



safer roads for everyone

## M4 Junction 28 Improvement Works, Newport, South Wales

### Road Safety Audit Stage 1

on behalf of ARUP

**TMS reference no: 12370A**

# M4 Junction 28 Improvement Works, Newport, South Wales

## Road Safety Audit Stage 1

### 1. Introduction

- 1.1 This report describes a Stage 1 Road Safety Audit carried out on proposed improvement works at the M4 Junction 28, Newport, South Wales, on behalf of Arup. The audit was carried out between 7<sup>th</sup> and 11<sup>th</sup> September 2015 in the offices of TMS Consultancy.
- 1.2 The audit team members (approved by the Welsh Government) were as follows:
  - ██████████ MSc, BSc (Hons), MCIHT, MSoRSA  
HA Approved Certificate of Competency  
Senior Engineer, TMS Consultancy
  - ██████████ LLB (Hons), LLM, MIHE, MCIHT, MSoRSA  
HA Approved Certificate of Competency  
Senior Road Safety Consultant, TMS Consultancy
- 1.3 The audit comprised an examination of the documents listed in **Appendix A**. The Road Safety Audit was undertaken in accordance with the Brief provided by Arup. The site was visited by the Audit Team on 7<sup>th</sup> September 2015 at 2pm. The weather was fine and dry. Traffic flows were light to moderate. Pedestrian and cycle flows were light.
- 1.4 The terms of reference of the audit are as described in HD 19/15. The team has examined and reported only on the road safety implications of the scheme as presented and has not examined or verified the compliance of the design to any other criteria.
- 1.5 All of the problems described in this report are considered by the audit team to require action in order to improve the safety of the scheme and minimise accident occurrence. The locations of specific problems are referenced on the plan in **Appendix B**.

1.6 The scheme consists of proposed improvement works at the M4 Junction 28, Newport, South Wales. Improvements will be carried out on following three junctions:

- M4 Junction 28 – extension of circulatory carriageway, provision of additional lanes and segregating islands and a through link for the M4 to/from Newport;
- Bassaleg Roundabout – increasing the size of the circulatory carriageway, some geometry improvements and partial full time signalisation;
- Pont Ebbw Roundabout – adjustments to the circulatory carriageway to balance and manage flows and introduction of links for the A48 east and westbound. The roundabout and all approaches will be signalised.

## 2. Items resulting from this Stage 1 Audit

### M4 Junction 28 Improvements

#### 2.1 PROBLEM

General – 3-lane approaches to traffic signals

Summary: Potential failure to stop and shunt-type vehicle collisions

Where approaches to the traffic signal stop lines is to be increased to three lanes around the M4 Junction 28, large vehicles in the outer lanes may mask the traffic signal heads to drivers of smaller vehicles in the middle lane(s). Failure to see the traffic signal heads may result in failure to stop, late braking or shunt-type vehicle collisions.

#### RECOMMENDATION

Duplicate high mounted primary traffic signal heads should be provided where there are three approach lanes.

#### 2.2 PROBLEM

General – traffic signal junctions

Summary: Potential late braking, shunt and overshoot-type vehicle collisions

Due to the close proximity of numerous sets of traffic signals, particularly on the north side of the junction, there is a potential for ‘see-through’ whereby a driver on the approach to a set of traffic signals may see and react to another set of signals ahead. This may result in late braking, shunt and overshoot-type vehicle collisions (and also potential vehicle to pedestrian collisions where a crossing is present).

#### RECOMMENDATION

At detailed design stage it should be ensured that any likely see-through is mitigated against by the provision of cowls or louvres.

## 2.3 PROBLEM

General – pedestrian crossings at traffic signals

Summary: Potential vehicle to pedestrian collisions

At some of the controlled pedestrian crossings around the junction, the distance between the stop lines and pedestrian crossing studs is only 2m. Given the high speed approaches around the junction vehicles braking late may overshoot the stop line with the potential for collisions with pedestrians on the crossings.

### RECOMMENDATION

A gap of 3m should be provided between the stop lines and pedestrian studs at controlled pedestrian crossings.

## 2.4 PROBLEM

General – approach to splitter islands

Summary: Potential hazard to vehicles

Although indicative at this stage, there are a number of splitter islands around the junction where the hatching markings are shown to be directed straight into the nosing of the islands. During darkness or adverse weather, drivers may be guided in the islands resulting in loss of control type vehicle collisions.

### RECOMMENDATION

At detailed design stage, it should be ensured that white lining on the approach to splitter islands pass to the side of the nosings rather than directly into them.

## 2.5 PROBLEM

General – pedestrian routes

Summary: Potential vehicle to pedestrian collisions

Some of the pedestrian routes, particularly on the southern section of the junction, are adjacent to high speed roads. Pedestrians may be vulnerable to high speed passing traffic.

### RECOMMENDATION

A risk assessment should be carried out to determine the requirements for vehicle restraint systems.

## 2.6 PROBLEM

General – traffic signals and signs

Summary: Potential late braking, shunt, sideswipe and overshoot-type vehicle collisions

There is a significant amount of vegetation around the existing junction. Poor forward visibility to traffic signal heads and signs due to being obscured by foliage may result in late braking, shunt, side-swipe and overshoot-type vehicle collisions (and also potential vehicle to pedestrian collisions where a crossing is present).

### RECOMMENDATION

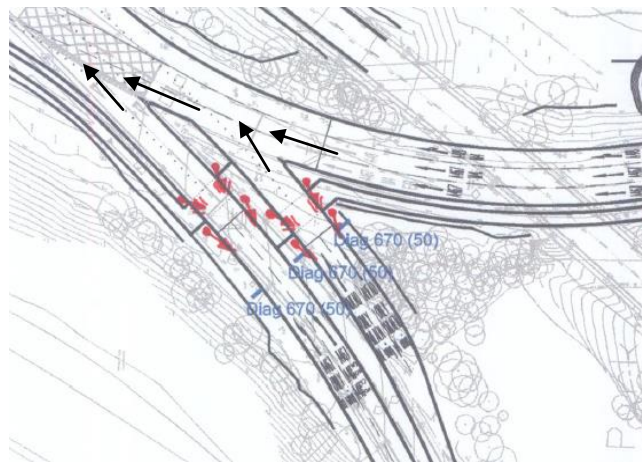
It should be ensured that adequate forward visibility is provided to traffic signal heads and signs throughout the junction which may require the cutting back or removal of vegetation.

## 2.7 PROBLEM

Location – M4 westbound diverge slip road and circulatory carriageway

Summary: Potential vehicle collisions

The M4 eastbound exit slip on the north east approach to the circulatory carriageway is shown to have traffic signals but it is not clear if these are purely for the controlled pedestrian crossings or the signals are integrated into the circulatory carriageway phasing and staging.



## RECOMMENDATION

It should be clarified at detailed design stage if the approach is to be integrated into the junction signalisation.

*Give way markings to cater for the eventuality of the signals failing.*

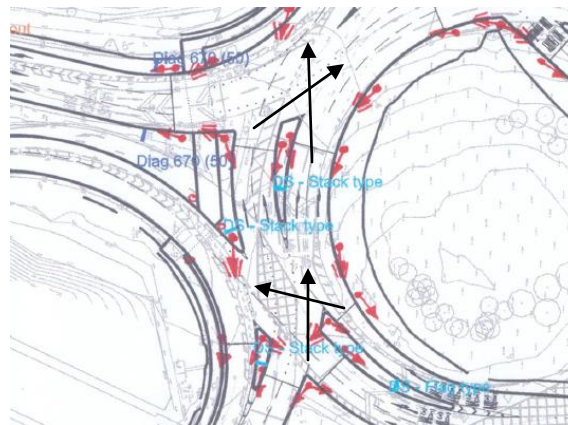
*In addition, although the drawing shows an adjacent stop line on the circulatory carriageway, no traffic signals are shown. This should be added at detailed design stage.*

## 2.8 PROBLEM

Location – Circulatory carriageway; northern quadrant

Summary: Potential side-swipe vehicle collisions

Within the northern quadrant of the circulatory carriageway, there is a potential for drivers to get into the incorrect lane in advance of the splitter islands on approach to the traffic signals. In the event that drivers do get into the wrong lane, they may attempt to correct themselves after passing the stop line, which may result in side-swipe vehicle collisions following crossing or converging manoeuvres (as indicated in the graphic below).



## RECOMMENDATION

Appropriate traffic routes should be clarified by road markings and the alignment of splitter islands.



## 2.9 PROBLEM

Location – Circulatory carriageway; southern quadrant (attenuation basin)

Summary: Potential hazard to occupants of errant vehicles

There is an attenuation basin shown within the centre of the circulatory carriageway at the southern end. In the event that an errant vehicle leaves the carriageway on the inside of the circulatory carriageway and descends to the attenuation pond, the occupants of the vehicle may risk serious injury or even drowning.

### RECOMMENDATION

At detailed design stage the attenuation basin should be risk assessed and a suitable vehicle restraint system provided as necessary.

## 2.10 PROBLEM

Location – Northwest arm

Summary: Potential vehicle to pedestrian collisions

No pedestrian crossing facilities are shown to be provided across the northern arm of the junction, despite there being footways on both sides of the road. If there is likely to be a pedestrian demand to cross here, vehicle to pedestrian collisions may result, given the likely high speed of vehicles.

### RECOMMENDATION

The need for a pedestrian crossing facility (preferably controlled) should be assessed and provided if necessary.

## 2.11 PROBLEM

General – Markings and signage

Summary: Potential lane changing and side-swipe type vehicle collisions

At a junction where there are multiple circulatory carriageway lanes and approach lanes to traffic signals, signage and road markings are critical to inform drivers which lane is correct for their intended exits and destinations. A lack of good and concise information may result in potential lane changing and side-swipe type vehicle collisions.

### RECOMMENDATION

At detailed design stage, a signage schedule should be provided for the M4 Junction 28. Signs should be clear and concise and consistent with the carriageway lanes provided. Gantry signage may be required for the wide multi-lane sections of the circulatory carriageway. It may also be prudent to provide carriageway lane destination markings. New signage should be provided on passively safe posts unless otherwise protected.

## **Bassaleg Roundabout Improvements**

### **2.12 PROBLEM**

Location – 3-lane approaches to traffic signals

Summary: Potential failure to stop and shunt-type vehicle collisions

Where approaches to the traffic signal stop lines is to be increased to three lanes around the Bassaleg roundabout, large vehicles in the outer lanes may mask the traffic signal heads to drivers of smaller vehicles in the middle lane(s). Failure to see the traffic signal heads may result in failure to stop, late braking or shunt-type vehicle collisions.

#### **RECOMMENDATION**

Duplicate high-mounted primary traffic signal heads should be provided where there are three approach lanes.

### **2.13 PROBLEM**

Location – Court Crescent entry onto circulatory carriageway

Summary: Potential side-swipe and circulatory carriageway vehicle collisions

There is a single lane entry onto the circulatory carriageway from Court Crescent which will operate under a give way control. Drivers wishing to enter the inside lane of the roundabout to make a right turn manoeuvre to A467 Forge Road (S) will have to cross four lanes of traffic. Given that the flows around the circulatory and will be heavy, this may be a difficult and hazardous manoeuvre for drivers. Potential sideswipe and circulatory carriageway vehicle collisions may result.

#### **RECOMMENDATION**

It should be ensured that adequate inter-green time is provided to give sufficient gaps for drivers to enter the circulatory carriageway from Court Crescent.

## 2.14 PROBLEM

Location – Circulatory carriageway; (attenuation basin)

Summary: Potential hazard to occupants of errant vehicles

There is an attenuation basin shown within the centre of the circulatory carriageway. In the event that an errant vehicle leaves the carriageway on the inside of the circulatory carriageway and descends to the attenuation pond, the occupants of the vehicle may risk serious injury or even drowning.

### RECOMMENDATION

At detailed design stage the attenuation basin should be risk assessed and a suitable vehicle restraint system provided as necessary.

## 2.15 PROBLEM

General – controlled pedestrian crossings on A467 Forge Road (S)

Summary: Potential vehicle to pedestrian collisions

At the controlled pedestrian crossings on the A467 Forge Road southern arm, the distance between the stop lines and pedestrian crossing studs is only 2m. Given the high speed approaches around the junction vehicles braking late may overshoot the stop line with the potential for collisions with pedestrians on the crossings.

### RECOMMENDATION

A gap of 3m should be provided between the stop lines and pedestrian studs at controlled pedestrian crossings.

## **Pont Ebbw Roundabout Improvements**

### **2.16 PROBLEM**

General – traffic signal heads on circulatory carriageway

Summary: Potential late braking, shunt and overshoot-type vehicle collisions

Forward visibility to traffic signal heads around the circulatory carriageway may be restricted by vegetation within the central island. Poor forward visibility to traffic signal heads and signs due to being obscured by foliage may result in late braking, shunt, side-swipe and overshoot type vehicle collisions (and also potential vehicle to pedestrian collisions where a crossing is present).

#### **RECOMMENDATION**

It should be ensured that adequate forward visibility is provided to traffic signal heads and signs throughout the junction which may require the cutting back or removal of vegetation.

### **2.17 PROBLEM**

Location – A48 Southern Distributer Road (western arm)

Summary: Potential hazard to pedestrians

There is a significant distance on the stagger between the pedestrian crossing across the east and westbound running lanes on the A48 Southern Distributer Road (W). Visually impaired pedestrians may have difficulty in locating the displaced crossing.

#### **RECOMMENDATION**

Either the length of the stagger should be reduced or additional wayfinding measures provided for visually impaired pedestrians to help locate the displaced crossings.

## 2.18 PROBLEM

Location – Access onto Pont Ebbw roundabout from south western arm

Summary: Potential vehicle

There is an existing separate bus layby and gate within the south western arm of the roundabout that is separated from the general traffic lanes on approach to the roundabout. The new road layout will mean that the bus stop will now be within the left turn lane for traffic to A48 Southern Distributer Road (W). Buses stationary at the bus stop will block driver visibility of the traffic signal heads during periods when the signals are operational. This may result in late braking, shunt and overshoot type vehicle collisions.

It will also result in drivers wishing to make the left turn manoeuvres having to do so via the straight-ahead lane which enters the main circulatory carriageway. Unexpected deviations may result in vehicle collisions within the south western arm or within the circulatory carriageway.

### RECOMMENDATION

The bus stop should be appropriately relocated.

### 3. Audit Team Statement

We certify that the terms of reference of the audit are as described in HD 19/15.

#### Audit Team Leader

██████████ MSc, BSc (Hons), MCIHT, MSoRSA  
HA Approved Certificate of Competency  
Senior Engineer, TMS Consultancy

Signed ██████████ .....

Date .....14<sup>th</sup> September 2015.....

#### Audit Team Member

██████████ - LLB (Hons), LLM, MIHE, MCIHT, MSoRSA  
HA Approved Certificate of Competency  
Senior Road Safety Consultant, TMS Consultancy

Signed ██████████ .....

Date .....14<sup>th</sup> September 2015.....

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## Appendix A

### Documents Examined:

#### M4 Junction 28

- Drawing No. M4J28-ARP-HGN-J28-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-ELS-J28-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HDR-J28-DR-CD-000001 Rev P01.1
- Drawing No. M4J28-ARP-HGN-J28-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HSN-J28-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HML-J28-DR-CH-000001 P01.1
- Drawing No. M4J28-ARP-HML-J28-DR-CH-000002 P01.1
- Drawing No. M4J28-ARP-HML-J28-DR-CH-000003 P01.1
- Drawing No. M4J28-ARP-HSR-J28-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HSR-J28-DR-CH-000002 Rev P01.1
- Drawing No. M4J28-ARP-HSR-J28-DR-CH-000003 Rev P01.1
- Drawing No. M4J28-ARP-HSR-J28-DR-CH-000004 Rev P01.1
- Drawing No. M4J28-ARP-HSR-J28-DR-CH-000005 Rev P01.1

#### Bassaleg Roundabout

- Drawing No. M4J28-ARP-HGN-BSG-DR-CH-000001 Rev P01.3
- Drawing No. M4J28-ARP-HDR-BSG-DR-CD-000001 Rev P01.1
- Drawing No. M4J28-ARP-HGN-BSG-DR-CH-000001 Rev P01.3
- Drawing No. M4J28-ARP-HSN-BSG-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HML-BSG-DR-CH-000001 P01.1
- Drawing No. M4J28-ARP-HML-BSG-DR-CH-000002 P01.1
- Drawing No. M4J28-ARP-HML-BSG-DR-CH-000003 P01.1
- Drawing No. M4J28-ARP-HSR-BSG-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HSR-BSG-DR-CH-000002 Rev P01.1
- Drawing No. M4J28-ARP-HSR-BSG-DR-CH-000003 Rev P01.1



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## Pont Ebbw Roundabout

- Drawing No. M4J28-ARP-HGN-EBW-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-ELS-EBW-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HDR-EBW-DR-CD-000001 Rev P01.1
- Drawing No. M4J28-ARP-HGN-EBW-DR-CD-000001 Rev P01.1
- Drawing No. M4J28-ARP-HSN-EBW-DR-CD-000001 Rev P01.1
- Drawing No. M4J28-ARP-HML-EBW-DR-CH-000001 P01.1
- Drawing No. M4J28-ARP-HML-EBW-DR-CH-000002 P01.1
- Drawing No. M4J28-ARP-HML-EBW-DR-CH-000003 P01.1
- Drawing No. M4J28-ARP-HSR-EBW-DR-CH-000001 Rev P01.1
- Drawing No. M4J28-ARP-HSR-EBW-DR-CH-000002 Rev P01.1
- Drawing No. M4J28-ARP-HSR-EBW-DR-CH-000003 Rev P01.1
- Drawing No. M4J28-ARP-HSR-EBW-DR-CH-000004 Rev P01.1
- Drawing No. M4J28-ARP-HSR-EBW-DR-CH-000005 Rev P01.1
- Drawing No. M4J28-ARP-HSR-EBW-DR-CH-000006 Rev P01.1

## **Other Information Provided:**

- Road Safety Audit Brief
- NMU Context Report
- Design Options Report

## Appendix B

Please refer to the following page for a plan illustrating the locations of the problems identified as part of this audit (location numbers refer to paragraph numbers in the report).

The location of the scheme is shown below:

