Stage 2 – Full Detail Provided

- Detailed design complete
- Kerb radii, height, material type
- Lighting/Signage/Roadmarking
- Hard/ Soft Landscape positions



Audit Brief Stage 3 RSA

Stage 3 (Post Construction)

- Audit brief (reason for audit, background information, any departures from TII Publications);
 - Copy of Stage 2 Audit of combined Stage ½ Audit (if carried out) including designers response and exception report if applicable;
 - Location plan of site and general arrangement drawings;
 - Contact Details of people who should attend audit;
 - Garda,
 - Site Representative,
 - Any other interested parties.
-

Road Safety Audit Report

ROAD SAFETY AUDIT REPORTS should be...

Brief Specific Clear Comprehensive

|
Succinct
Concise

|
What specifically
is the issue?

|
Simple
Language
To the point

|
Cover the whole scheme
Pick up all problems
Consider for all road users
(Checklists)

Road Safety Audit Report

1. Introduction

- Background to Audit, Audit Stage
- List of Audit Team
- Site visit details
- Info provided / not provided / departures / (parts of site not complete for Stage 3)
- Description of scheme
- Previous RSAs
- Collision history (if reqd)

2. Items Arising from the Audit

- Problems & Recommendations
- Graphical aids to show location and nature of each problem

3. Audit Statement

4. Appendices

- RSA Brief Checklist ?
 - RSAAS Audit Team approval
 - List of information provided
 - Collision data sources (if reqd)
 - Problem locations plan
 - Feedback Form
-

Problems and Recommendations

Main element of the RSA report is the **‘problems and recommendations’**

- Report shall contain descriptions of specific road safety problems identified by the Audit Team;
 - Problem descriptions should be simple and clear
 - Identify:
 - what type of collision might arise?
 - how the collision might happen?
 - who might be involved? **“who could be hurt here?”**
 - Should include **background reasoning** in support of findings
 - Make **proportionate and viable recommendations** to eliminate or mitigate the potential hazards identified
-

Report Writing - Phraseology

- When making a recommendation, use **'Should'**, not **'must / shall'** – you are not the Designer, may be misinterpreted as an instruction from the Road Safety Audit Team.
 - The hazard **should** be mitigated. (by either removing, setting back, making forgiving or protecting if first two options are not viable). Don't say a safety barrier **should** be provided. Too prescriptive, it may be possible to remove the hazard, safety barrier – final option!
 - Recommendations to **'consider'** something should be avoided. It is too weak, and provides the Designer/Employer with an easy 'out' e.g. “We considered the recommendation but decided against doing anything”.
 - new safety barrier or alternative mitigation measures **should** be provided at this location.
-

Report Writing - Phraseology

- If you use the word **'Monitor'** you are not sure if it's a road safety problem or not. Use only where a specific monitoring requirement is targeted, can be scheduled and allocated to someone.
 - The Client should monitor right turn movements at this junction for a 3 to 6 month period. If the problem persists, a dedicated provision for right turning vehicles should be provided at the junction'
 - Audit Team should not **quote a standard** when making a recommendation. Auditors are not checking the scheme against standards. Use the word **'appropriate'** instead
 - The **appropriate** tactile paving layout **should** be provided at this crossing facility.
-

Examples of Stage 1 RSA



Specific Problem:

Visibility obscured by bridge

Parapet

Safety problem? Risk of injury?

Yes

Collision Type?

Side-impact collision

How collision might happen?

Side road vehicle cannot see and turns out in front of mainline vehicle

Who might be involved / hurt?

Vehicle occupants

Examples of Stage 1 RSA



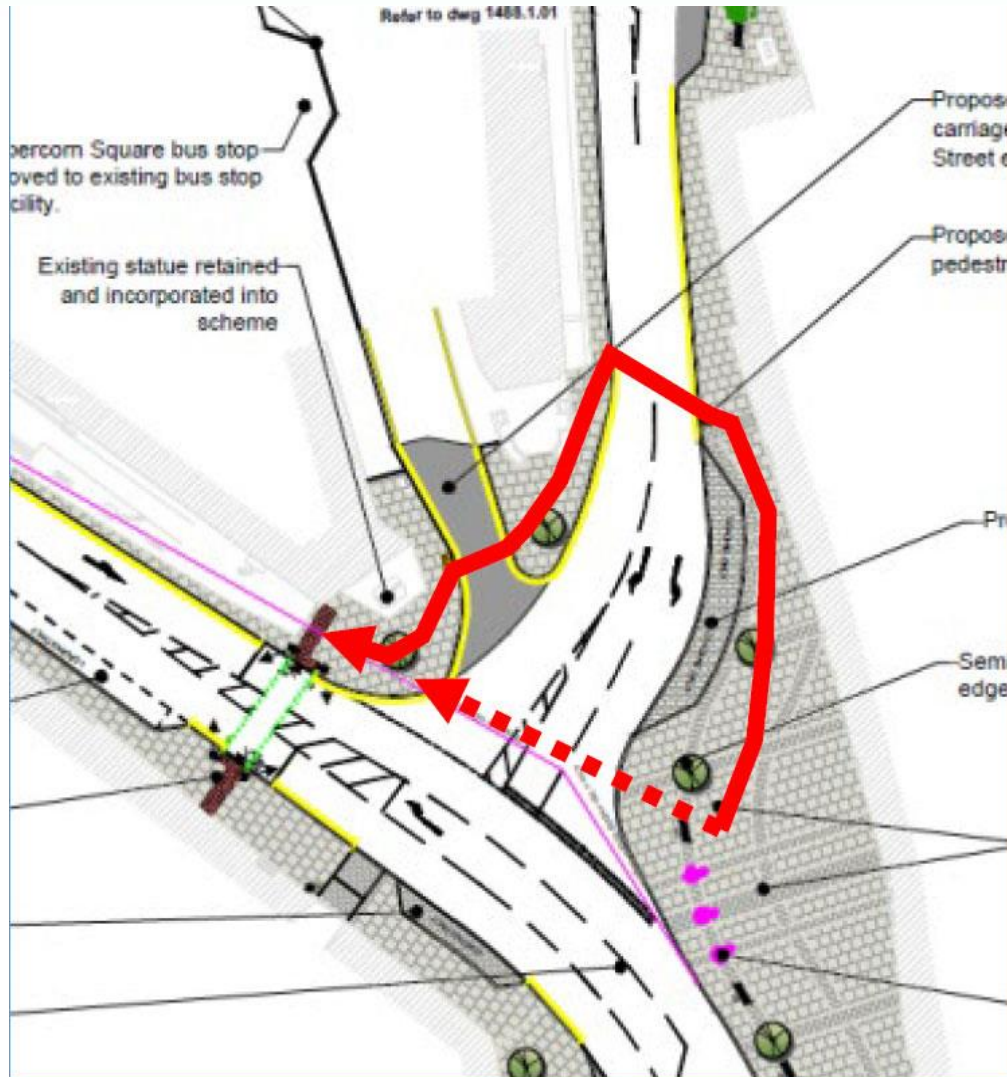
Report Problem:

The **visibility to the right for drivers** exiting the internal road adjacent to the watercourse **may be restricted by the parapet walls** of the bridge structure. As a result **drivers may pull out in front of oncoming traffic**, which could lead to **side-impact collisions**.

Report Recommendation:

Adequate junction visibility **should be provided** to the right taking the bridge construction into account.

Examples of Stage 2 RSA



Specific Problem:

No crossing facility for pedestrian
desire line

Safety problem? Risk of injury?

Yes

Collision Type?

Vulnerable road user injury

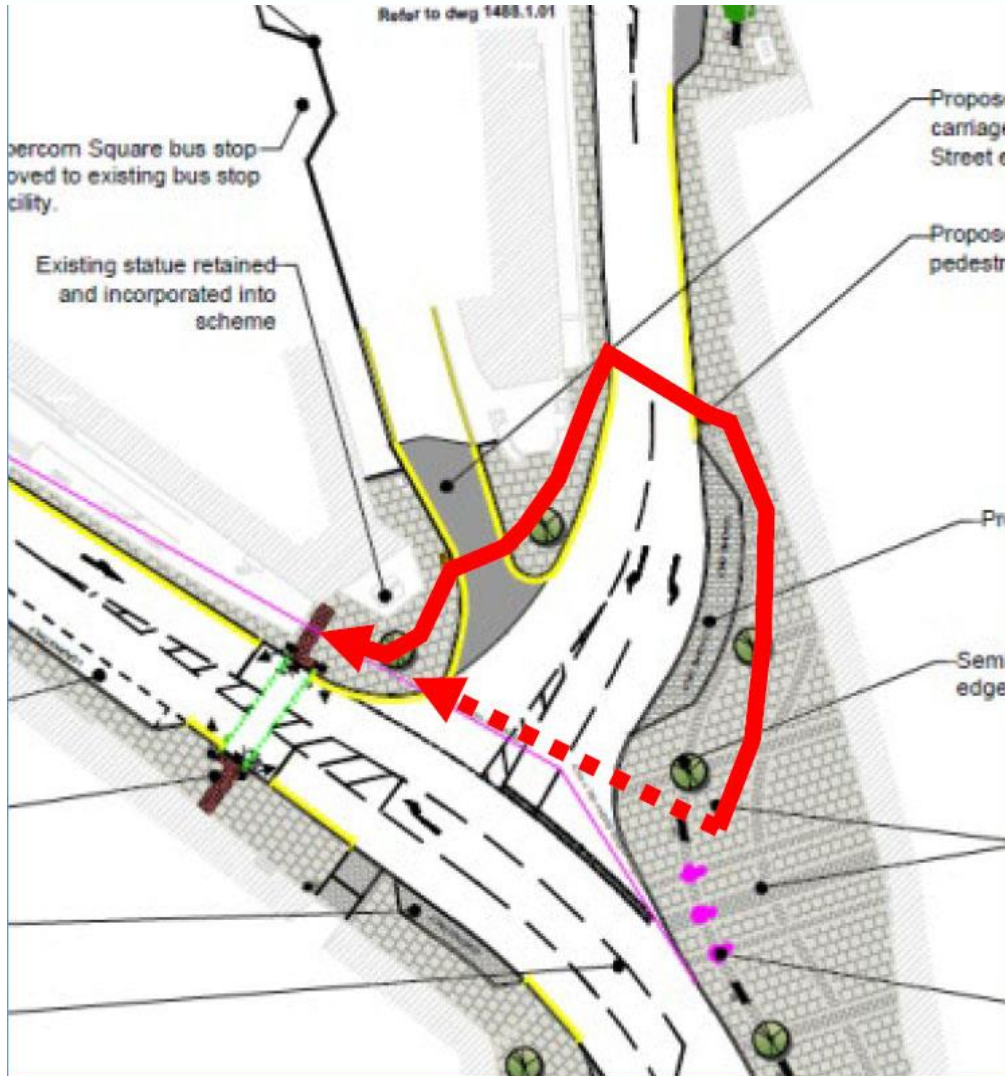
How injury might happen?

Pedestrians attempt to cross 3 lanes of traffic.

Who might be involved / hurt?

Vulnerable road users (incl mobility
or visually impaired)

Examples of Stage 2 RSA



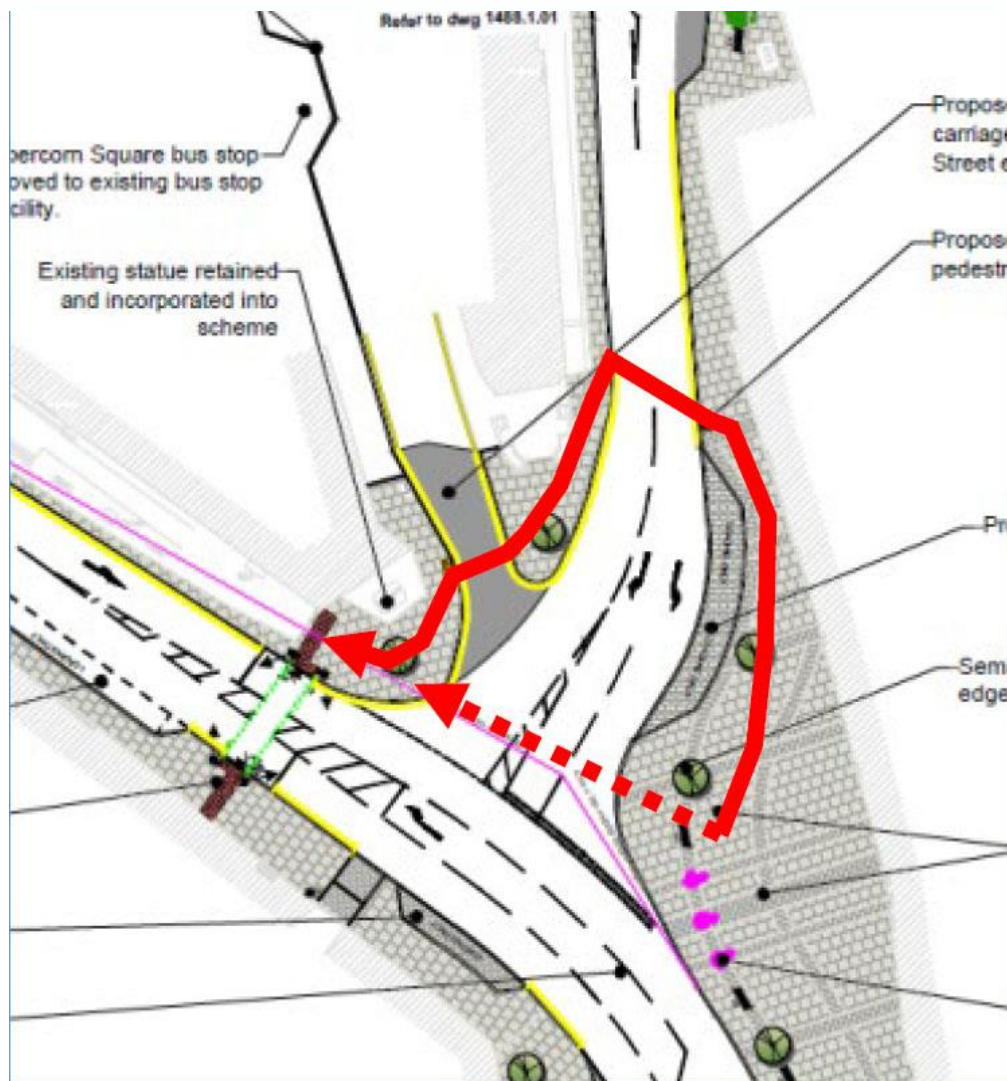
Report Problem:

Pedestrians on Thomas Street **may take the shortest desire line** across the proposed junction rather than walking around the loading bay and crossing both the Dublin Road and John Street. Pedestrians attempting to cross three traffic lanes at the junction are at an increased risk of being struck by a vehicle.

Report Recommendation:

A pedestrian crossing facility **should** be provided to cater for pedestrian desire lines at the junction.

Examples of Stage 2 RSA



Specific Problem:

Double lane exit at junction. Vehicles exiting the junction can mask sightline of driver in adjacent vehicle.

Safety problem? Risk of injury?

Yes

Collision Type?

Side impact collision

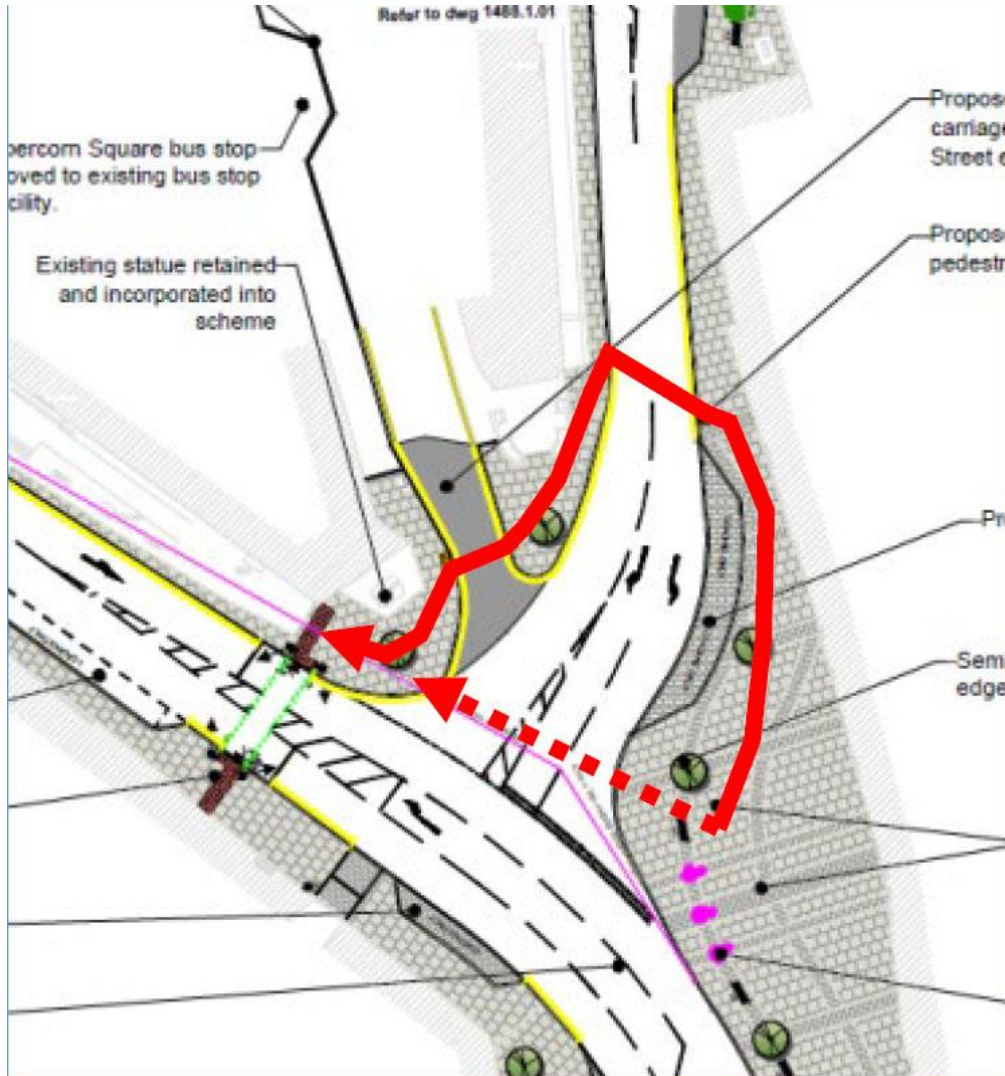
How injury might happen?

Driver of side road vehicle cannot see and turns out in front of mainline vehicle

Who might be involved / hurt?

Vehicle occupants

Examples of Stage 2 RSA



Report Problem:

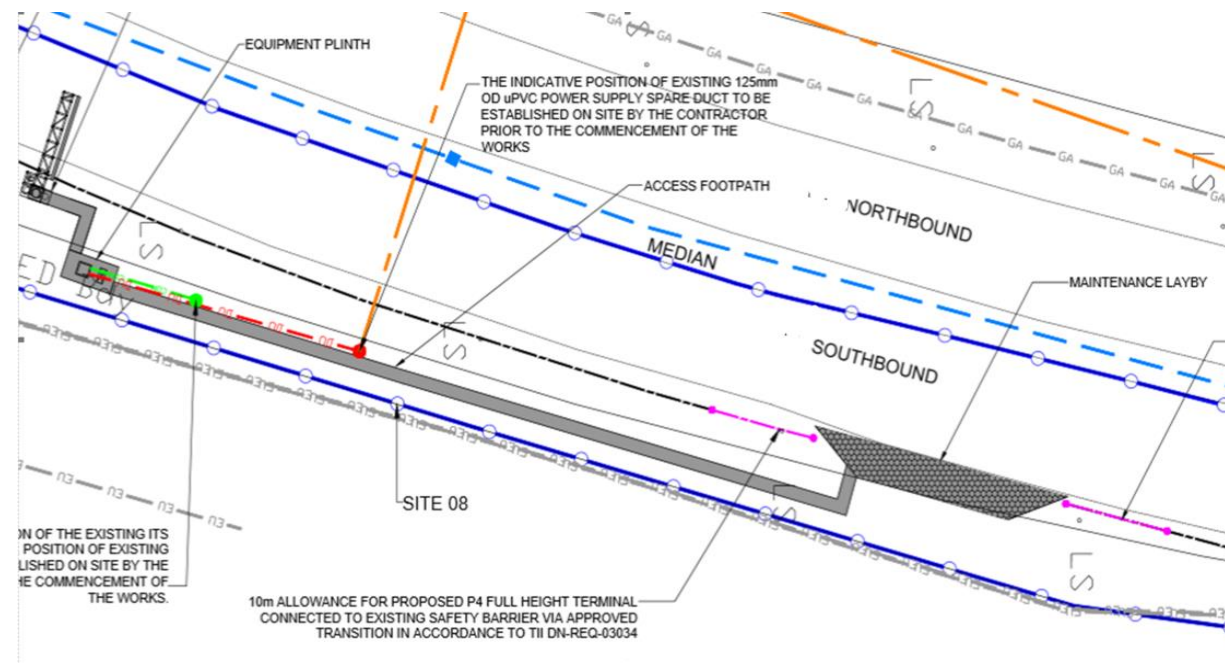
The **visibility for drivers exiting** Thomas Street may be masked by adjacent vehicle at stop line. As a result **drivers may pull out in front of oncoming traffic**, which could lead to **side-impact collisions**.

Report Recommendation:

The double lane exit at the junction **should be removed**.

Examples of Stage 2 RSA

- Access/Egress for maintenance vehicles, immediately after signals/at the end of a tight merge.
- Additional breaks in barrier , two new terminals , additional hazards exposed to facilitate layby.
- Alternative access from walkway/ amenity site recommended.



Examples of Stage 2 RSA



Examples of Stage 3 RSA



Specific Problem:

Driver confusion

Safety problem? Risk of injury?

Yes

Collision Type?

Side swipes

How collision might happen?

Vehicles in both lanes attempt to travel straight on for Town Centre

Who might be involved / hurt?

Vehicle occupants)

Examples of Stage 3 RSA



Report Problem:

This **provision of lane indication arrows** on the **southbound approach to the roundabout** indicates that vehicles in both lanes can take the straight ahead exit. However there is only one exit lane provided for this exit. **This may result in side-swipe type collisions.**

In addition the current arrangement may also **cause confusion for drivers** who wish to turn right at the roundabout

Report Recommendation:

Road markings on approach to roundabout **should ensure clarity** for drivers traversing through the roundabout.

Report Writing

What Makes a Good RSA Report...

- Keeps to road safety issues;
 - How well is the problem described;
 - Uses photos and image snips to help describe problems
 - Makes practical recommendations
 - Avoids the use of certain terms e.g. must / shall / consider / Monitor
 - Refers to any information not submitted for that stage (e.g. departures, drainage design, etc)
-

Report Writing

What Makes a Poor RSA Report...


- Too much emphasis on design features or operational issues rather than road safety issues;
 - Uses multiple paragraphs to explain problems and set out Recommendations;
 - Does not list the drawings / information examined;
 - Has impractical or highly specific recommendations;
 - Refers to site photos in an Appendix.
-

Re-audit - See section 3.18 of Guidelines

Is it ever needed?...

- Rarely and TII Safety Section can be consulted if there is any doubt;
 - Can be required if there are major changes;
 - Need for it should be discussed between the Audit Team Leader and Designer;
 - The re-audit added to original report as an annex;
-



 Bonneagar Iompair Éireann
Ionad Gnó Gheata na Páirce
Sráid Gheata na Páirce
Baile Átha Cliath 8
Éire, D08 DK10

 Transport Infrastructure Ireland
Parkgate Business Centre
Parkgate Street
Dublin 8
Ireland, D08 DK10

 www.tii.ie

 info@tii.ie

 +353 (0)1 646 3600

 +353 (0)1 646 3601