Llywodraeth Cymru / Welsh Government

M4 Junction 28 Improvements

Road Safety Audit Stage 2 - Designer's Response

M4J28-ARP-HAC-SWG-RP-CH-000003

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1 Introduction

This Road Safety Audit Response Report relates to the Stage 2 Road Safety Audit Report for the M4 Junction 28 Improvements Scheme. The Stage 2 Road Safety Audit Brief comprised a set of detailed design drawings assembled by the Design Team for the scheme, and sent by Simon Westwood to the Road Safety Audit Team for examination. The Road Safety Audit Report was prepared and issued by the Road Safety Audit Team Leader, Darren Newbold of TMS Consultancy.

The proposed scheme comprises the improvement of three existing junctions to the West of Newport, specifically Junction 28 of the M4, Bassaleg Roundabout and the Pont Ebbw Roundabout.

At Junction 28, the proposed scheme would replace the existing roundabout and A48 approach from Castleton, with an enlarged gyratory, and incorporate a link to allow eastbound traffic from the M4 and A48 to link directly to the A48 Cardiff Road eastbound. The finished junction would benefit from full-time signalisation.

At Bassaleg, the existing roundabout would be enlarged to the south and west, and full time signals introduced. The Court Crescent and Park View arms would operate as priority, without signals. A signalised crossing of the A467 Forge Road arms to the south of the roundabout would provide a crossing facility for NMUs.

At Pont Ebbw, the existing roundabout gyratory would be modified, and two through links added, one for the eastbound A48 and one for the westbound A48. The roundabout would benefit from full-time signalisation.

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

2 Key Personnel

2.1 Welsh Government (Project Sponsor)

Project Engineer/Director, Welsh Government

2.2 WSP: Parsons Brinckerhoff (Employer's Agent) and TACP (Environmental Advisor)

Project Engineer, WSP|Parsons Brinckerhoff
Project Manager, WSP|Parsons Brinckerhoff
Environmental Advisor, TACP

2.3 TMS Consultancy (Road Safety Audit Team)

Road Safety Audit Team Leader, TMS Consultancy
Road Safety Audit Team Member, TMS Consultancy

2.4 Costain (ECI Contractor) and Arup (Design Organisation)

Project Director, Costain
Project Manager, Costain
Project Director, Arup
Project Manager, Arup
Design Team Leader, Arup

3 Items Raised at the Stage 2 Road Safety Audit

3.1 Problem 2.1

Locations	Location - M4 Junction 28
Summary	Potential hazard to errant vehicles. There are a number of locations around the M4 Junction 28 where P1 terminal ends are shown to be provided facing oncoming traffic. The ramped ends of the P1 terminals may present a launch hazard to errant vehicles.
Recommendation	P4 terminal ends should be provided.
Design Team Response	The designer disagrees with the recommendation to provide P4 terminals at the sites indicated. The proposed speed limit in this area is 40mph. TD 19/06 indicates that P1 terminals are the minimum standard of provision for this speed. We consider that the provision of P4 terminals may give the appearance of a higher speed limit, and encourage inappropriate vehicle speeds as a result. The designer proposes that the proposed P1 terminals are retained. An Exception would be required if this Designer's Response is agreed.

3.2 Problem 2.2

Locations	M4 Junction 28; Attenuation Ponds
Summary	Potential hazard and risk of drowning to occupants of errant vehicles. There does not appear to be any vehicle restraint system (VRS) at the attenuation ponds at M4 Junction 28. In the event that an errant vehicle leaves the carriageway, the vehicle may overturn as it descends the embankment before entering the pond. Serious injury or drowning may result to the occupants of the vehicle.
Recommendation	The attenuation ponds should be risk assessed to ascertain the need for a vehicle restraint system.

Design Team Response	Agree. The designer has undertaken a risk assessment in accordance with TD 19/06. The ponds on Junction 28 have been considered for the risk of drowning. The northernmost pond would have a maximum depth of water of 0.71m in the critical design storm. The southern pond would have a maximum depth of water of 0.67m in the critical design storm. Given that the water depths are less than a metre, the risk of vehicle occupants drowning is considered to be extremely low. Furthermore the side-slopes of the ponds are graded with a gradient no steeper than 1:5, which would not necessitate the provision of a vehicle restraint system, as the risk of overturning a vehicle on a slope with this gradient is lower than for steeper slopes. The findings of the risk assessment are that vehicle restraints systems are not required for either pond location. The design is therefore compliant with the auditor's recommendation, no further action is required and an Exception is not required.

3.3 Problem 2.3

Locations	M4 Junction 28 EB on/WB off slips
Summary	Potential hazard to visually impaired pedestrians. On the footways on both sides of the controlled pedestrian crossing across the M4 J28 E/B on and W/B off slip, the tactile paving has been configured incorrectly. The lack of a stem in the tactile paving may result in visually impaired pedestrians either not recognising the presence of a controlled crossing and / or not being able to locate the push button unit and rotating cone. Vehicle to pedestrian collisions may occur if pedestrians enter the carriageway inappropriately.
Recommendation	The tactile paving should be configured in an "L" shape.
Design Team Response	Agree. The tactile paving will be modified to provide the requisite 'L' shape in accordance with the relevant guidance.

3.4 Problem 2.4

Locations	M4 Junction 28; pedestrian crossings
Summary	Potential trip/slip hazard

There are a couple of locations throughout the junction where drainage gullies appear to conflict with the tactile paving / dropped kerbs at pedestrian crossing points. Gullies within the crossing path of pedestrians may present a trip / slip hazard. The Locations identified are as follows:

- On the south side of the A48 (N) on the through road from A48 South;
- On the south side of the M4 E/B off slip at signal junction with M4 J28.

Recommendation The gullies should be relocated away from the dropped kerbs/tactile paving.

Design Team Response Agree, the gullies will be re-located on the uphill side of dropped kerbs. If this should result in larger than desirable spacing, a second gully will be introduced on the downhill side of dropped kerbs.

3.5 Problem 2.5

Locations M4 Junction 28

Summary Potential late lane change and sideswipe type vehicle collisions.

The M4 Junction 28 layout is to change significantly. Although, a comprehensive signage design has been provided there appears to be a lack of carriageway text destinations markings, which may lead to drivers entering into the incorrect lane for their intended destinations. Potential late lane changing and sideswipe type vehicle collisions may result.

Recommendation On carriageway text destinations markings should be provided throughout to compliment the scheme signage.

Design Team Response Agree. On carriageway destination text to be provided indicating route numbers in a fashion which complements the traffic signs.

3.6 Problem 2.6

Locations Advanced Direction Signs

Summary Potential hazard to occupants of errant vehicles

Although covered by a 40mph speed limit, vehicle speeds are likely to be in excess of the posted limit. There are a number of large advanced direction signs (ADS) around the M4 Junction 28 that are not passively safe or protected by a vehicle restraint

system (VRS). In the event that an errant vehicle travelling at speed leaves the carriageway, and strikes the ADS structure, serious injury may result to the vehicles occupants. The ADS identified that are neither passively safe nor protected are as follows:

- J28-M-ADS-05 and 05a
- J28-M-ADS-06
- J28-M-ADS-08
- J28-M-ADS-14
- J28-M-ADS-15
- J28M-ADS-16
- J28M-ADS-19
- J28M-ADS-25

Recommendation

The ADS signs should be risk assessed to determine whether the signs should be either passively safe or protected by VRS.

Design Team Response

Agreed. The designer has undertaken a risk assessment in accordance with TD 19/06 including for each of the signs listed. The signs identify as requiring safety barriers for a speed limit of 50mph. Taking account of the lower posted speed limit of 40mph, and the consequence factors, the risk is not considered significant enough to warrant specific provision of safety barriers. Furthermore the provision of barriers may encourage higher vehicle speeds by visually reinforcing the appearance of a high speed road. The design is therefore compliant with the auditor's recommendation, no further action is required and an Exception is not required.

3.7 Problem 2.7

Locations

Street Lighting

Summary

Potential hazard to occupants of errant vehicles.

The drawing does not identify if the lighting columns around the M4 Junction 28 are passively safe. Although covered by a 40mph speed limit, vehicle speeds are likely to be in excess of the posted limit. In the event that an errant vehicle travelling at speed leaves

	the carriageway, and strikes a lighting column, serious injury may result to the vehicles occupants. In addition, there is a lighting column on the west side of the junction (see diagram below) that appears to be located right on the edge of the carriageway. This column may be particularly vulnerable to vehicle strikes.
Recommendation	Lighting columns if not protected by vehicle restraint systems should be passively safe. The lighting column identified above should be relocated away from the carriageway edge.
Design Team Response	The designer agrees with the recommendation to move a column back from the edge of carriageway. The designer disagrees with the general recommendation for passively safe lighting columns on Junction 28. Newport City Council have stated an express desire for street lighting columns to not be passively safe. This would require significant lengths of additional safety barrier. The cost of provision of safety barriers would therefore be significant, with a significant associated maintenance overhead. The lighting columns have been setback at a distance where a risk assessment undertaken in accordance with TD 19/06 indicates that a barrier is not required to protect the lighting columns at 50mph. An Exception would be required if this Designer's Response is agreed.

3.8 Problem 2.8

Locations	Approach to splitter islands
Summary	Potential hazard to vehicles Due to the small scale nature of the drawings, it is difficult to determine at the splitter islands around the junction if 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	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.

Design Team Response	Agreed. White lining will be aligned with traffic islands in accordance with the provisions of Traffic Signs Manual, providing an offset of 150-300mm to guide vehicles past the islands. This will be shown clearly on construction issue drawings showing the setting out of road markings.

3.9 Problem 2.9

Locations	A467 Forge Road (S)
Summary	Potential hazard to errant vehicles. A P1 terminal ends is shown to be provided facing oncoming traffic on the A467 (S) on exit from the Bassaleg Roundabout. The ramped end of the P1 terminals may present a launch hazard to errant vehicles.
Recommendation	A P4 terminal should be provided.
Design Team Response	The designer disagrees with the recommendation to provide P4 terminals at the sites indicated. The proposed speed limit in this area is 30mph. TD 19/06 indicates that P1 terminals are the minimum standard of provision for this speed. We consider that the provision of P4 terminals may give the appearance of a higher speed limit, and encourage inappropriate vehicle speeds as a result. The designer proposes that the proposed P1 terminals are retained. An Exception would be required if this Designer's Response is agreed.

3.10 Problem 2.10

Locations	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.
Design Team Response	Agree. The pond Bassaleg has been considered for the risk of drowning. The pond would have a maximum depth of water of 0.35m in the critical design storm. Given that the water depth is less than a metre, the risk of vehicle occupants drowning is considered to be extremely low. Furthermore the side-slopes of the ponds are graded with a gradient no steeper than 1:5, which would not necessitate the provision of a vehicle restraint system, as the risk of overturning a vehicle on a slope with this gradient is lower than for steeper slopes. The findings of a risk assessment undertaken in accordance with TD 19/06 are that vehicle restraints systems are not required for this pond location. The design is therefore compliant with the auditor's recommendation, no further action is required and an Exception is not required.

3.11 Problem 2.11

Locations	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.
Design Team Response	Agreed. The design will include for an increased intergreen, above that required for the signal layout, based on time of day.

3.12 Problem 2.12

Locations	A467 Forge Road (S)
Summary	Potential hazard to errant vehicles. On the west side of A467 Forge Road there is an embankment slope on the nearside created to enable the widening works. In the event that an errant vehicle leaves the carriageway on the nearside, the vehicle may be at risk of overturning down the embankment slope. Serious injury may result to the vehicles occupants.
Recommendation	The embankment should be risk assessed to ascertain the need for a vehicle restraint system.
Design Team Response	Agree. The embankment has been risk assessed in accordance with TD 19/06 to determine the need for a vehicle restraint system, the results of this risk assessment for this section of road (with a 50 mph speed limit) found the provision of a Road Restraint System to not be necessary for the hazard identified by the road safety auditor. The design is therefore compliant with the auditor's recommendation, no further action is required and an Exception is not required.

3.13 Problem 2.13

Locations	A467 Forge Road (S)
Summary	Potential hazard to errant vehicles. The chevron boards (J28-BAS-WRS-09) located on the central island of the Bassleg Roundabout appears to overhang the grasscrete maintenance paving across the island. The sign may be a hazard and obstruction to maintenance workers using the footpath.
Recommendation	Either the chevron sign should be relocated or the grasscrete maintenance paving should be diverted to avoid conflict with the sign.
Design Team Response	Agree. The sign and maintenance track to be realigned to avoid the obstruction of the maintenance track by the sign face.

3.14 Problem 2.14

Locations	Bassaleg Roundabout
Summary	Potential late lane changing and sideswipe type vehicle collisions. The Bassaleg Roundabout is to be enlarged considerably. Although, a comprehensive signage design has been provided there appears to be a lack of carriageway text destinations markings, which may lead to drivers entering into the incorrect lane for their intended destinations. Potential late lane changing and sideswipe type vehicle collisions may result.
Recommendation	On carriageway text destinations markings should be provided throughout to compliment the scheme signage.
Design Team Response	Agree. Carriageway text for principal routes to be included within the design to complement the signing.

3.15 Problem 2.15

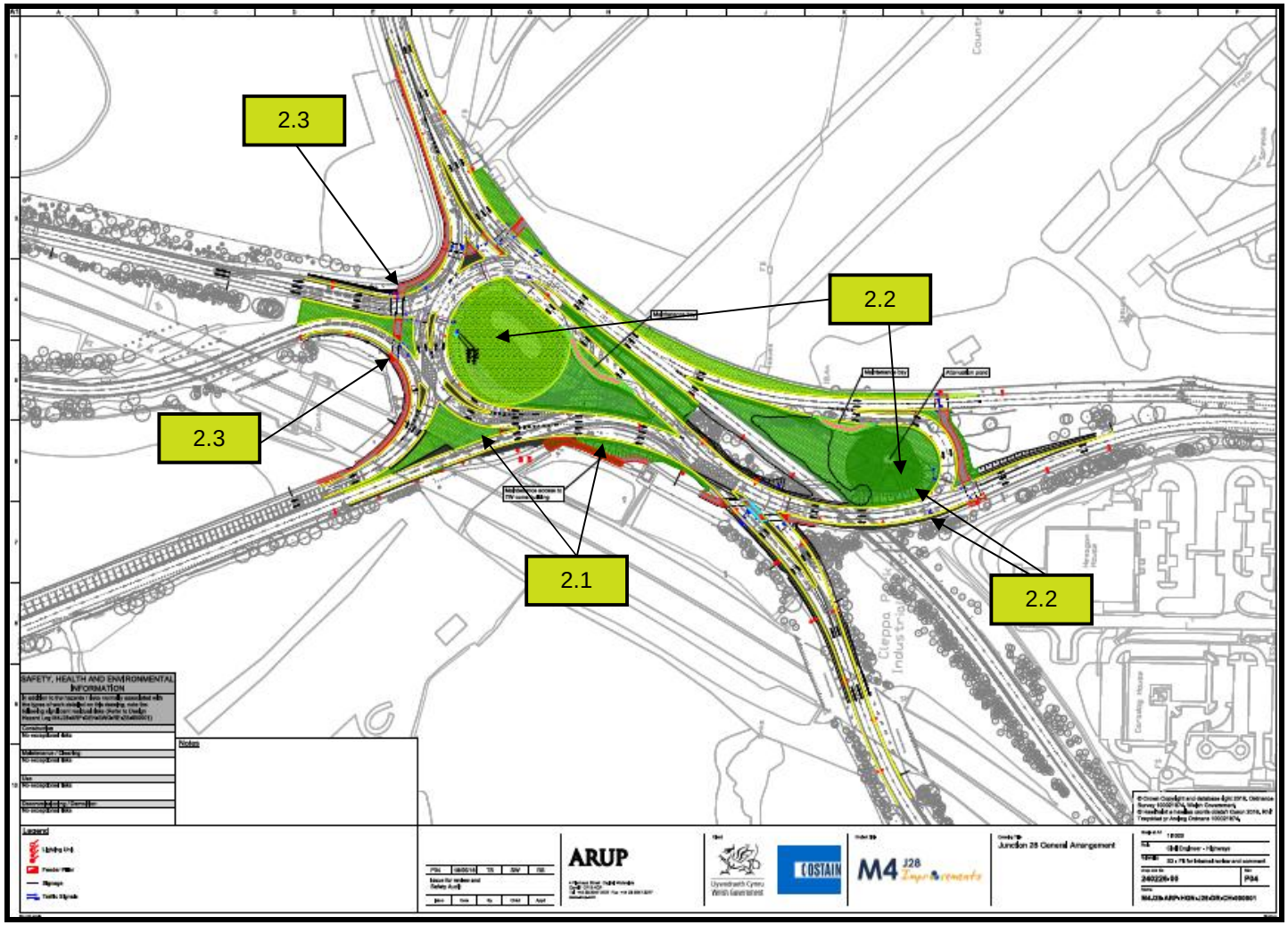
Locations	A48 Southern Distributor Road (western arm)
Summary	Potential hazard to pedestrians. There is a significant distance on the stagger between the pedestrian crossing across the east and westbound running lanes on the A48 Southern Distributer Road (W). Visually impaired pedestrians may have difficulty 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.
Design Team Response	Agree. Wayfinding measures, such as guardrailing, kerbs or guidance paving for visually impaired pedestrians to be evaluated in conjunction with the local accessibility group, and most appropriate measure(s) included within the design.

3.16 Problem 2.16

Locations	General, illuminated bollards.
Summary	Potential hazard to vehicles. On Drawing No. M4J28-ARP-HSN-EBW-DR-CH-000001, illuminated bollards (Nos. 08 and 13) are shown to be in the carriageway. Although assumed to be a drafting error, items of street furniture within the carriageway may be a hazard to vehicles. In addition, bollard no.10 is detailed to have a keep left face. However, vehicles can pass to either side of the bollard (ahead from south to north) and circulating the roundabout.
Recommendation	Bollards Nos. 8 and 13 should be removed from the carriageway. Bollard No. 10 should feature a plain faced aspect.
Design Team Response	Agree. Bollards 8 and 13 to be removed from the carriageway, and bollard 10 to feature a plain faced aspect.

Appendix A

Road Safety Audit Plans


2.3
2.2
2.3
2.1
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SAFETY, HEALTH AND ENVIRONMENTAL INFORMATION
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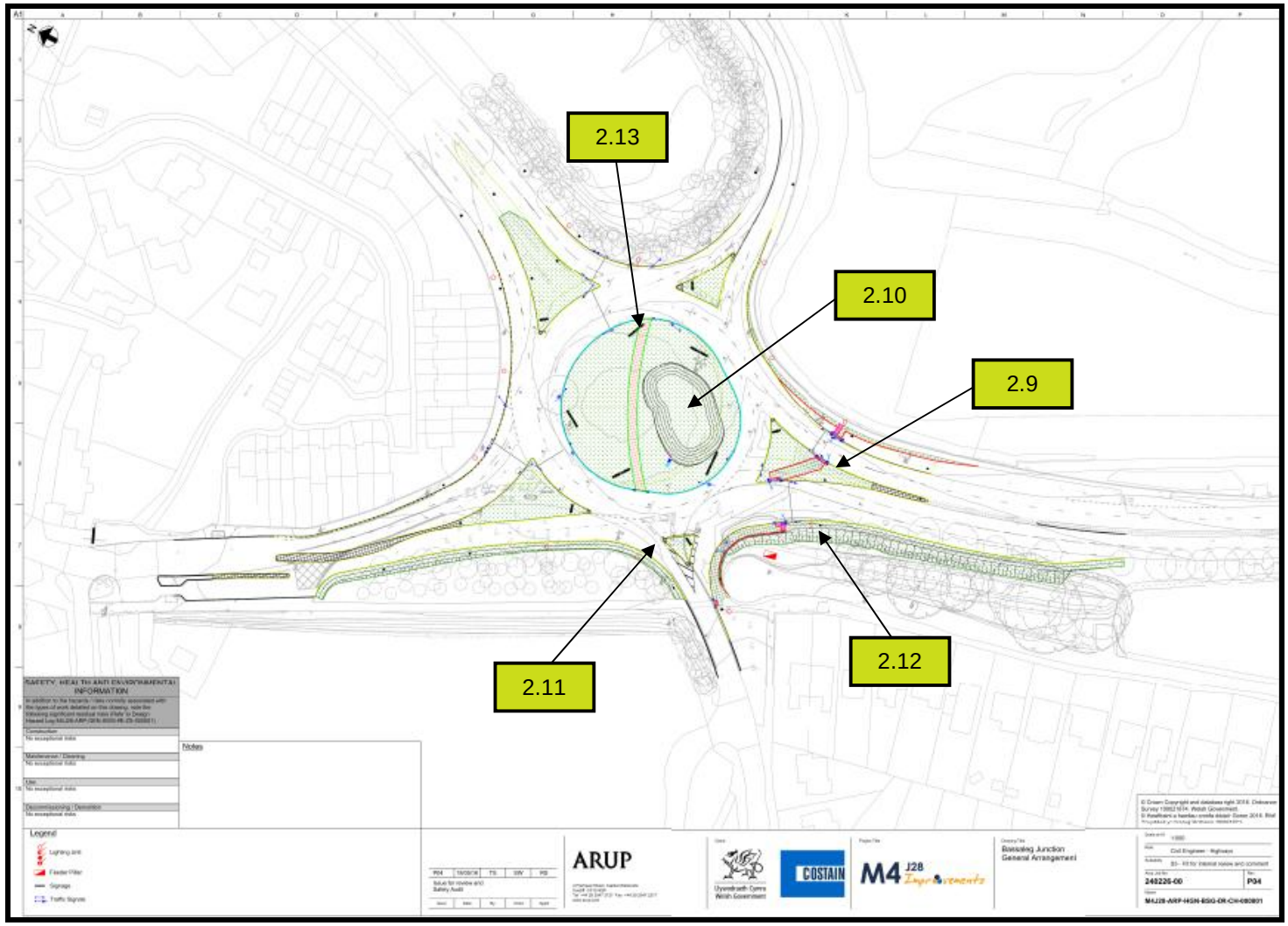
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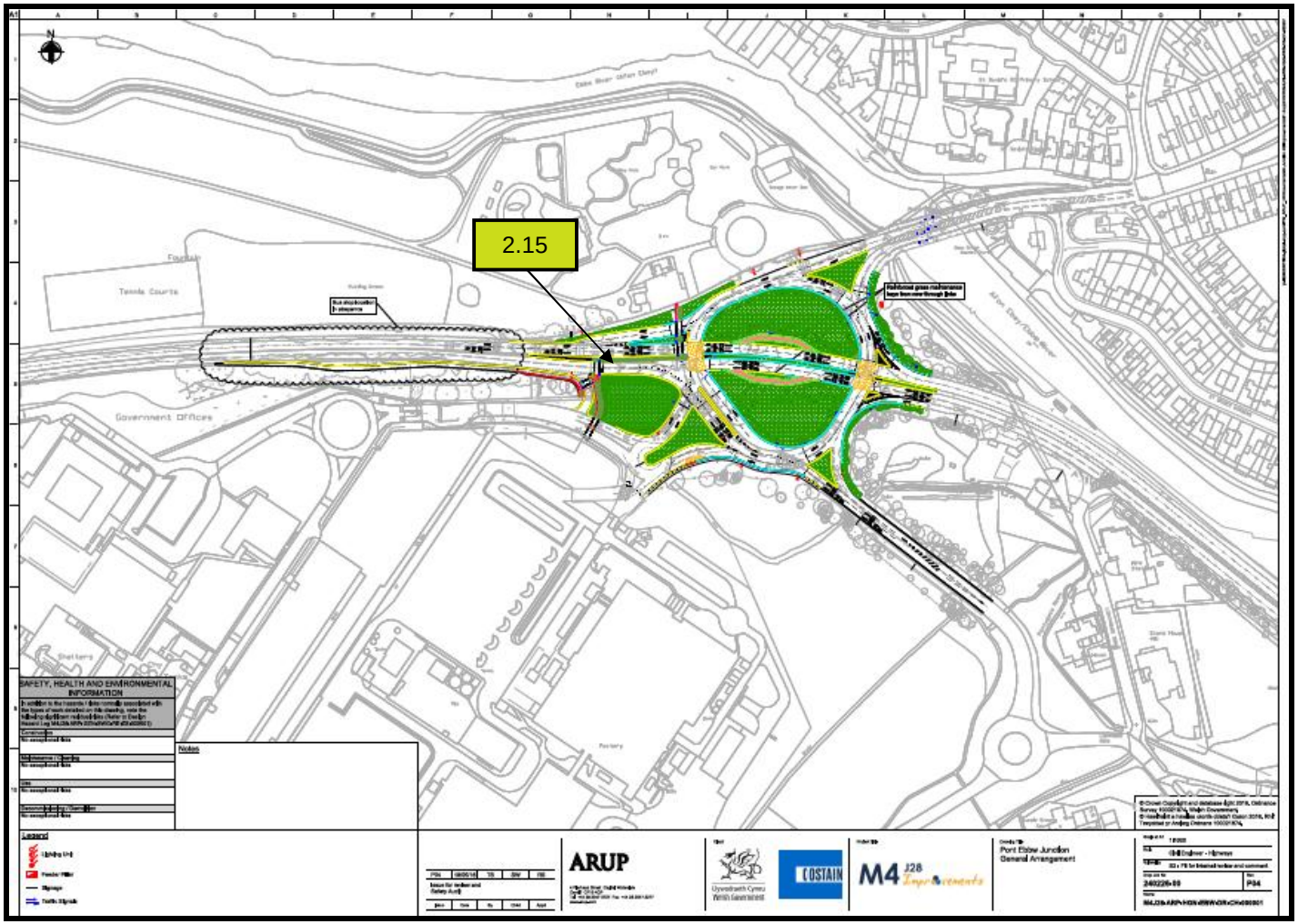
2.15
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