

Bonneagar Iompair Éireann  
Transport Infrastructure Ireland

## TII Publications



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# Design Phase Procedure for Road Safety Improvement Schemes, Urban Renewal Schemes and Local Improvement Schemes

**DN-GEO-03030**  
April 2021

## About TII

Transport Infrastructure Ireland (TII) is responsible for managing and improving the country's national road and light rail networks.

## About TII Publications

TII maintains an online suite of technical publications, which is managed through the TII Publications website. The contents of TII Publications is clearly split into 'Standards' and 'Technical' documentation. All documentation for implementation on TII schemes is collectively referred to as TII Publications (Standards), and all other documentation within the system is collectively referred to as TII Publications (Technical).

## Document Attributes

Each document within TII Publications has a range of attributes associated with it, which allows for efficient access and retrieval of the document from the website. These attributes are also contained on the inside cover of each current document, for reference.

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<b>TII Publication Number</b>	<i>DN-GEO-03030</i>

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<b>Stream</b>	<i>Geometry (GEO)</i>	<b>Publication Date</b>	<i>April 2021</i>
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## TII Publications




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<b>Activity:</b>	Design (DN)
<b>Stream:</b>	Geometry (GEO)
<b>TII Publication Title:</b>	Design Phase Procedure for Road Safety Improvement Schemes, Urban Renewal Schemes and Local Improvement Schemes
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**Updates to TII Publications resulting in changes to  
Design Phase Procedure for Road Safety Improvement Schemes, Urban Renewal Schemes  
and Local Improvement Schemes DN-GEO-03030**

**Date:** April 2021

**Page No:** \_\_\_\_\_

**Section No:** \_\_\_\_\_

**Amendment Details:**

The previous version considered maintenance schemes. Maintenance schemes predominantly involve pavement works and other road feature pavement works. These schemes fall under current expenditure and are supported by the TII Pavement Management System. Maintenance schemes are no longer considered in this standard.

In the previous version procedures were provided for 'Minor Improvement Schemes' The Term 'Minor Improvement Schemes' has been changed to 'Local Improvement schemes' which includes a variety of scheme types such as development led schemes, schemes led or funded by other agencies, community schemes and Local Authority schemes that are not safety led.

This version includes for Urban Renewal Schemes on National Roads which are designed in accordance with the Design Manual for Urban Roads and Streets.

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## Summary

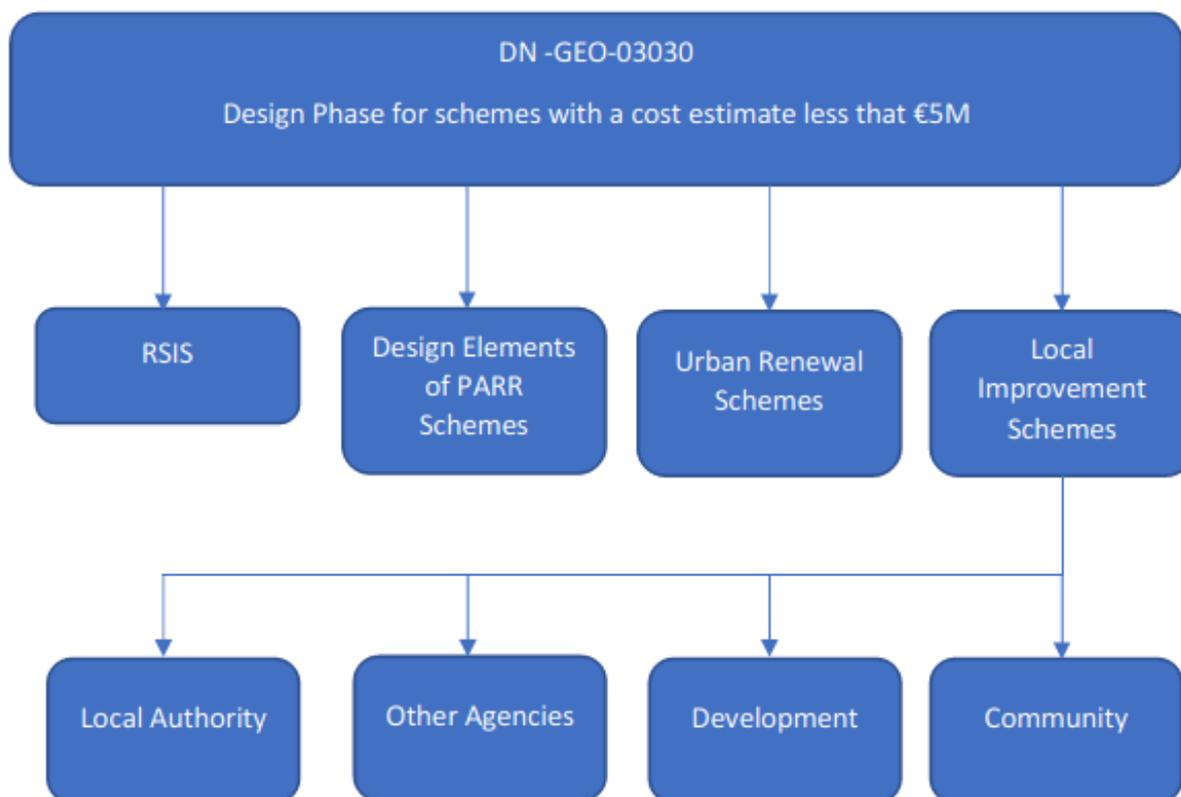
**This standard is to be used for the design phase of all schemes on national roads, whether funded by TII or not, which have design elements, which have a cost estimate of less than €5m and which are not otherwise being progressed in accordance with the procedures set out in the TII Project Management Guidelines, PE-PMG-02041.**

Schemes for which this standard applies fall under one of the following four categories:

- Road Safety Improvement Schemes (RSIS) that have already been approved at Feasibility and Options Stage of TII Publications (Standards) GE-STY-01037.
- Urban Renewal Schemes (URS) i.e. schemes that are designed in accordance with The Design Manual for Urban Roads and Streets (DMURS).
- Road Safety Improvement aspects (i.e. design elements) of Pavement Asset Repair and Renewal (PARR) Schemes. TII Publications (Standards) AM-PAV-06049.
- Local Improvement Schemes (LIS) e.g. local authority general improvement schemes which have not been identified as Road Safety Improvement Schemes, schemes led, funded or partly funded by other agencies, development led schemes and/or community schemes.

This Standard sets out the procedures to be followed for the technical aspects of the Design Phase of the scheme types described above. Statutory and environmental procedures for all schemes should adhere to the relevant legislation and guidance documentation.

The schemes for which this standard applies is shown graphically below.



Some typical (non-exhaustive) examples of schemes covered by this standard are provided below.

**Examples where this Standard is applicable.**

1. A commercial development being promoted by a private entity which accesses a National Road.
2. A rural greenway being funded by government grants that crosses a National Road.
3. A tidy towns scheme from local fundraising that enhances a village on a National Road.
4. A roundabout sponsorship scheme that proposes to erect a structure in the central island of a roundabout on a National Road.
5. A traffic calming scheme designed in accordance with DMURS on a national road in a rural town.
6. An upgrade of a junction on a National Road to increase capacity.
7. The provision of new vehicle restraint systems along a National Road.
8. The widening of a structure on a National Road.
9. The introduction of a nearside passing bay as part of a PARR scheme.

***All examples are for schemes with a cost estimate below €5M for the portion of the works associated with the National Road interface.***

# 1. Introduction

## 1.1 Purpose

This Standard sets out the procedures to be followed for the technical aspects of the Design Phase of the following scheme types;

- RSIS that have already been approved at the Feasibility and Options Stage of GE-STY-01037.
- URS i.e. schemes that are designed in accordance with DMURS.
- Road Safety Improvement aspects (i.e. design elements) of PARR Schemes, AM-PAV-06049.
- LIS e.g. local authority general improvement schemes which have not been identified as Road Safety Improvement Schemes, schemes led, funded or partly funded by other agencies, development led schemes and/or community schemes.

The procedures for the approval of Road Safety Improvement Schemes from Identification to Close Out are outlined in GE-STY-01037. This Standard specifically deals with the Design Phase procedures for those schemes.

Where a RSIS can be progressed in conjunction with a PARR scheme, only the RSIS elements are subject to the procedures set out in this Standard and in GE-STY-01037. This is to ensure that the proposed RSIS elements are subject to the appropriate process and to ensure that a Design Report is produced and reviewed. It is not intended that an entire PARR scheme be subject to the procedures set out in this Standard.

The purpose of the Design Report is to address and present issues relating to compliance with the relevant parts of the TII Publications (Standards) for the preferred option taken forward from the Feasibility and Options Phase after Gateway Approval 1. This is to ensure that the standards to be applied are recorded and that all proposed relaxations (where required) and departures are identified within the Departure Application. A copy of the Design Report shall be issued via the TII Departures Portal, irrespective of whether there are any departures or relaxations.

Design Reports must also be produced for all schemes including those that are designed in accordance with DMURS.

Design Reports must be submitted for review via the TII Departures Portal or schemes cannot progress to the next Phase. It should be noted that the Departure Application is a check mechanism to ensure consistency in use of TII Standards and/or specifications and is not an approval of the Design Report per se.

## 1.2 Definitions

- Approval Gateway:** An Approval Gateway is a systematic review of proposals which require formal TII approval prior to proceeding to the next stage of the process.
- Design Manual for Urban Roads and Streets (DMURS):** Published by the Department of Transport, Tourism and Sport in association with the Department of Planning Housing and Local Government. DMURS provides guidance relating to the design of urban roads and streets.
- Design and Environmental Evaluation Phase:** Phase 3 as set out in the TII Publications (Technical) PE-PMG-02041 Project Management Guidelines.

- Although the PMG do not in general apply to schemes <€5M the same terminology for scheme phases apply.
- d) **Design Report:** The report to be produced as part of the procedure described in this standard. This should include a cost estimate in accordance with TII Publications (Technical) PE-PMG-02044 Cost Management Manual. It is envisaged that only minor changes to the design will take place in Phase 5 (Pre- Construction Phase) such as changes necessary to meet conditions associated with statutory or environmental approvals. The use of the term 'Preliminary Design Report' or 'PDR' in other TII Publications should take the meaning 'Design Report' as outlined above when referring to schemes that are subject to the procedures set out in this Standard.
- e) **Implementation Authority (IA):** The Implementation Authority is the relevant road authority responsible for the scheme.
- f) **Local Improvement Scheme (LIS):** 'Local Improvement Schemes' includes a variety of scheme types which have a total scheme budget of less than €5m. Typically such schemes could belong to one of the following categories.
- Local Authority general improvement schemes which have not been identified as Road Safety Improvement Schemes,
  - Schemes led or funded or partly by other agencies,
  - Development led schemes,
  - Community schemes.
- g) **National Road Network:** The primary and secondary road network which comprises motorways, dual carriageways and single carriageway roads.
- h) **Pavement Asset Repair and Renewal (PARR) Scheme:** Activity targeted at extending the life of an existing road pavement and/or improving its load carrying capacity or skid resistance. Examples include overlay and inlay works and edge strengthening of an existing road pavement.
- i) **Project Appraisal Guidelines (PAG):** TII Project Appraisal Guidelines for National Roads.
- j) **Project Management Guidelines (PMG)** TII Project Management Guidelines for National Roads.
- k) **Public Spending Code (PSC):** The Department of Public Expenditure and Reform (DPER) publication "The Public Spending Code" (PSC) sets out the rules and procedures to ensure that the best possible value for money is obtained whenever public money is being spent or invested.
- l) **Road Safety Improvement Scheme (RSIS):** Road Safety Improvement Schemes on the National Road Network. A RSIS can also form part of a PARR Scheme where the safety improvements are not on the entire pavement scheme.
- m) **TII Regional Management (TII RM):** Division within TII responsible for the delivery of the roads programme for the National Road Network within specific geographic regions.
- n) **TII Regional Road Safety Engineer (TII RRSE):** Road safety engineer for road safety programme within a specific geographic region.
- o) **TII Road Safety (TII RS):** Division within TII responsible for the delivery of the roads safety programme for the National Road Network.
- p) **TII Road Safety Inspection Engineer Road (TII RSIE):** Road safety inspection engineer for road safety programme within a specific geographic region.

- q) **Type A:** High Collision Location (HCL) Schemes.
- r) **Type B:** Road Safety Inspection Schemes (RSISs) that require design.
- s) **Type C:** Routine Road Safety Inspection Schemes (RSIS) that do not require design (e.g. replace lighting pole with passively safe pole, remove hazard/tree from the clear zone etc.).
- t) **Type D:** Road Safety Improvement schemes proposed by the Local Authority.
- u) **Urban Renewal Scheme (URS):** Scheme designed in accordance with the Design Manual for Urban Roads and Streets (DMURS).

## 2. Scheme Types

This Standard describes the procedures to be followed during the Design Phase of the following scheme types:

- Road Safety Improvement Scheme (RSIS).
- Road Safety Improvement aspects of PARR Scheme.
- Local Improvement Scheme (LIS).
- Urban Renewal Scheme (URS).

A RSIS may be a stand-alone scheme that has been identified and developed through the Scheme Identification and Feasibility and Options Phases of GE-STY-01037 or may be a RSIS that forms part of a PARR scheme.

A flow chart outlining the procedure for the development of a RSIS is presented in Figure 2.1 of GE-STY-01037 and is reproduced in Figure 4.1 of this Standard.

### **3. Project Appraisal Procedures**

All schemes developed by the Implementing Authority (IA) shall comply with the Public Spending Code (PSC).

#### **3.1 Schemes Funded By TII**

The Project Appraisal Balance Sheet (PABS) template can be downloaded from [https://www.tiipublications.ie/downloads/project\\_appraisal\\_guidelines/PE-PAG-02037\\_Unit-14-Attachments.zip](https://www.tiipublications.ie/downloads/project_appraisal_guidelines/PE-PAG-02037_Unit-14-Attachments.zip).

A sample PABS is contained in Appendix C of this Standard for a typical RSIS of a junction Improvement.

A sample PABS is contained in Table 14.1 of TII Publications (Technical) PE-PAG-02037 for a typical minor widening and realignment scheme.

#### **3.2 Schemes Not Funded by TII**

LIS not funded by TII should undergo the relevant project appraisal procedures of the funding agency or body.

## 4. Design and Environmental Evaluation Phase, Road Safety Improvement Scheme.

Flowcharts for all stages of development of RSIS are provided in Figure 2.1 and Appendix A of GE-STY-01037 and are reproduced in Figure 4.1 below and in Appendix A of this Standard.

The Design and Environmental Evaluation Phase of a RSIS shall commence after Gateway Approval 1 and if sufficient funding is available.

The Design and Environmental Evaluation Phase of a RSIS is shown within the green dashed line of Figure 4.1 below.

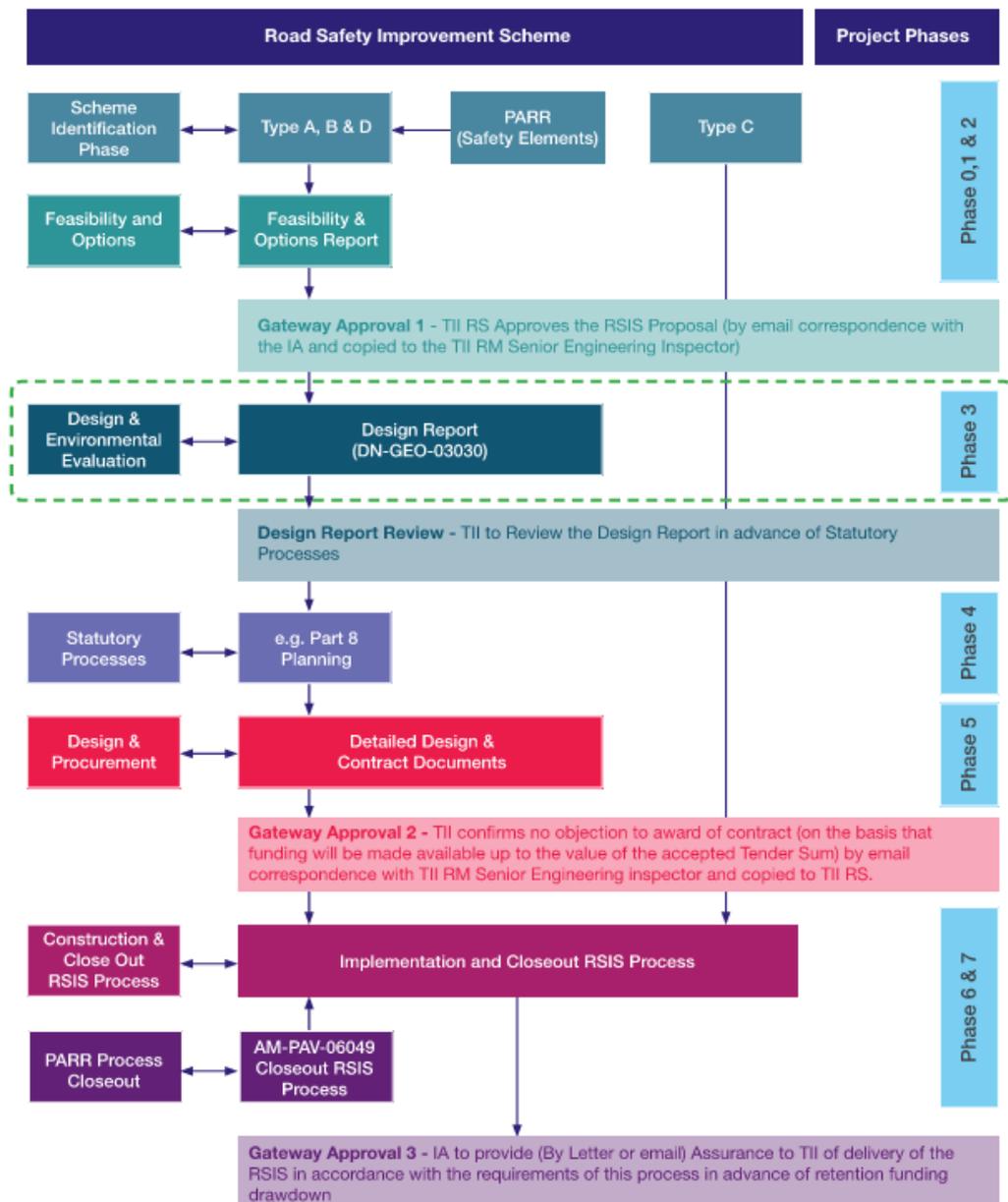


Figure 4.1 RSIS Development Phases

## 5. Design Reports

RSIS, URS & LIS require the preparation of a Design Report, including Relaxations and Departures (where appropriate in accordance with Section 1.1 of TII Publications (Standards) GE-GEN-01005 Departures from Standards and Specification.

The Design Report should address the technical elements only of the scheme design only. Other aspects of the scheme development such as statutory procedures or environmental procedures that do not have a direct impact on the design elements may be referred to in the Design Report. Such reports will be reviewed through the various processes set out for those aspects of the scheme development. It is intended that Design Reports will be relatively concise documents containing only relevant information.

The Design Report should not duplicate information from the Feasibility and Options Report produced prior to Gateway Approval 1 except for relevant details pertaining to the preferred option that have been taken forward such as the cost estimate and information required for the PABS.

For consistency of reporting Design Reports should follow the same format for all schemes. To assist in this process sample Design Reports have been uploaded to <https://www.tiipublications.ie/downloads/DN-GEO-03030/Sample-Design-Report-Junction-Upgrade.docx> and <https://www.tiipublications.ie/downloads/DN-GEO-03030/Sample-Design-Report-Local-Realignment.docx>. If any of the headings are not relevant for a particular scheme, then “Not Applicable” or “N/A” should be written under the heading. Additional headings may be added for schemes with important technical aspects not included in the sample reports.

Departures from Standards shall be contained as an Appendix to the Design Report and shall be submitted as part of the report and not individually or independently. Approval cannot and will not be provided retrospectively for Departures from Standards identified at a later stage. Refer to GE-GEN-01005 for further information. The Departure from Standards Application form is available at <https://www.tiipublications.ie/downloads/departures-from-standards/Application-Form-for-Tender-Departure.docx>.

### **DMURS.**

The principles, approaches and standards set out in DMURS apply to the design of all urban roads and streets (that is streets and roads with a speed limit of 60 km/h or less), except

- a) Motorways
- b) In exceptional circumstances, certain urban roads and streets with the written consent of Approving Authorities which in respect of urban national roads is TII.

A scheme that is being designed in accordance with DMURS shall require a Design Report. Any deviations from the requirements or guidance set out in DMURS shall be detailed in the Design Report.

Schemes that are being designed in accordance with DMURS shall comply with relevant TII Specifications with regards to materials, standard construction details and maintenance requirements.

Where URS involve design at Transition Zones the guidance provided in TII Publications (Standards) DN-GEO-03084 The Treatment of Transition Zones to Towns and Villages on National Roads, is to be followed.

The Design Report for schemes that are designed in accordance with DMURS shall contain evidence of complying with TII Specifications.

The Design Report for schemes designed in accordance with DMURS shall contain a DMURS Compliance Statement. This statement shall include a table demonstrating compliance with the four Core Design Principles.

Design Principle 1: To support the creation of integrated street networks which promote higher levels of permeability and legibility for all users, and in particular more sustainable forms of transport.

Design Principle 2: The promotion of multi-functional, place-based streets that balance the needs of all users within a self-regulating environment.

Design Principle 3: The quality of the street is measured by the quality of the pedestrian environment.

Design Principle 4: Greater communication and co-operation between design professionals through the promotion of a plan-led, multidisciplinary approach to design.

### **Road Safety Audit**

Road Safety Audits shall be carried out in accordance with GE-STY-01024.

At the end of the Design and Environmental Evaluation Phase a Stage 1, Stage 2 or a Combined Stage 1&2 Road Safety Audit shall be carried out depending on the complexity and level of detail provided. The completed report including the signed feedback form shall be included as an Appendix to the Design Report. Any changes to the design arising from the Road Safety Audit shall be incorporated into the design drawings submitted with the Design Report. Audit Reports shall also be uploaded to the TII Road Safety Audit Approvals System (RSAAS) at <https://web.tii.ie/safetyaudits/>.

### **Quality Audit**

Quality Audits as described in Section 5.4.2 and Advice Note 4 of DMURS shall be carried out for schemes designed in accordance with DMURS. The Road Safety Audit aspects of the Quality Audit shall comply with GE-STY-01024.

## **6. Design and Environmental Evaluation Phase Cost Estimate**

### **6.1 Total Scheme Budget**

The Design Report shall contain a Total Scheme Budget. For TII funded schemes the scheme estimate should broadly follow the templates provided in Appendix A4 of PE-PMG-02044 Cost Management Manual. The template is available for download at <http://TIIPublications/downloads/>.

A breakdown of the cost estimate shall be presented as an Appendix to the Design Report. A copy of the summary Appendix A4 template is contained in Appendix B of this Standard.

The Design Report shall include the cost estimate of the preferred option that was contained in the Feasibility and Options Report approved at Gateway Approval 1. Any significant cost estimate changes, compared to the funds approved at Gateway Approval 1, may require resubmission of the Feasibility and Options Report. Where the revised cost estimate no longer offers an acceptable benefit approval may be withdrawn. Any significant changes to the scope of the scheme or cost estimate should be agreed (by letter or e-mail) with TII RM and TII RS prior to the IA progressing the scheme through any subsequent phases and Gateway Approvals.

Where cost estimates are or become greater than €5M this Standard no longer applies and the TII Project Management Guidelines, PE-PMG-02041 should be followed.

## **7. Design Report Submission**

Design Reports for RSIS URS and LIS shall be issued as part of a Departure Application on the TII Departures Portal. The procedure for obtaining access to the website is outlined in DN-GEN-01005. Design Reports, including any Departures from Standards contained within the appendices, shall be uploaded as an attachment to a single departure.

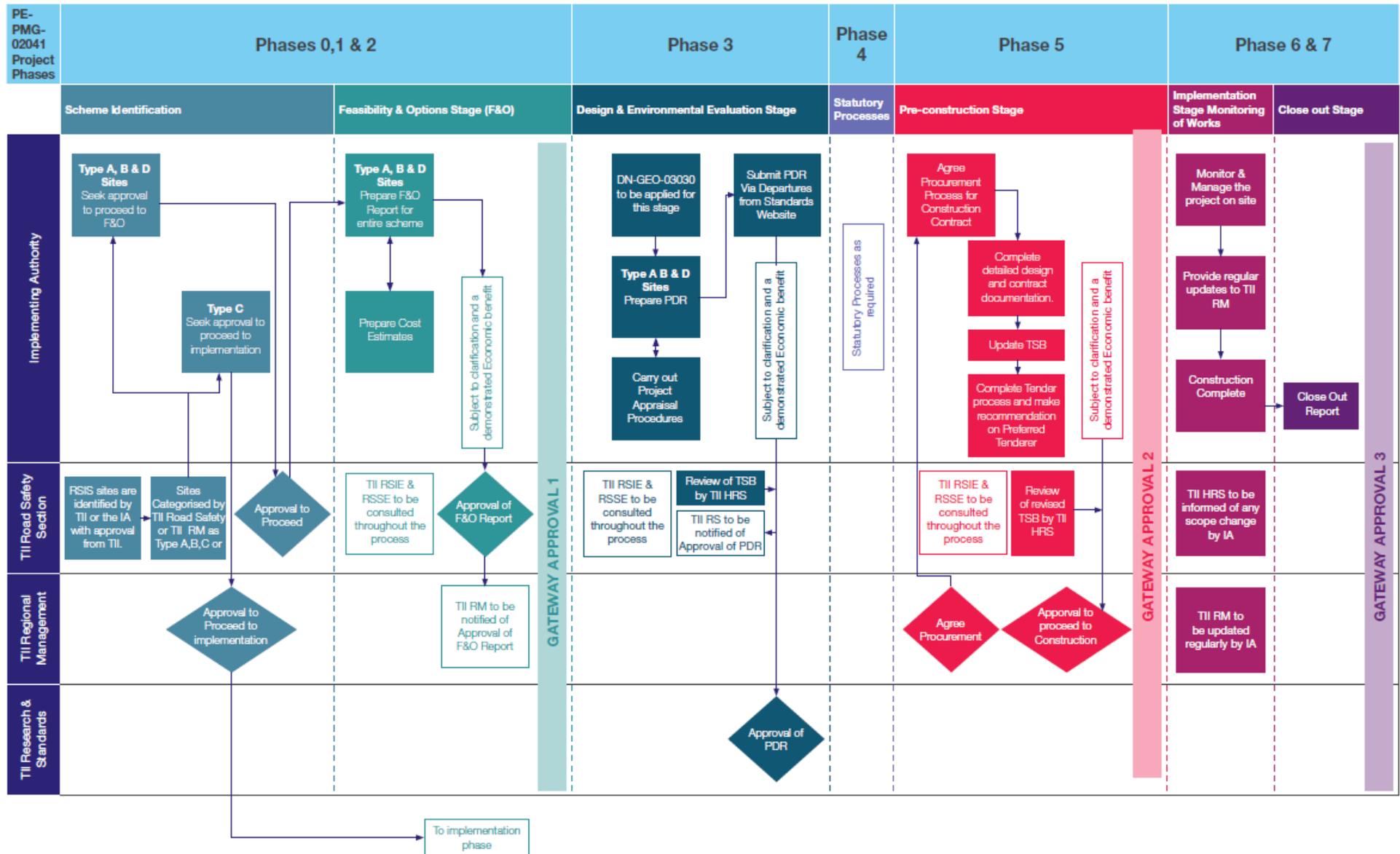
Applicants should allow a minimum of three weeks from receipt of the Design Report by TII to notification of checking. Clarifications or additional information may be sought by TII. Design Reports of insufficient quality will be rejected.

## **8. Statutory Procedures**

Statutory Planning Procedures (Phase 4) should not commence prior to the review and satisfactory responses to any comments from TII of the Design Report. Similarly for smaller schemes where Statutory Planning Procedures are not required Design and Procurement Procedures should not commence prior to the review and satisfactory responses to any comments from TII of the Design Report.

## **Appendix A:**

### Road Safety Improvement Scheme Flow Chart



## **Appendix B:** Cost Estimate Breakdown

<b>ROUTE No.</b>		Date		
<b>PROJECT NAME</b>		PRS No		
Road Authority		Region?		

Tick Appropriate Box

Estimate Only (sheet not signed)	<input type="checkbox"/>	Estimate at Appraisal (TC1)	<input type="checkbox"/>	Estimate prior to Tender Issue (TC2)	<input type="checkbox"/>	Estimate at Tender Award (TC3)	<input type="checkbox"/>	Outturn Costs	<input type="checkbox"/>
-------------------------------------	--------------------------	--------------------------------	--------------------------	--	--------------------------	--------------------------------------	--------------------------	---------------	--------------------------

<b>Project Description</b>	
----------------------------	--

Project Programme, Status and Appraisal (when available)			
Programme	Stage /Activity	Start [mm/yyyy]	Completion [mm/yyyy]
	Design		
	EIS / NIS		
	CPO		
	Tender		
	Construction		
<b>Project Status</b>	Land Acquisition		
	Planning Status		
<b>Appraisal</b>	Status		BCR
<b>Approvals Granted</b>	Undertake Detailed Design/Appraisal		<input type="checkbox"/>
	Proceed to CPO/Purchase Land		<input type="checkbox"/>
	Award Construction Tender		<input type="checkbox"/>

Base Cost Expenditure Heading	Base Cost (incl VAT)	Contingency	Budget €	Yearly Profiles (Euro)				
				Pre 2020	2020	2021	2022	Post 2022
Main Contract Construction			0					
Main Contract Supervision			0					
Archaeology			0					
Enabling Works & Other Contracts			0					
Walking / Cycling / PT Connectivity / Asset Renewal			0					
Land & Property			0					
Planning & Design (incl GI & Topo)			0					
<b>TOTAL</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>
<b>Programme Risk</b>							<b>0</b>	
<b>Minor Project Estimate</b>							<b>€0</b>	

Senior Engineering Inspector: \_\_\_\_\_ Date: \_\_\_\_\_

Head of Roads Capital Programme: \_\_\_\_\_  
Date: \_\_\_\_\_

Regional Manager: \_\_\_\_\_ Date: \_\_\_\_\_

Director of Capital Programme: \_\_\_\_\_  
Date: \_\_\_\_\_

Project Services: \_\_\_\_\_ Date: \_\_\_\_\_

Chief Executive: \_\_\_\_\_ Date: \_\_\_\_\_

PROJECT NAME

0

PRS No

0

Top Risks Considered under Main Contract Construction	Risk #	Risk Description	Overall Impact
(and potential impact)	1		
	2		
	3		
	4		
	5		
	6		
	7		
	8		
	9		
	10		
	11		0
	12		
	<b>Total</b>		

## **Appendix C:**

Sample PABS for a Junction  
Improvement Scheme .

PAG Unit 14 Project Appraisal Balance Sheet - Summary Table for Minor Projects (€0.5m to €5m) as defined by DN-GEO-03030													
Scheme Name:		Description:		Problems Identified:		Budget Cost €m							
N99/R99 Junction Improvement Scheme		Provision of a right turning lane on the N99		RSIS Type A site, Feasibility & options Report identified rear-end right turn issue.		€0.85m							
Current Typical Carriageway Width:		Route No:		Speed Limit:	Proposed Carriageway Standard:								
7.5m		N99		100kph	2 x 3.5m through lanes and 3.0m turning lane								
Appraisal Criteria	Appraisal Sub-Criteria	Objectives (Guidance available in PAG Unit 3.0)	Qualitative Statement:	Sub-criteria Performance Description	Sub-criteria Score	Appraisal Criteria Score							
Environment	Air Quality	N/A	No change to traffic volumes	Not significant or Neutral	4	Neutral							
	Noise and vibration	N/A	No change to traffic volumes	Not significant or Neutral	4								
	Landscape & visual quality	N/A	Proposals within existing road boundaries	Not significant or Neutral	4								
	Biodiversity	N/A	Existing Route, minor pavement widening into existing verge	Not significant or Neutral	4								
	Cultural, Archaeological, Architectural Heritage	N/A	Desktop study carried out, no archaeological or architectural sites adjacent to the scheme	Not significant or Neutral	4								
	Land Use	To minimise land take	No land required, existing road boundaries are wide	Not significant or Neutral	4								
	Water resources	N/A	Existing alignment	Not significant or Neutral	4								
Safety	Collision reduction	Reduce collision rate	Right turning lane provides refuge. Posty and tensioned mesh fence provides passively safe boundary	<table border="1"> <tr> <td>Current Rate:</td> <td colspan="2">See F&amp;O Report</td> </tr> <tr> <td>Proposed Rate (see PAG 6.11):</td> <td>2 Lane Single carriageway &gt; 60kph</td> <td>0.080 PIA/mvkm</td> </tr> </table>	Current Rate:	See F&O Report		Proposed Rate (see PAG 6.11):	2 Lane Single carriageway > 60kph	0.080 PIA/mvkm	Major or highly positive	7	Highly Positive
	Current Rate:	See F&O Report											
Proposed Rate (see PAG 6.11):	2 Lane Single carriageway > 60kph	0.080 PIA/mvkm											
Security	Cater for vulnerable road users	Width provided for cyclists in hard shoulder through the junction.		Moderately positive	6								
Economy	Transport Efficiency and Effectiveness	N/A	N/A	<table border="1"> <tr> <td>Current AADT:</td> <td></td> </tr> <tr> <td>Forecast 2030 HG AADT:</td> <td></td> </tr> </table>	Current AADT:		Forecast 2030 HG AADT:		Not significant or Neutral	4	Neutral		
	Current AADT:												
	Forecast 2030 HG AADT:												
Wider economic impact	N/A	N/A		Not significant or Neutral	4								
Transport Reliability and Quality	N/A	N/A		Not significant or Neutral	4								
Accessibility and Social Inclusion	Vulnerable groups	N/A	N/A		Not significant or Neutral	4	Neutral						
	Deprived geographic areas	N/A	N/A		Not significant or Neutral	4							
Integration	Transport integration	Provide safer access to Regional Road network	As per Collision Reduction above		Not significant or Neutral	4	Neutral						
	Land-use integration	N/A	N/A		Not significant or Neutral	4							
	Geographical integration	N/A	N/A		Not significant or Neutral	4							
	Integration with other government policies	N/A	N/A		Not significant or Neutral	4							
Physical Activity	Physical Activity	Provide opportunity for cyclists and pedestrians at the junction	Hard shoulder (1.5m) maintained through junction to cater for pedestrians and cyclists	Minor or slightly positive	5	Slightly Positive							
<b>Overall Description of Scheme:</b>						<b>Neutral</b>							

## **Appendix D:**

### Worked Examples of Road Safety Improvement Schemes

## 1.0 WORKED EXAMPLES

- 1.1 It is important that Design Organisations correctly identify problems, and their causes, before attempting to produce solutions. A number of notional examples follow which are intended to illustrate the scale and type of improvement measures/options:

**Example 1: Improvements to Overtaking Section**

**Example 2: Improvements to Existing Cross Section**

**Example 3: Route Enhancement**

**Example 4: Relocation of Junction**

**Example 5: Removal of Adverse Camber**

**Example 6: Junction Improvements**

**Example 7: Junction Redesign**

**Example 8: Sign Relocation and Site Clearance**

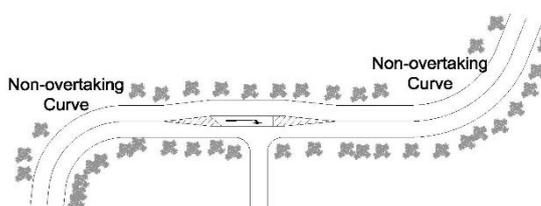
**Example 9: Vertical Alignment Improvement**

**Example 10: Curve Widening**

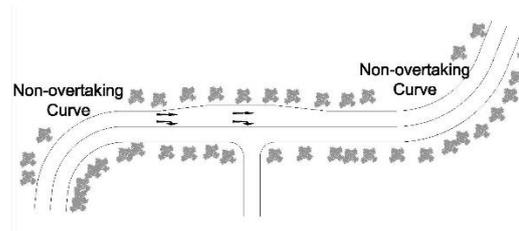
- 1.2 Layouts provided in this chapter are intended for guidance only and are not exhaustive.

### Example 1: Improvements to Overtaking Section

- 1.3 An existing rural road contains a ghost-island junction on an overtaking section. The ghost-island is causing an obstruction to overtaking manoeuvres. An assessment of traffic figures and collision history reveals that the right turning movements could be accommodated by a simple junction in place of the ghost-island junction.
- 1.4 The proposed Minor Improvement Scheme involves replacement of the existing ghost-island junction with a simple junction. The existing pavement width is utilised to provide nearside overtaking in accordance with TII Publication DN-GEO-03060.



**Figure 1/1 Example 1 Existing Alignment With Ghost Island**



**Figure 1/2 Example 1 Proposed Alignment With Nearside Overtaking Opportunity**

### Example 2: Improvements to Existing Cross Section

- 1.5 The existing rural road cross section does not comply with the requirements of TII Publications with a narrow carriageway and no hard strips present. The existing road boundaries consist of hedges directly adjacent to the carriageway and agricultural land borders both sides of the road.

- 1.6 The proposed Road Safety Improvement Scheme involves the widening of the carriageway to provide the minimum cross-section warranted by the measured AADT figures. The works involve the repositioning of the road boundary fencelines to allow the construction of the additional pavement works. Redesign and reconstruction of the road drainage is also required as part of the works. The fence is replaced with a passively safe fence as it is within the Clear Zone and the remainder of the Clear Zone contains no hazards.

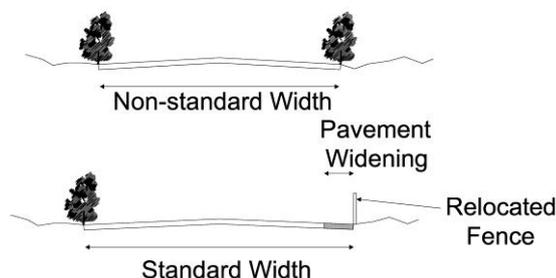


Figure 1/3 Example 2

### Example 3: Route Enhancement

- 1.7 The existing road consists of a series of sub-standard curves adjacent to sections of reasonably straight road alignment. The section of road is at a location where a number of collisions have occurred.
- 1.8 The proposed Road Safety Improvement Scheme involves the realignment of the road to remove the sub-standard alignment and replacement with an alignment consistent with the adjacent sections of road.

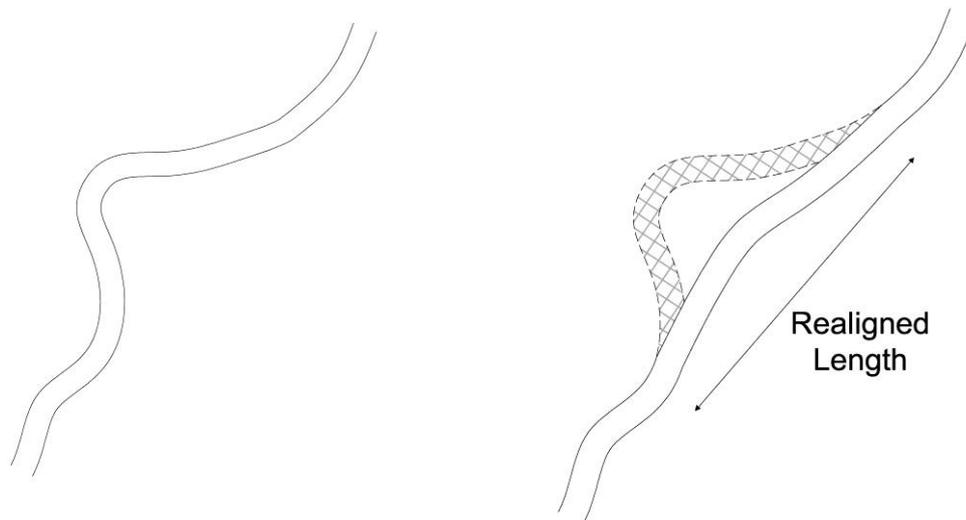


Figure 1/4 Example 3 Substandard Curve

Figure 1/5 Example 3 Realigned Road

### Example 4: Relocation of Junction

- 1.9 The existing road consists of a ghost island junction located on a straight section of road providing access to a number of properties. The straight section of alignment lies between two curves forming non-overtaking sections of alignment.
- 1.10 The proposed Road Safety Improvement Scheme involves the relocation of the junction towards one of the non-overtaking sections of the alignment, increasing the overtaking opportunity for road users on the straight section of road. Some clearance of obstructions between the road edge and the road boundary, including the inside of the bend, is required at the new junction location to ensure visibility requirements are maintained.

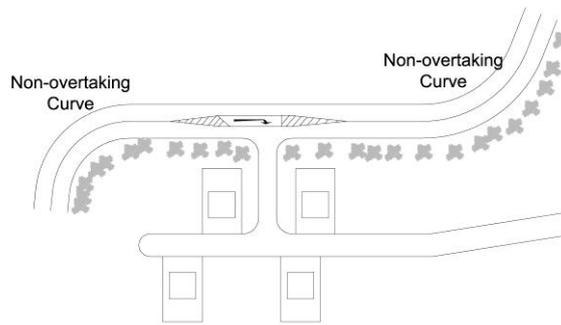


Figure 1/6 Example 4 Existing Junction

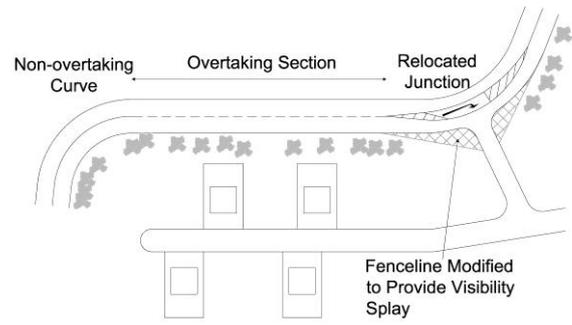


Figure 1/7 Example 4 Relocated Junction

**Example 5: Removal of Adverse Camber**

- 1.11 An existing alignment consists of back to back curves with adverse camber unsuited to the Design Speed of the road.
- 1.12 The proposed Road Safety Improvement Scheme involves the introduction of appropriate superelevation by means of overlay to the existing pavement. A number of existing accesses require modification to tie-in to the new road edge levels. The degree of superelevation applied may be dictated by the length of straight road between the two curves. A water film depth analysis to be carried out to avoid flat spots.

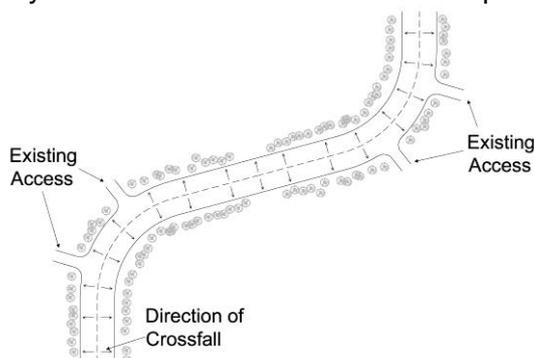


Figure 4/8 Example 5 Adverse Camber

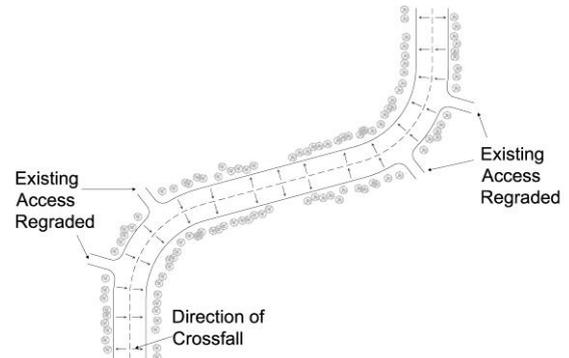


Figure 4/9 Example 5 Superelevation

**Example 6: Junction Improvements**

- 1.13 An existing simple junction is located on the inside of a bend with inadequate visibility splay and sub-standard forward visibility.
- 1.14 The proposed Road Safety Improvement Scheme involves the redesign of the junction to incorporate a ghost island right-turn lane. This requires pavement widening at the junction location. Additional signage is also required. The fenceline at the junction is modified and the verge is cleared to provide the required visibility splay for the calculated Design Speed.

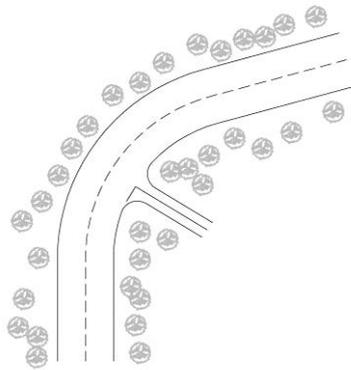


Figure 1/10 Example 6 Existing Junction

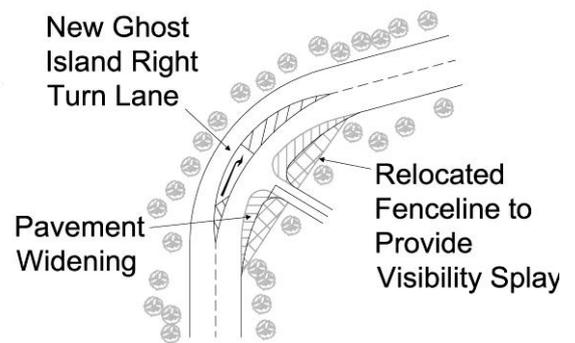


Figure 1/11 Example 6 Improved Junction

**Example 7: Junction Redesign**

- 1.15 The existing road layout consists of a junction between a main road and a minor road. The minor road junction with the main road is at an acute angle resulting in substandard visibility splay at the junction.
- 1.16 The proposed Road Safety Improvement Scheme involves the redesign of the junction to form a skew junction in accordance the requirements of TII Publication DN-GEO-03060. These works will involve the modification of existing fencelines at the junction location to ensure adequate visibility splays are provided.

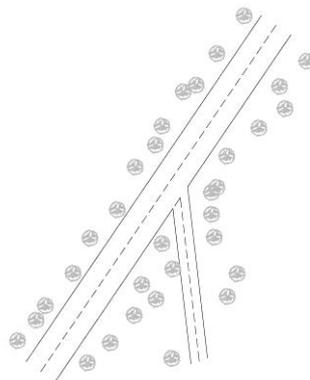


Figure 1/12 Example 7 Existing Junction

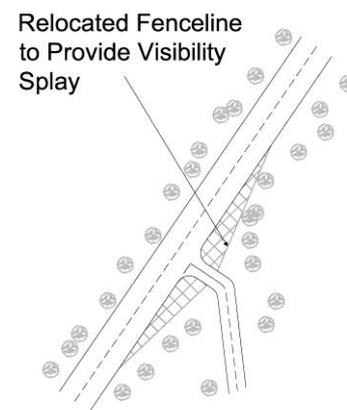


Figure 1/13 Example 7 Junction Redesign

**Example 8: Sign Relocation and Site Clearance**

- 1.17 The visibility splay for an existing road junction has been compromised by the growth of nearby trees which have also obscured road signs on the junction approaches.
- 1.18 The proposed Road Safety Improvement Scheme involves the removal of some trees and the relocation of a number of signs to provide the required visibility and advance warning.

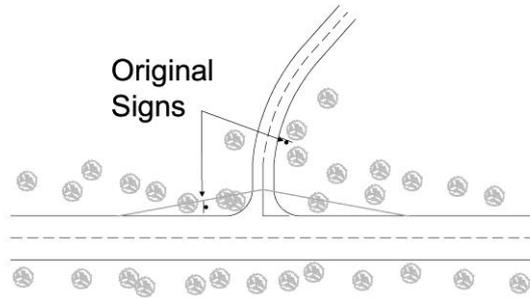


Figure 1/14 Example 8 Inadequate Visibility

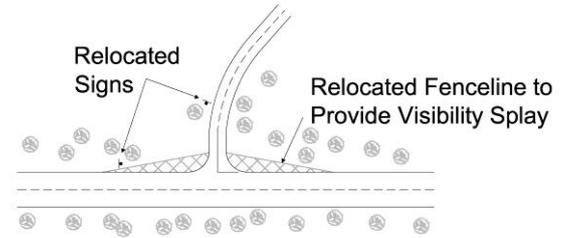
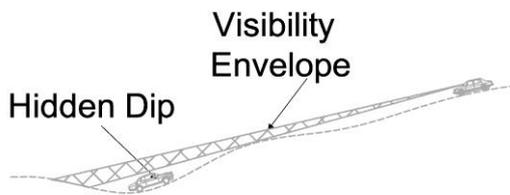


Figure 1/15 Example 8 Visibility Provided

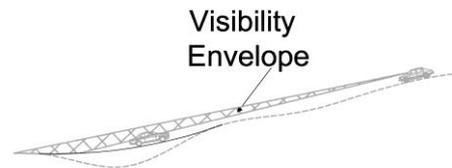
**Example 9: Vertical Alignment Improvement**

- 1.19 The vertical profile of an existing road contains a hidden dip which is caused by an existing sub-standard vertical alignment limiting visibility to oncoming traffic.
- 1.20 The proposed Road Safety Improvement Scheme involves the redesign of the vertical profile to remove the hidden dip.



Existing Vertical Alignment

Figure 1/16 Example 9 Hidden Dip



Realigned Vertical Alignment

Figure 1/17 Example 9 Vertical Reprofiled

**Example 10: Curve Widening**

- 1.21 The existing road contains substandard curves without curve widening and with inadequate road markings. The existing pavement width makes it difficult for HCVs to pass each other comfortably.
- 1.22 The proposed Road Safety Improvement Scheme involves the introduction of curve widening in accordance with TII publication DN- GEO-03031. This requires the acquisition of some private lands to accommodate the pavement widening. Appropriate road markings are also provided.

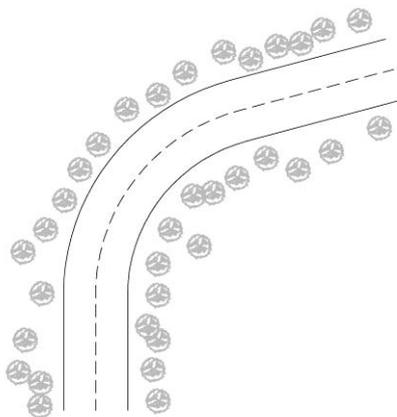


Figure 1/18 Example 10 Existing Curve

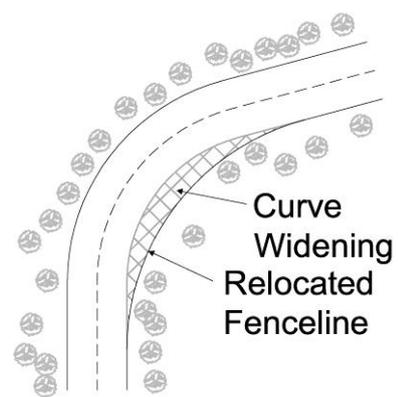


Figure 1/19 Example 10 Curve Widened





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