Smart Motorways Programme

M4 J3 – 12

Package 1 (J8/9 to J12) Road Safety Audit Stage 2

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Arcadis Jacobs Report

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Working on behalf of Highways England

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Contents

Acronyms

ALR	All lane running
EA	Emergency area
ERT	Emergency roadside telephone
ECP	Emergency crossover point
HFS	High friction surfacing
HGVs	Heavy goods vehicles
LBS	Lane below sign
MSA	Motorway service area
PIC	Personal injury collisions
POP	Police observation platform
RRRAP	Road restraints risk assessment process
RRS	Road restraint system
RSA	Road safety audit
SM	Smart motorway
SoRSA	Society of Road Safety Auditors
TJR	Through Junction Running
TTM	Temporary traffic management

1 Introduction

1.1 Road Safety Audit Team

This report results from a Stage 2 Road Safety Audit (RSA) carried out on the M4 Smart Motorways Programme Package 1 section, between Junctions 8/9 and 12. The RSA has been undertaken at the request of Steve Foxley, the Highways England Project Sponsor, following a value engineering exercise that has resulted in changes to the scheme, including Junctions 8/9 and 11 reverting to no Through Junction Running (TJR). The RSA was carried out during October 2020.

The RSA team membership and brief were approved by Steve Foxley, the Overseeing Organisation Project Sponsor. The team was as follows:

Alison Foale BEng (Hons) MSc MCIHT MSoRSA
Highways England Approved Certificate of Competency
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Road Safety Team Member, Arcadis

The road safety aspects of the M4 Smart Motorways Programme Package 1 section, between junctions 8/9 and 12, were the subject of comment in four previous RSAs, which are detailed in Section 2.

During the Road Safety Audit process, the brief was revised in response to queries raised by the RSA Team. The revised brief (P02) was issued to the team on 14th October 2020 and included links to missing drawings and documents, increased clarity on non-through junction running and more information regarding the value engineering exercise.

1.2 Scheme Summary

This is the second Stage 2 RSA undertaken on this section of the scheme. The second RSA has been undertaken to capture the changes made through the value engineering process. As part of this exercise the provision of TJR was reviewed and has resulted in TJR being removed from Junctions 8/9 and 11, due to the operational benefits associated with queuing traffic at the diverges and high merging flows.

The overall scheme consists of the upgrade of the M4 motorway to a smart motorway between Junction 3 (Hayes) in west London and Junction 12 (Theale), which is near Reading. This RSA is for Package 1, which covers 29 km of mainline M4 carriageway between Junction 8/9 and Junction 12.

Improvement of the M4 to a smart motorway will help to relieve congestion by permanently converting the hard shoulder to a running lane and using technology to vary speed limits and

manage traffic. Signs and signals will be used to inform drivers of conditions on the highway network, when and where variable speed limits are in place, and when lanes are closed.

The Package 1 section includes:

- Conversion of the hard shoulder to a permanent running lane and, where no hard shoulder is in place at present, the construction of a new lane;
- Extension of underbridges and other structures such as culverts and subways to accommodate the improved motorway;
- Changes to junctions and slip roads needed to accommodate traffic joining and leaving the improved motorway, and to allow use of the hard shoulder as a running lane, as well as allowing 'No-TJR;
- Provision of new gantries and signs to allow the motorway to function as a smart motorway with a variable speed limit, and to provide messages to road users; and
- Other infrastructure needed for the improved motorway, such as Emergency Areas (EAs), enhanced communication systems, closed circuit television and electrical supplies, as well as works to accommodate statutory undertakers' apparatus and other parties who may be affected by the scheme.

The all lane running (ALR) Junction 3 to Junction 12 smart motorway scheme has been designed to be compliant with IAN 161/13 but does incorporate aspects of IAN 161/15. In October 2019 following concerns about safety, the Government requested that an evidence stocktake was carried out on smart motorways and an action plan developed in response to this work. The action plan has identified measures that the Government has committed to, of which the following are particularly relevant to this section of ALR between junctions 3 and 12. This includes:

- Faster rollout of stopped vehicle detection.
- Committing to a new standard for spacing of places to stop in an emergency.
- Considering a national programme to install more EAs on existing smart motorways - retrofitting additional EAs on existing smart motorways where places to stop in an emergency are more than one mile apart.
- Making EAs more visible - ensuring that all existing EAs will have a bright orange road surface, dotted lines on the surfacing showing where to stop, better and more frequent signs on approach to the EA.
- More traffic signs giving the distance to the next place to stop in an emergency - installing more traffic signs in between places to stop in an emergency so you should almost always be able to see a sign wherever you are on the motorway.

1.3 Site Visits

The RSA took place during the Covid-19 pandemic and was undertaken by the audit team utilising remote working, including video calls, screen sharing and shared documents.

In line with Highways England guidance at the time, a physical site visit was required as part of the RSA. Due to restrictions on vehicle sharing the site was visited as follows:

- Alison Foale and Daniel Harris visited the site on 23/09/2020 between 10:00 and 14:00 when the weather was overcast, the road surface dry and traffic conditions were moderate. During the site visit video drive through footage was captured to aid the audit process.
- Charles Hutchinson and Samantha Thirlwell visited the site on 13/10/2020 between 14:30:00 and 16:50 when the weather was fine and the road surface dry. During this

period traffic conditions were moderate with the exception of the eastbound carriageway of M4 just east of Junction 12. A collision had just occurred at the time of the site visit at this location and resulted in stationary traffic and substantial queuing along the eastbound carriageway (all lanes) and Junction 12 merge. This was caused by a vehicle striking the central concrete step barrier and then colliding with a temporary variable speed limit sign which led to the vehicle overturning a short distance beyond the struck sign.

It is of note that construction of the proposed scheme has already commenced.

The audit team members undertook collaborative online reviews of the brief, design drawings and supplementary materials. During the online reviews digital resources including Ordnance Survey mapping and Google Streetview were utilised to help inform the RSA.

1.4 This Report

This report is presented based upon the checklist contained in Appendix B of GG 119 for RSA. The terms of reference of the Road Safety Audit are as described in GG 119. The Road Safety Audit 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 designs to any other criteria. However, in order to clearly explain a safety problem or the recommendation to resolve a problem, the Audit Team may on occasion have referred to a Design Standard for information only. Observations made should not be construed as implying that a technical audit has been undertaken in any respect.

This RSA has examined the road safety implications of the scheme as presented, based on the normal operating state. It has not considered or investigated road safety with regards to incident management, maintenance, temporary traffic management or emergency state operating regimes within the extents of the scheme.

The drawings and documents provided as part of this RSA are shown in the List of Drawings and Documents Supplied in Appendix A. It is of note that not all of the drawings and documents detailed in the Audit Brief were supplied. Drawings and documents not supplied includes:

- HA514451-CHHJ-VUT-S1_ZZZZZZZZZZ~_Z-DR-CU-1000 to 1091 Existing Utilities Drawings – Sheets 0 to 91
- HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5001 to 5091 Existing Drainage Drawings Sheets 1 to 91
- HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1001 Contract 1 J8/9 to J12 Earthwork General Arrangement Drawing
- HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1020-1028 Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings
- HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1081 Contract 1 J8/9 to J12 Earthwork General Arrangement Drawing
- HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH- 0720-0728 Pavements PSV Drawings
- HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-7001 to 7002 Pavements Drawings
- HA514451-CHHJ-HSN-S1_ML000000_Z-DR-CH-1001 to 1017 Master Traffic Signs Sheets 01 to 17 Drawings
- HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12101 to 12191 Existing Traffic Signs Sheets 1 to 91 Contract 1 (1:500) Drawings
- HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5070 onwards Lighting Duct Arrangement Drawings

- HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE- Electrical Drawings 14001, 14006, 14010, 14012, 14015 to 14016, 14021, 14025, 14031, 14033 to 14034, 14036 to 14037, 14040, 14042 to 14043, 14045, 14052 to 14054, 14057 to 14073 and 14077 to 14079.
- HA514451-CHHJ-HSR-S1_LR000000_B-DR-CH-1007 Cutbush Comms Drawing
- 5149707-117-ATK-RSA-HE-RSA1+2-D1 (v 2.0) July 2018 Stage 1&2 RSA for Temporary Compound 3C
- HA514451-CHHJ-HGT-S1_EWZZZZZZ_Z-DR-CE-1020 to 1028 and 1081 Earthworks drawings
- 07 Area 3 Accident Data CAD M4 J5 - 8-9 (1 Apr 2012 to 31 Mar 2017)
- 07 Area 3 Accident Data CAD - M4 J8 -12 (1 Apr 2012 to 31 Mar 2017)
- 07 Area 3 Accident Data M4 J5- 8 (1 Apr 2012 to 31 Mar 2017)
- 07 Area 3 Accident Data M4 J8-9 to 12 (1 Apr 2012 to 31 Mar 2017)

Road safety issues related to the missing drawings and documents cannot be identified. It may also mean that combined issues resulting from interaction of two or more discipline features at a location may not have been identified.

The brief details that 'No pavement resurfacing (*to be undertaken*) in locations where a residual service life of over 5 years is expected', but this is not reflected in the pavements drawings.

During the investigation of drawings and documents a number of inconsistencies were noted between drawings sets. As an example, these included: EAs shown to be designed and surfaced differently, gantry mounted traffic sign details and signing drawings showing different sign arrangements and individual Verge Mounted Traffic Signs and signing drawings showing different sign arrangements. In addition, drawings included a large number of notes regarding 'areas in abeyance' and long and cross sections were not supplied.

The documents include a departures from standard tracking spreadsheet, which has been reviewed as part of the RSA. Any issue resulting from a departure is raised within the report. Personal injury collision (PIC) data was not supplied to the Audit Team as part of this RSA. Data supplied as part of the original RSA2 for the Package 1 section indicated that there have been 324 PICs in the last five years, consisting of 273 slight, 44 serious and 7 fatal collisions, with a killed or seriously injured (KSI) rate of 15.7%. The KSI collisions were split by direction with 46% occurring eastbound and 54% westbound.

A location plan is supplied in Appendix B. Each of the problems identified by the audit team has been referenced to the detailed design drawings and allocated a unique reference number and is shown on the plan extracts contained within Appendix C.

1.5 What happens next

This audit report has been submitted to the Project Sponsor. The Design Organisation is required to manage the production of the RSA response report, as detailed in GG 119, in collaboration with the Overseeing Organisation. The response report should reach one of the conclusions set out below, namely:

- accept the RSA problem and recommendation made by the RSA team;
- accept the RSA problem raised, but suggest an alternative solution, giving appropriate reasoning; or
- disagree with the RSA problem and recommendation raised, giving appropriate reasoning for rejecting both.

In addition, the RSA response report shall contain a response from the Overseeing Organisation and a RSA action for each problem agreed between the Design Organisation and Overseeing Organisation.

Safety issues identified during the audit which the Terms of Reference exclude from this report, but which the audit team wishes to draw to the attention of the Project Sponsor, will be set out in a separate covering correspondence. These issues could include but not be limited to maintenance items and operational issues.

2 Items Raised in previous Road Safety Audits

2.1 Summary

The road safety aspects of the M4 Smart Motorways Programme Package 1 section, between junctions 8/9 and 12 have been subject to comment in the following RSAs:

- Full scheme combined Road Safety Audit Stage 1 and 2 – September 2017;
- Compound 5 Road Safety Audit Stage 2 – June 2018;
- Compound 3C combined Road Safety Audit Stage 1 and 2 – July 2018; and
- Package 1 (J8/9 to 12) Road Safety Audit Stage 2 Rev P01 – December 2018.

Problems raised during the full scheme combined Road Safety Audit Stage 1 and 2 and Compound RSAs, which remained, were captured as part of the Package 1 (J8/9 to 12) Road Safety Audit Stage 2 Rev P01.

Problems relating to the M4 Smart Motorways Programme Package 1 section, between junctions 8/9 and 12, raised in the previous revision P01 Stage 2 Road Safety Audit in 2018 are detailed in the table below. Where a problem remains the relevant Stage 2 RSA problem number is detailed.

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
3.1.1	Location: Chainage 54400 junction 11 eastbound Summary: Increased risk of side impact collisions due to reduced length of the eastbound diverge. The eastbound diverge at junction 11 is reduced in length and informatory signing of the diverge arrangement has not been provided increasing the risk of side impact collisions and late braking.	Provide suitable informatory signing on both the diverge and mainline of the eastbound diverge arrangement at junction 11.	Exception Note that the reference in the RSA2 Report Summary is for the J11 eastbound diverge. The Auditors have confirmed that this should refer to the J11 eastbound MERGE as per drawings at the back of the report. The Designer disagrees with safety auditor recommendation. Signing has been provided on the eastbound approach to junction 11. The merge slip consists of two taper tiger tail merge which although of reduced length has good visibility. Traffic signing at this location is in accordance with standards.	Yes (in part)	Value engineering alterations to the scheme have resulted in increased merge lengths being provided and a reduction of three M4 running lanes at this location. While it is stated the signing is in accordance with standards, providing increased awareness of the double tiger tail merge will help to reduce the potential for merge collisions, particularly given the lower number of lanes.	3.3.3
3.1.2	Location: All EAs Summary: Consistency and suitability of EAs. In response to public concerns, some EAs associated with other all lane running (ALR) motorways have been redesigned to include a highly visible orange road surface, improved signage and carriageway markings to help drivers position themselves within the EA. The EAs in this contract are provided at regular intervals throughout the scheme. Advance signing is provided, the surface finish is consistent with the main carriageway and there are no carriageway markings. Drivers may not be fully aware of where to stop in an emergency reducing motorist	Provide a contrasting orange road surface, carriageway markings within each EA and improved signage on the approaches to maintain consistency with other ALR schemes.	Designer agrees with safety auditor recommendation. This is currently the basis of a client instruction that is to be provided on all EA. Improvements to signing, road markings and orange surfacing will be provided in accordance with MPI 66.	No	The current design indicates that EAs are to be provided in line with current best practice and Action 8 in the Department for Transport's Smart Motorway Stocktake requested by the Secretary of State – making EAs more visible.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
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	confidence and potentially increasing the risk of drivers stopping away from the EA. This could increase the risk of rear shunts and collisions between vehicles and motorists outside of their vehicle.					
3.1.3	Location: EAs Summary: Use of emergency refuge telephones. Emergency refuge telephones are provided at the rear of each EA, behind the vehicle restraint system. The telephones appear to be orientated such that users are not facing oncoming traffic when using them and they are likely to be difficult to access for mobility impaired users. It is also unclear if the emergency telephone and the instructions within the telephone box are suitably illuminated. This could result in vehicle occupants remaining in their vehicle or in the EA rather than standing behind the restraint system as directed by the instructions for the EA. This increases the risk of injury should another vehicle enter the E.	Ensure that the orientation of the emergency refuge telephones results in users facing oncoming traffic when using the telephone. Ensure that the instructions within the telephone box are legible during hours of darkness.	Designer agrees with safety auditor recommendation. Alignment of Emergency refuge telephone will be positioned so that users will be viewing oncoming traffic. Legibility will be as per standard Type 354 ERT provision, this is standard SMP provision.	No	Designers decision log response closes out this problem.	-
3.1.4	Location: All EAs Summary: Sign posts and sign faces impacting users The sign posts at the rear of the EA are likely to impact on the working width of the road restraint system (RRS) reducing the performance of the barrier. The signs appear	Ensure the sign posts are outside the working width of the RRS and that sign faces are mounted at 2.1m.	Designer agrees with safety auditor recommendation. This cross section is incorrect and requires amendment – the sign faces are orientated parallel to the carriageway rather than perpendicular to it.	No	Designers decision log response and updated drawings close out this problem.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
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	to be mounted such that people waiting behind the RRS are at increased risk of striking the sign faces resulting in head injuries.		Sign posts within the working width of the barrier are passively safe by their nature at a minimum setback of 600mm, which is permitted. (TD 19/06 3.14 and 3.66.) Motorists do not need to go behind the VRS to use the emergency telephone (as per IAN161/13 cl. 5.30) and the mounting height is specified at 1500mm in MPI 66 (p10.)			
3.1.5	Location: All EAs Summary: Environmental barrier may result in people waiting within the working width of the RRS The 'Type 3' EA cross section shows an environmental barrier located behind the RRS. When a vehicle is using the EA it is likely that the vehicle occupants will either: wait in the area between the RRS and the environmental barrier; remain in the EA; or seek an alternative location to wait. This increases the risk of injury should another vehicle enter the EA.	Ensure that the vehicle occupants are provided with a sufficiently wide area to wait, outside of the working width of the RRS.	Designer agrees with Safety Auditors recommendation. IAN 161/13 indicates that it is not intended that users of the ERT climb over the VRS. Use of the ERT is to take place from the traffic side of the VRS. This is in accordance with IAN 161/13 paragraph 5.30. There is only one location at Chainage 50870 EB where this Type 3 EA detail is used and a constrained VRS system is to be used at this location i.e. 0.8m W2 working width. We will update details of drawing that will allow a sufficiently wide area for users that have climbed over the VRS to wait outside of VRS working width.	No	Designers decision log, plus the updated EA pone signage/procedure closes this problem out.	-
3.1.6	Location: EA at chainage 43300 (EB) Summary: EA on embankment with no pedestrian restraint The EA at chainage 43300 (eastbound) is on an embankment. The RRS drawings indicate	Provide a pedestrian restraint at the top of the slope outside of the working width of the RRS.	Designer agrees with safety auditor recommendation. Pedestrian restraint will be placed outside the RRS working width.	Yes (in part)	Pedestrian restraint has been provided at the top of the slope, but this only covers the area immediately behind the emergency telephone, not the tapers. If a driver was to cross the RRS within the tapers (for instance if this is where	3.1.16

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	that a pedestrian restraint is not provided at the rear of EA, behind the RRS. This could result in injuries to pedestrians if they slips/fall down the slope behind the RRS.				their vehicle came to rest) they will still be vulnerable to slips/falls down the slope.	
3.1.7	Location: Junction 10 Summary: Potential for vehicles to stop on the carriageway Although the scheme does not incorporate a hard shoulder and 'no hard shoulder' signs are provided, a hard shoulder is provided on the M4 through junction 10 in both directions. Given the lack of opportunity to stop outside of the motorway running lanes, it is likely that this area will be used by stopping vehicles for non-emergency reasons. This could increase the risk of collisions involving; stationary vehicles, vehicle occupants waiting outside of their vehicle and vehicles re-joining the carriageway resulting in late braking and lane changing.	Provide carriageway markings within the hard shoulder to discourage vehicles from stopping.	Exception Designer disagrees with the Safety Auditor's recommendation. The principle of No Through Junction Running has been applied at this location where 3 lanes are carried through and the existing hardshoulder provision is provided. This is the IAN 161 SMP standard approach. The hard shoulder is provided for use under regulation 7 of the Motorway Traffic (England and Wales) Regulations to provide a safe refuge for motorists experiencing the circumstances laid out in 7(2) (a), (b) (c) and (d) of the regulations. Hatching out the hard shoulder will deter use of the hard shoulder under conditions (a), (b), (c) and (d) resulting in the possibility of a vehicle broken down in a live traffic lane. The designer recommends this audit recommendation is not pursued.	Yes	Incorporated into various issues relating to EA spacings and places of relative safety.	Various
3.1.8	Location: Scheme wide Summary: Vegetation impacting forward visibility	Ensure that existing and reinstated vegetation (either from inside or outside the highway	Designer agrees with safety auditor recommendation. Information will be made available for future maintenance.	Yes	Vegetation clearance drawings have been supplied, but it is still unclear what is to be reinstated and the impact this could have on signs at the time of opening and after seasons of growth.	3.1.20

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	Temporary vegetation clearance is detailed throughout the majority of Contract 1 between the edge of carriageway and the highway boundary. The drawings state that following construction of the final scheme, vegetation is to be 'reinstated as appropriate', although the type of planting is not clear. The reallocation of carriageway space will result in vehicles in lane 1 being immediately adjacent to the edge of carriageway. It is likely that over time vegetation in the verge, or from outside the highway boundary, will reduce forward visibility to other vehicles and signs. This is likely to be exacerbated where; the carriageway bends to the left, forward visibility is impacted by bridge structures or signage, and for drivers of left hand drive vehicles. Reduced forward visibility could increase the risk of rear shunts and side impact collisions due to lane changing.	boundary), does not adversely impact forward visibility to other vehicles or signs at the time of completion and in the future. Include forward visibility splays within the maintenance programme.				
3.1.9	Location: Gaps in the RRS Summary: Gaps in the RRS increasing the risk of impact with hazards in the verge Throughout the scheme there are short gaps in the RRS. The Audit Team are concerned that the close proximity of lane one to the gaps and the additional terminals and anchor points creates additional hazards that would not exist if the gaps were closed. The gaps also increase the risk of errant vehicles leaving the carriageway and striking objects in the verge. This includes (but is not limited	Ensure that all unprotected sign posts, railings and other vertical features in the verge are passively safe and/or protected, subject to the outcome of the Road Restraints Risk Assessment Process (RRRAP).	Designer agrees with safety auditor recommendation. Gaps have been provided where there is no hazard on the verge and no VRS was required according to the RRRAP assessment. All pedestrian guardrails are to be designed with design load Class 1, with knee rail infill as per MCX 0138. This type of guardrail was not considered as hazard that needs VRS protection. If there are signs at gaps, this is because they are	No	Designers decision log response closes out this problem.	-

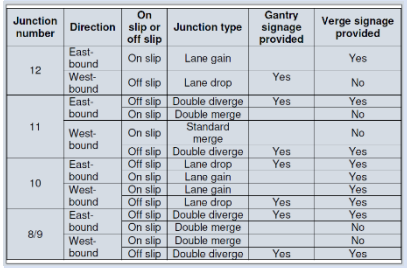
Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	to) unprotected sign posts of unknown size/composition and pedestrian guard rail at chainage 59750 (eastbound) and pedestrian guard rail at the rear of an A chamber access (chainage 43400 (westbound)). Should an errant vehicle leave the carriageway at a gap in the RRS and strike a vertical feature or RRS terminal/anchor point it would likely increase the severity of injuries.		on passive posts, so no VRS was required to protect them. Gaps have been provided according to the guidance on IAN 161/13 CL 5.12 that specifies minimum gap of 20m: "If in an emergency a road user is unable to reach a refuge area, they may consider pulling their vehicle onto the verge. For this reason, although gaps between sections of VRS of less than 20m must be closed, larger gaps should not be closed. This supersedes TD 19 paragraph 3.15."			
3.1.10	Location: Gaps in the RRS in advance of EAs Summary: Gaps in the RRS could be mistaken for ERAs There are a number of gaps in the RRS that are immediately in advance of the EAs, for example at chainages 35800 and 38100 (both westbound). These gaps could be confused by motorists as an EA and result in vehicles stopping for non-emergency reasons. The gaps may not be suitable for vehicles to stop in due to the available space increasing the risk of collisions involving static vehicles, drivers outside of their vehicle and vehicles re-joining the carriageway.	Close the gaps in the RRS in advanced of the EAs.	Exception Designer disagrees with the Safety Auditor's recommendation. Gaps have been provided according to the guidance on IAN 161/13 CL 5.12 that specifies minimum gap of 20m: "If in an emergency a road user is unable to reach a refuge area, they may consider pulling their vehicle onto the verge. For this reason, although gaps between sections of VRS of less than 20m must be closed, larger gaps should not be closed. This supersedes TD 19 paragraph 3.15." Also, the proposed EAs will be designed with an orange surface to make them more obvious to drivers as to where they need to stop.	No	The identified gaps still exist, but the issue is not deemed to remain due to the response provided coupled with updated signs and appearance of EAs, and the latest thinking on Smart Motorways in relation to gaps providing off carriageway places of refuge in an emergency.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
3.1.11	Location: Various Summary: RRS working width impacted by pedestrian restraint barrier Pedestrian restraint barrier is detailed within the working width of the RRS at a number of locations in the westbound carriageway, such as at chainages 35220, 35400, 36280 and at the rear of the westbound EA at chainage 50550 and for a length of more than 300m around chainage 56400. This could increase the severity of a loss of control collision, result in secondary collisions and increase the risk of injuries to pedestrians and operatives who may be between the RRS and the pedestrian restraint barrier.	Locate the pedestrian restraint barrier outside the working width of the RRS.	Designer agrees with safety auditor recommendation. The above-mentioned locations have been checked and the proposed pedestrian restraint systems are outside the working width of the VRS.	Yes	Issue remains in some locations. It is noted in addition to the designers response that in the previously specified locations guard rail has either been relocated away from the RRS or removed/reduced where this doesn't have an impact on pedestrians, workers or members of the public.	3.1.21
3.1.12	Location: Chainage 54400 (westbound) Summary: Risk of vehicles leaving the carriageway through a gap in the RRS At chainage 54400, adjacent to the westbound diverge at junction 11, there is a gap in the RRS. At this location the verge falls away from the carriageway. Vehicles making lane change manoeuvres adjacent to this gap will increase the risk of a vehicle leaving the carriageway at this location resulting in injury.	Close the gap in the RRS.	Exception Designer disagrees with the Safety Auditor's recommendation. The proposed hatching between the two diverge lanes will discourage drivers from making late lane changes. Gaps have been provided according to the guidance on IAN 161/13 CL 5.12 that specifies minimum gap of 20m: "If in an emergency a road user is unable to reach a refuge area, they may consider pulling their vehicle onto the verge. For this reason, although gaps between sections of VRS of less than 20m must be closed, larger gaps	No	Value engineering has resulted in alterations to the scheme layout at this location. While the new proposal retains the gap in the RRS, the hatching between the diverge lanes has been removed. In addition, the removal of through junction running results in three mainline ahead lanes compared to four. This has also resulted in space for a 'hardshoulder' which extends beyond the gap in RRS and is at its widest point alongside it. The designers response regarding the RRRAP assessment, in combination with the revised layout, reduces the risk of vehicles leaving the carriageway at	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
			should not be closed. This supersedes TD 19 paragraph 3.15." The specific location has been assessed within the RRRAP and the slope between CH. 54360-CH. 54490 did not require VRS protection.		this location and the need for closing this gap.	
3.1.13	Location: Chainage 37300 (eastbound) Summary: RRS gap at Police Observation Platform (POP) location A gap in the RRS coincides with the access to an existing POP. It is unclear if the POP is to remain as part of the scheme. Should the POP remain it could be used by vehicles for emergency and non-emergency reasons. In both situations this could increase the risk of collisions involving static vehicles, occupants outside of their vehicle and vehicles re-joining the carriageway.	Confirm the status of the POP. If it is to remain provide suitable signage to discourage its use by unauthorised vehicles.	Designer agrees with safety auditor recommendation. The POP is not be used and measures will be added to discourage use.	Yes	Issue remains. Additional concerns regarding unauthorised use of POPs.	3.1.29
3.1.14	Location: Winnersh Railway Underbridge (chainage 47150) Summary: RRS working width impacted by environmental barrier The fencing drawings, in combination with the RRS drawings, indicate that the upgraded and proposed environmental barriers on each side of the M4 carriageway are located within the working width of the RRS parapet. This could increase the severity of a loss of control collision and result in secondary collisions.	Locate the environmental barrier outside the working width of the RRS.	Designer agrees with safety auditor recommendation. The environmental barrier is to be placed outside the working width of the RRS.	No	Drawings have been modified and it appears the fencing no longer impacts the RRS working width at this location.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
3.1.15	Location: Junction 10 eastbound merge and diverge slip roads (chainage 46300 and 46600) Summary: Unintended effects of new high friction surfacing (HFS) Short lengths of HFS are proposed on the Junction 10 eastbound merge and diverge slip roads. At both locations the HFS ties into the existing provision which was noted during the site visit as faded and in poor condition. The proposed HFS is likely to have a considerably greater braking coefficient than the existing and will be much more visible. This may confuse motorists resulting in late braking and an increased risk of loss of control collisions.	Provide new HFS for the full length of the existing provision.	Designer agrees with safety auditor recommendation. HFS to be added for the full length of provision.	Yes	Problem remains and is replicated at other locations.	3.1.33
3.2.1	Location: Chainage 61800 and 33900 Summary: Ramp metering on entry slip roads Advance signals warning signs associated with ramp metering are being retained on the eastbound merge slip roads at junctions 12 and 8/9. The ramp metering layout is unclear, no stop line is shown and details regarding the signals equipment and skid resistance of the surface on the approach to the signals is not provided. This could lead to driver confusion, hesitation and late braking resulting in shunt type collisions.	Provide details of the ramp metering layout and how it interfaces with the proposed merges.	The ramp metering at J12 EB Onslip is being retained on a like for like basis. The ramp Metering at J8/9 EB Onslip is not part of this scheme, it is part of Contract 2.	Yes (in part)	Ramp metering is being retained. The signs are in place, but no stop line is shown and details regarding the signals equipment and skid resistance of the surface on the approach to the signals is not provided.	3.2.1
3.3.1	Location: Scheme wide Summary: Lack of post and foundation details	Ensure all unprotected sign	Designer agrees with safety auditor recommendation.	Yes	Problem remains. Various locations where signs are located in vulnerable locations.	3.3.1

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	Sign post and foundation details have not been provided. There are a number of instances where signs and posts appear to be unprotected. If these sign posts are not passively safe it could increase the risk and severity of injuries should a vehicle leave the carriageway.	posts are passively safe.	Sign posts which are not protected by VRS are passively safe by their nature at a minimum setback of 600mm, which is permitted. (TD 19/06 3.14 and 3.66-3.69.)			
3.3.2	Location: Remotely operable temporary traffic management signs Summary: Lack of sign face, post and foundation details Remotely operable temporary traffic management signs are proposed at locations throughout the Contract 1 section. No details have been provided regarding the size of sign faces, posts or foundations associated with these signs. Signs of an inappropriate size could result in driver confusion (if too small), conflict with vehicle restraint systems or impact on forward visibility to other permanent signs, such as sign TM-B-56/8_16 (chainage 45850).	Ensure all remotely operable temporary traffic management signs are of appropriate size, are positioned outside the working width of vehicle restraint systems and do not impact on forward visibility to permanent signs.	Designer agrees with safety auditor recommendation. All ROTTMs are to standard sizes. The larger signs are provided on verges only and the smaller where signs are paired in the central reserve. All signs will be positioned outside the working width of the VRS. An exercise is taking place ensuring that they do not impact on forward visibility to permanent signs.	Yes	Problem remains. Details not provided.	3.3.2
3.3.3	Location: Various Summary: Inconsistent provision of road layout merge/diverge signs Informatory road layout merge/diverge signs, such as PS-A-64/4_80 and PS-A-57/2_55 are not provided at every junction. This includes merge/diverges that are subject to departures, where the layouts have become more complex and there is an increase in the	Provide informatory road layout merge/diverge signs at each merge/diverge.	Designer disagrees with the Safety Auditor's recommendation. Merges with a lane gain require additional signage however standard merge (including tiger tail merges) do not require signage in accordance with IAN 144/16; likewise diverges with a lane drop require additional signage however standard diverges (even tiger tail diverges) do	Yes	Issue remains. As an example, informatory road layout merge/diverge signs such as PS-B-73/0A and B and PS-B-72/8_60 are provided at the J12 eastbound merge and provide information on the merge layout for drivers on the slip road and the mainline carriageways. This is repeated at J10, but not at J11 and J8/9, despite similar layouts. The signs may not be	3.3.3

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	number of lanes. This could result in driver confusion, increasing the risk of collisions associated with vehicles merging/diverging to/from the M4 carriageway.		not.  		needed but a decision has been taken somewhere not to provide a consistent approach.	
3.3.4	Location: Various Summary: Signs located in front of the RRS or in gaps in the RRS A number of signs are located in front of the RRS or in gaps in the RRS provision. This includes: • Sign PS-B-52/9_80 (chainage 42000) • Sign PS-B-65/6_20 (chainage 50900) • Sign PS-B-61/8_56 (chainage 54700) • Sign PS-B-70/6_05 (chainage 59650) • Sign PS-B-70/6_98 (chainage 59750) In the event of vehicle leaving the carriageway and striking the RRS or continuing through a gap, they could strike the signs and sign posts, potentially increasing the severity of the collision.	Ensure the signs are located behind the RRS.	Designer agrees with the Safety Auditor comments. All signs will be located behind the VRS and outside of the working width.	Yes	Issue remains at various locations. Unclear if all signs are passively safe.	3.3.4

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
3.3.5	Location: Merge lane approaches to the M4 Summary: Merging vehicles unaware of M4 speed limit Existing post mounted matrix signs are detailed on some of the merge lane approaches to the M4. It is unclear if these are being retained or removed. If these signs are being removed or not provided drivers may be unaware of the current speed limit on the M4. This could result in inappropriate speeds on the M4 within a period of reduced speed operation, resulting in rear shunts and increased collision severity.	Provide matrix speed limit signs on each merge lane approach to the M4.	Designer agrees with the Safety Auditor comments, contract documents are unclear. We confirm that all existing entry slip road signals are to be replaced with new signals providing joining traffic with speed settings on the mainline.	No	AMIs shown on all entry slips in tech drawings.	-
3.3.6	Location: Diverge slip roads at junctions Summary: Provision of 'Variable Speed Limit Ends' and 'End of Motorway' signs 'Variable Speed Limit Ends' and 'End of motorway' signs are not provided consistently through the scheme. For example, they are not provided on the junction 11 and junction 8/9 exit slips or the eastbound junction 10 exit slip. Drivers may be unaware that they have left a variable speed limit section of the M4 or that the motorway has ended, increasing the risk of inappropriate speeds on the local highway network. This could lead to late braking, rear shunts and increased collision severity. At some locations 'Variable Speed Limit Ends' signs are provided on both sides of the exit slip and will be visible from the main line M4 carriageway. This could result in	Adopt a consistent approach to signing the end of motorway restrictions and the variable speed limit, ensuring that drivers are aware of the speed limit of the road they are joining. Ensure 'Variable Speed Limit Ends' signs are located and orientated to avoid confusion on the main line M4 carriageway.	Designer agrees with the Safety Auditor's recommendation to adopt a consistent approach. To clarify this approach: - J8/9 is a Motorway – Motorway link so 'End of motorway' signs are not required. - J10 is a Motorway – Motorway link so 'End of motorway' signs are not required. - At J11 the 'End of motorway' signs exist outside the extents of the drawings and are not proposed to be removed. - 'Variable speed limit ends' signs have been provided as required as per IAN 161/15 2.7.12.	No	Designers decision log response closes out this problem.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	confusion and inappropriate speeds on the M4 within a period of reduced speed operation, resulting in rear shunts and increased collision severity.					
3.3.7	Location: Junction 12 eastbound merge (chainage 62000) Summary: Sign clutter resulting in reduced visibility to sign faces Nine signs are provided in the nearside verge of the eastbound merge at junction 12. The number of signs and the spacing between them is likely to result in information overload and reduced visibility to sign faces. This could result in drivers being unaware of hazards or the upcoming merge layout. In turn this could lead to rear shunt type collisions at the ramp metering or side impact collisions at the merge.	Rationalise the number of signs where possible and ensure that adequate clear forward visibility is provided to all sign faces.	Designer agrees with the Safety Auditor comments. The number of signs and visibility interactions will be rationalised where possible.	Yes	Problem remains in full as the current design is identical to original RSA2.	3.3.7
3.3.8	Location: Junction 10 diverge nosings Summary: Lack of direction signs Direction signs are provided at each diverge nosing except at Junction 10. The lack of direction signs for the A329 (M) may result in late lane change manoeuvres and increased collisions on the diverge.	Provide direction signs on the diverge nosings.	Exception Designer disagrees with the Safety Auditor's recommendation. Diverge signage is not provided in the nosing for a lane drop arrangement as per IAN 144/16. Diverge signage for a lane drop arrangement may be confusing to a driver as they would see the signage behind the second exit and may be tempted to cross solid white lines to use it.	No	Designers decision log response closes out this problem.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
3.3.9	Location: A329 (M) northbound on slip (chainage 46300) Summary: The variable speed limit is not signed The variable speed limit is not signed for motorists joining the M4 from the A329 (M) northbound. This could result in inappropriate speeds on the M4 within a period of reduced speed operation, resulting in rear shunts and increased collision severity.	Provide a variable speed limit sign.	Designer agrees with the Safety Auditor comments. This signage has already been provided but an inset is missing from the drawing. Inset to be added.	No	Designers decision log response and provision of the sign in the current design closes out this problem.	-
3.3.10	Location: Chainage 59200 Summary: Restricted forward visibility Sign reference PS-A-70/1_66 may restrict forward visibility to sign reference PS-A-70/1_93 on the westbound merge slip at Reading services, reducing the effectiveness of the variable speed limit sign. This could result in drivers joining the M4 at inappropriate speeds, increasing the risk of late braking and merging collisions.	Provide adequate forward visibility to the sign.	Designer agrees with the Safety Auditor comments. PS-A-70/1_93 achieves the required forward visibility of 105m.	No	Designers decision log response and updated design closes out this problem.	-
3.3.11	Location: Chainage 34400 Summary: Proposed sign may restrict visibility for merging vehicles An emergency telephone one mile ahead sign (PS-A-45/3_35) is provided on the westbound merge nosing. Given the alignment of the carriageway this sign may reduce visibility to the mainline for merging vehicles, resulting in increased collisions at the merge. It should be noted that the existing	Relocate the sign in the nosing so that it does not impact on visibility and provide an additional sign in the nearside of the westbound merge lane.	Designer agrees with the Safety Auditor's recommendation. The location of PS-A-45/3_35 will be moved so as not to impact on visibility for merging vehicles. The 1 mile ahead EA sign is not required for slip road traffic at this location. EA signs are provided closer to the EAs i.e. ½ mile locations and will be superseded by MPI 66 which require 1/3 mile in advance locations.	Yes	Sign remains on nosing. In addition, a new sign (PS-A-45/2_68) indicating no hard shoulder for 7 miles is provided to the west and may further reduce visibility to the mainline for merging vehicles. Sign PS-A-45/2_68 also appears to be mounted in the hard shoulder.	3.3.11

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	sign informs drivers on the main line and westbound merge lane.					
3.3.12	Location: Chainage 46700 Summary: Position of bend warning sign may lead to confusion A bend warning sign (PS-B-57/6_28) is provided on the nosing between the M4 carriageway and the eastbound diverge on to the A329 (M) Reading. The position of the sign may result in driver confusion as to which route is subject to the warning, increasing the risk of rear shunts on the M4 if vehicles slow or loss of control collisions on the bend.	Relocate the bend warning sign.	Designer agrees with the Safety Auditor comments. The sign will be relocated further from the diverge to make it more apparent that it applies to the slip road.	Yes	The sign is still located in a similar position and appears to now be (incorrectly) orientated towards the mainline carriageway.	3.3.12
3.3.13	Location: Chainage 58650 (westbound) Summary: Visibility to ERA/emergency phone sign compromised EA/emergency phone sign PS-A-69/6_45 is provided in the nearside verge but is positioned approximately 25m behind countdown marker sign PS-A-69/6_19. Visibility to the EA sign is likely to be compromised which could lead to drivers being unaware of the next EA. This may result in drivers seeking alternative refuge in the diverge increasing the risk of shunt collisions and collisions with drivers outside of their vehicle.	Reposition the signs ensuring adequate forward visibility is provided.	Designer agrees with the Safety Auditor comments. The EA signage is to be reviewed following changes to its design which have resulted following a recent instruction from Highways England; the sign will be changed to 2/3 mile and relocated downstream of the entrance to the Motorway Service Area.	Yes	The design of the sign has changed, but the location is the same. Problem remains.	3.3.14
3.3.14	Location: Chainage 35150 (eastbound) Summary: Visibility to countdown marker sign compromised	Reposition the sign ensuring adequate	Designer agrees with the Safety Auditor comments. The sign is to be relocated upstream.	No	The junction layout has changed, removing the requirement for the sign.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	Countdown marker sign PS-B-46/0_80 is provided in the nearside verge but visibility to the sign face is obscured by the gantry sign (G7-02) upright. This could result in late lane changing and side impact collisions at the diverge.	forward visibility is provided.				
3.3.15	Location: Chainage 33900 (WB) Summary: Visibility to lane designation sign compromised The 'Variable Speed Limit Ends' sign PS-A-44/8_10A is provided in the nearside verge in front of lane designation sign PS-A-44/8_20B. This will obscure visibility to the lane designation sign increasing the risk of collisions on the diverge due to late lane changing.	Reposition the signs ensuring adequate forward visibility is provided to both.	Designer agrees with the Safety Auditor comments. The signs PS-A-44/8_10A and PS-A-44/8_10B are to be relocated further downstream, after the warning signs where adequate visibility is achieved.	Yes	The signs are still positioned in the same way. Problem remains.	-
3.3.16	Location: Junction 11 exit slip roads Summary: Inconsistent lane destination carriageway markings On the eastbound and westbound exit slip roads at junction 11, lane destination carriageway markings are provided that are inconsistent with the existing markings downstream. The inconsistencies relate to both the named destination and the road numbers. Drivers are also advised to follow the B3270 for the Royal Berkshire Hospital, although this is inconsistently used resulting in late lane changing on the approach to the	Provide lane destination markings that are consistent with the proposed signing and the existing markings that are to remain.	Exception Eastbound: Note it is not clear from the audit comment what is referred to here but we assume that this is relating to the provision of '& R'DING B3270'. Designer disagrees with the Safety Auditor's recommendation for the Junction 11 East Bound diverge. The designer accepts there is an inconsistency with the proposed worded destinations relating to '& R'DING B3270'. Adding '& R'DING	Yes (in part)	Issue remains on westbound diverge.	3.3.26

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	circulatory, increasing the risk of side impact collisions.		B3270' however will increase the worded destination markings to 5 rows, this information will decrease the time traffic in the left-hand lane has to react. The designer considers that the proposed marking destinations match the existing provision and that the motorist is better informed by the portal gantry sign, downstream. The gantry sign is consistent with the existing lane destination wording downstream. The designer recommends no further action.			
3.3.17	Location: Chainage 59200 Summary: Removal of 'SLOW' carriageway markings The eastbound and westbound diverge lanes to the Reading Motorway Service Area (MSA) are to be resurfaced with HFS. The existing 'SLOW' markings are not detailed to be reinstated following the resurfacing. Given the short diverge length and tight left-hand bends the removal of the 'SLOW' markings could result in late braking and vehicle loss of control.	Provide 'SLOW' carriageway markings to TSRGD Diagram 1024.	Designer agrees with the Safety Auditor comments. The design will be amended to include 'SLOW' carriageway markings to TSRGD Diagram 1024.	Yes	'SLOW' carriageway markings still omitted from the design.	3.3.27
3.3.18	Location: Gantry signs Summary: Sign lighting It is unclear how a number of irregularly shaped gantry signs faces, such as G07-31 at junction 10, are to be lit. Inappropriate	Ensure gantry signs are suitably lit and don't impact on the opposing traffic lanes.	Designer agrees with the Safety Auditor comments. Illumination proposals will be compliant.	Yes	Gantry sign lighting no supplied. Problem remains.	3.3.31

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
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	illumination could result in the sign faces being difficult to read, resulting in late vehicle movements and increased risk of side impact collisions. If the lighting provided is visible on the opposing carriageway this could result in glare and/or driver confusion, leading to collisions.					
4.1.1	Location: Ascot Road/Compound 5 access Summary: Reduced forward visibility The drawings provided for Compound 5 are based on the existing alignment of Ascot Road, although this is going to change as the ALR scheme includes the off line replacement of Ascot Road overbridge. The realignment of Ascot Road will potentially reduce visibility to and from the compound access, increasing the risk of late braking and rear shunts.	Revise the drawings to incorporate the compound access onto the realigned Ascot Lane, ensuring that adequate forward visibility is available.	Designer agrees with the Safety Auditor comments, however the Compound 5 Access is no longer being provided so this comment doesn't apply.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-
4.1.2	Location: Ascot Road Summary: Reduced stopping sight distance The revised alignment of Ascot Road is subject to a compound departure in terms of the vertical profile and stopping sight distance. Although the proposed alignment is very similar to the existing profile, no advanced warning signs for the compound access have been provided for drivers approaching from the south. There is an increased risk of northbound vehicles intending to enter the compound slowing on	Provide an advance junction warning sign for northbound traffic on Ascot Road, prior to the over bridge.	Designer agrees with the Safety Auditor comments, however the Compound 5 Access is no longer being provided so this comment doesn't apply. The Alignment will revert to existing alignment.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	the approach, increasing the risk of rear shunts.					
4.1.3	Location: Ascot Road/Compound 5 access Summary: Compound access arrangements The size of Compound 5, its role, and the volume and type of vehicles accessing it during the construction period has not been provided. Access to the compound is promoted as right in/left out for construction traffic although it is not clear how this is going to be enforced, as only one map type ADS (location unknown) is provided for northbound traffic on Ascot Lane. The ghost right turn lane provided to facilitate right turn movements can only accommodate two heavy goods vehicles (HGVs). Ascot Road is subject to a 40mph speed limit and is subject to departures relating to forward visibility due to the crest. The combination of these issues could result in collisions involving turning vehicles, collisions due to HGVs undertaking movements that are not promoted, HGVs blocking the southbound Ascot Road carriageway and increased collisions relating to late braking. Recommendation	Ensure that a traffic management plan is put in place for Compound 5, that it is supplied to all contractors and that the signing of permitted/encouraged vehicle movements on Ascot Road is robust and provides suitable advanced warning. Ensure that the ghost right turn lane provides sufficient stacking space to accommodate the peak movement of HGVs to the compound.	Designer agrees with the Safety Auditor comments, however the Compound 5 Access is no longer being provided so this comment doesn't apply.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-
4.2.1	Location: Ascot Road/Compound 5 access Summary: Lack of sign locations and potential lack of clearance	Provide the sign locations and ensure a minimum clearance of 450mm	Designer agrees with the Safety Auditor comments, however the Compound 5 Access is no longer	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	Details of the proposed Ascot Road/Compound 5 access sign locations have not been provided. The proposed giveway sign at the compound access does not appear to have sufficient clearance to the edge of carriageway, increasing the risk of the sign face being struck, reducing its effectiveness. Poor sign location and insufficient clearance could result in driver confusion and injuries as a result of vehicles striking sign faces.	is provided from all sign faces to the edge of carriageway.	being provided so this comment doesn't apply. PMI has been received to design out the Compound Access – this is no longer an issue. Alignment will revert to existing.			
4.2.2	Location: Marsh Lane Summary: Lack of forward visibility to warning sign A proposed advance junction warning sign is provided at the back of the footway on the east side of Marsh Lane. It is not clear if adequate forward visibility to the junction warning sign will be provided, reducing the effectiveness of the sign and increasing the risk of late braking and rear shunts. The sign is also detailed to be mounted at 1.8m. At this height, pedestrians in the footway could strike the sign resulting in injury.	Ensure that adequate forward visibility to the warning sign is provided for southbound traffic. Mount the sign at a minimum of 2.1m.	Designer agrees with the Safety Auditor comments. Adequate forward visibility is achieved to the warning sign in accordance with TSRGD Chapter 4. Sign mounting height to be revised to a minimum 2.1m.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-
4.2.3	Location: Monkey Island Lane overbridge Summary: Lack of carriageway marking details No carriageway marking details have been provided for the Monkey Island Lane overbridge. A lack of carriageway markings,	Ensure suitable carriageway markings are provided for the extent of the Monkey Island Lane overbridge works.	Exception Designer disagrees with the Safety Auditor's recommendation Monkey Island Lane is a rural single carriageway road where the proposed width varies from	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	particularly a centre line, could result in head on collisions across the overbridge.		3.8m (tie in to existing) to 5.5m. Due to the restricted width centreline road markings have not been proposed in accordance with Traffic Signs Manual Chapter 5 Clause 4.6. The proposed design reflects the existing situation and has been agreed with the Local Highway Authority. Please note that a departure for the proposed reduced cross section, matching the existing, has also been approved by the Local Highway Authority.			
4.3.1	Location: Ascot Road/Compound 5 access Summary: Pedestrian facility provided away from the desire line An uncontrolled pedestrian crossing is provided across the compound access, set back approximately 20m from Ascot Road. This does not correspond with the likely pedestrian desire line across the junction and there is a risk that pedestrians will attempt to cross the compound access where there are no dropped kerbs, increasing the risk of trips and falls.	Increase the size of the junction to accommodate a pedestrian refuge within the mouth of the junction. Ensure that the revised junction layout can accommodate the expected vehicle movements to and from the compound.	Designer agrees with the Safety Auditor comments, however the Compound 5 Access is no longer being provided so this comment doesn't apply.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-
4.3.2	Location: Ascot Road/Compound 5 access Summary: Inconsistent use of tactile paving A number of the Ascot Road/Compound 5 access drawings show tactile paving on only one side of the proposed uncontrolled crossing of the compound access in an	Provide buff tactile paving on both sides of the crossing.	Designer agrees with the Safety Auditor comments, however the Compound 5 Access is no longer being provided so this comment doesn't apply.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
	unspecified colour. Visually impaired pedestrians may be unaware of the crossing, increasing the risk of trips/falls and collisions with vehicles.					
4.3.3	Location: Marsh Lane junction with Glebe Close Summary: Vehicles over running the proposed footway The existing 2m wide footway on the east side of Marsh Lane is being extended to Glebe Close. It then continues adjacent to the 3m wide Glebe Close carriageway, tieing into the public footpath previously accessed via an unmade ramp from Marsh Lane. During the site visit there was evidence of large vehicles accessing Glebe Close over running the verges either side of the junction, where the footway is to be provided. There is a risk that the proposed footway will be overrun where pedestrians could be walking, increasing the risk of injury.	Provide swept path analysis for the junction, including for large vehicles known to access Glebe Close.	Designer agrees with the Safety Auditor comments. The solution has been developed after consultation with the local authority, where it was agreed that the realignment of the footpath along Glebe Close would provide a safer access route for pedestrians compared to existing but also allow for vehicle movements that may overrun the verge in this very constrained area. Splay kerbs have been specified to facilitate these movements. Volume of both vehicular and pedestrian traffic is expected to be low.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-
4.3.4	Location: Marsh Lane/Glebe Close Summary: Pedestrian route signing Signing of the re-routed footpath via Glebe Close has not been provided. Pedestrians following the footpath may not appreciate that the route continues via Glebe Close. This could result in pedestrians seeking alternative routes, potentially resulting in injury.	Provide signing for the re-routed public footpath via Glebe Close.	Designer agrees with the Safety Auditor comments. A new sign will be provided to inform users of the new layout.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-

Road Safety Audit Stage 2 Rev P01 Issues				Audit Team Response		
Item No.	**Problem**	**Recommendation**	**Designer's decision log**	**Problem remains? (in part or full)**	**Comments**	**New Stage 2 item no.**
4.3.5	Location: Monkey Island Lane Summary: Misleading provision of tactile paving On the eastern side of Monkey Island Lane, tactile paving is provided on one side of the maintenance access. This indicates to visually impaired pedestrians that there is a matching facility on the opposite side of the access. The footway does not continue on the southside of the access, which could result in pedestrian trips and falls.	If the footway provision does not continue, remove the tactile paving provision.	Designer agrees with the Safety Auditor comments. Tactile paving to be removed.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-
4.3.6	Location: Marsh Lane overbridge Summary: Parapet infill not provided The Marsh Lane overbridge includes a 1.8m high parapet. The parapet includes mesh infill but does not include a solid panel at the base of the parapet. The solid panel helps shield the view of traffic passing under the bridge, which can unsettle horses, increasing the risk of conflict with passing vehicles and riders being unseated.	Incorporate the solid panel as recommended by the British Horse Society.	Designer agrees with the Safety Auditor comments but the design has been revised. The parapet height shown on the Rev C01 general arrangement drawing for Marsh Lane Replacement overbridge is in error and will be corrected at the next revision to state a 1.4m high parapet (as per the DCO discharge drawings for this bridge). It is not intended to provide an equestrian parapet at Marsh Lane.	N/A	Side roads and compounds have been omitted from this RSA and are subject to separate RSAs.	-

3 Items Raised at this Stage 2 Road Safety Audit - Mainline

3.1 General

Drainage

3.1.1 PROBLEM

Location: Existing Drainage Chambers EXC1B-002 (WB) and EXC1A-001 (EB) (Drawing No. HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5104 Rev C03)

Summary: Drainage chambers within traffic lanes may result in slip/fall hazards for motorcyclists leading to injury

At chainage 61620 an existing drainage chamber is positioned within the nearside diverge lane for Junction 12 from the M4 westbound carriageway. A similar scenario is located at chainage 61720 on the eastbound merge lane on to the M4 from Junction 12. There is a risk that the position of these drainage chambers may result in slips/falls by motorists, particularly motorcyclists, under wet road conditions leading to injury.

Recommendation

It is recommended that the chambers are appropriately sited out of the traffic lane to remove the slip/fall hazard.

3.1.2 PROBLEM

Location: Various Emergency Areas (Drawing No. HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5001-5077)

Summary: Location of EA spillage containment may lead to poor skid resistance of vehicles making an emergency stop due to uneven or slippery surface leading to injury.

Throughout the scheme, spillage containments are positioned within EAs. An example of this is at the proposed westbound EA E9-A2 located at chainage 5800. The details of these containment facilities are not clear and may pose a risk should they cause an uneven surface or impact on the skid resistance of vehicles making an emergency stop within these areas. This may lead to injury through loss of control collisions.

Recommendation

It is recommended that the EA spillage containment is appropriately sited to ensure it does not impact on vehicles entering the emergency areas.

Technology

3.1.3 PROBLEM

Location: Scheme wide

Summary: Non-installation of stopped vehicle detection (SVD) may lead to collisions

It is not clear from the RSA Brief documentation whether SVD is included in this scheme, other than the M4 scheme will adopt SVD if it is rolled out to all SM schemes. The faster roll out of SVD, one of the commitments in the Smart Motorway Stocktake, is to be completed within 36 months. Given that that this scheme is being constructed over this period it would be preferable if SVD formed part of the technology being delivered to improve the detection of stopped vehicles potentially reducing the risk of collisions involving vehicles stopped in a live lane. The risk of increased collision severity may become worse during low traffic high speed periods.

Recommendation

Incorporate SVD in accordance with the Smart Motorway Stocktake commitment.

Emergency Areas (EAs)

3.1.4 PROBLEM

Location: EA spacing - scheme-wide

Summary: Insufficient spacing of EAs may lead to shunt collisions

There does not appear to be enough EAs sufficiently located along the route. Should a motorist experience vehicle malfunction there is an increased likelihood that the motorist may have to stop in the carriageway and be exposed to greater risk and potentially live lane collisions. The situation may be exacerbated if SVD is not in operation or if the breakdown occurs during periods of high speed free-flowing traffic. The Audit Team does note however that the spacing of the EAs complies with Interim Advice Note 161/15 (IAN 161/15).

The recent Smart Motorway Stocktake outlined the Government's commitment to making smart motorways as safe as they can be and included a reduced distance between safe places to stop in an emergency to a maximum of a mile, applicable to new schemes. The Government is also considering a national programme of retrofitting additional EAs on existing smart motorways where places to stop are more than one mile apart.

It is not clear what the definition of a new scheme is and so the conversion of the M4 J3 to J12 to smart motorway appears to fall somewhere between being a new scheme and an existing scheme. Nevertheless by looking at the feasibility of implementing the new spacing distance at this stage would minimise the impact on motorists in the future as temporary traffic management is currently in place. This would also provide an improved spacing distance reducing the risk of live lane stops and associated collisions such as rear shunts.

Recommendation

It is recommended that the EA spacing distance is reduced in line with the Government's Smart Motorway Stocktake commitment.

3.1.5 PROBLEM

Location: EA E9-B2 (Drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1017 Rev C02 Sheet 17 of 91) M4 eastbound (chainage 57100)

Summary: Reduced visibility to EA E9-B2 may result in EA entry conflicts

Forward visibility to EA E9-B2 is potentially restricted by the parapet for Mortimer Line Railway underbridge which could also restrict visibility to the EA sign, depending on the mounting height. Drivers intending to use the EA may not appreciate its position so close behind the parapet and miss the EA increasing the risk of a live lane stop collision.

Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1017 Rev C02

Recommendation

It is recommended that the sign for the emergency area is mounted so that the bridge parapet does not obscure the sign face.

3.1.6 PROBLEM

Location: EA E9-A2 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1014 Rev C02 Sheet 14 of 91) M4 westbound (chainage 58000)

Summary: Reduced visibility to emergency area E9-A2 may lead to conflicts

Forward visibility to the ½ mile EA sign for EA E9-A2 is potentially restricted by the parapet for Mortimer Line Railway underbridge depending on the mounting height of the sign. Drivers intending to use the EA may not appreciate its position increasing the risk of a live lane stop collision.

Recommendation

It is recommended that the sign for the EA is mounted so that the bridge parapet does not obscure the sign face.

3.1.7 PROBLEM

Location: EAs E9-B2 and E8-B3 (Drawings HA514451-HGN-S1_ML000000_Z-DR-CH-1017 and 1029 Revs C02 Sheets 17 and 29 of 91) M4 eastbound (chainages 57100 and 52800)

Summary: Insufficient signing of places of relative safety may lead to collisions

An EA (E9-B2) is provided on the eastbound M4 at chainage 57000. The next place of relative safety is either the hard shoulder provided through junction 11 or the eastbound diverge slip,

a spacing of approximately 1.8km. These places of relative safety are not signed and it is not clear if emergency roadside telephones (ERTs) will be provided now that the through junction running has been removed as part of the value engineering exercise. If a driver misses these opportunities to stop then the next EA sign is at chainage 54000 indicating ⅔ mile to EA E8-A1 (Ch 52800). The total distance between the two EAs E9-B2 and E8-B3 is approximately 4.2km which could result in an increase in live lane stop collisions.

Recommendation

It is recommended that additional ERTs are provided and that signing is provided to advise drivers of places of relative safety, such as the junction 11 diverge, or that hard shoulder is available intra junction at junction 11.

3.1.8 PROBLEM

Location: EA E8-B1 and E7-B4 (Drawings HA514451-HGN-S1_ML000000_Z-DR-CH-1040 and 1055 Revs C02 Sheet 40 and 55 of 91) M4 eastbound (chainages 48800 and 43300)

Summary: Insufficient signing of places of relative safety may lead to collisions

An EA (E8-B1) is provided on the eastbound M4 at chainage 48800. The next place of relative safety is either the hard shoulder provided through junction 10 or the eastbound diverge slip, a spacing of approximately 2km. These places of relative safety are not signed and it is not clear if emergency roadside telephones will be provided now that the through junction running has been removed as part of the value engineering exercise. If a driver misses these opportunities to stop then the next EA sign is at chainage 45750 indicating 1½ mile to EA E7-B4 (Ch 43300). The total distance between the two EAs E8-B1 and E7-B4 is approximately 5.5km which could result in an increase in live lane stop collisions.

Recommendation

It is recommended that additional ERTs are provided and that signing is provided to advise drivers of places of relative safety, such as the junction 10 diverge, or that hard shoulder is available intra junction at junction 10.

3.1.9 PROBLEM

Location: EA E7-B1 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1073 Rev C02 Sheet 73 of 91) M4 eastbound (chainage 36800) and the unknown next EA

Summary: Insufficient signing of places of relative safety may lead to collisions

An EA (E7-B1) is provided on the eastbound M4 at chainage 36800. The next place of relative safety is either the hard shoulder provided through junction 8/9 or the eastbound diverge slip, a spacing of approximately 2.35km. These places of relative safety are not signed and it is not clear if ERT will be provided now that the through junction running has been removed as part of the value engineering exercise. If a driver misses these opportunities to stop then the next EA sign is beyond chainage 33500 which is the extent of the Package 1 section. The gap between EAs is therefore unclear, although is likely to be in excess of 5km, which could result in an increase in live lane stop collisions.

Recommendation

It is recommended that additional emergency phones are provided and that signing is provided to advise drivers of places of relative safety, such as the junction 8/9 diverge, or that hard shoulder is available intra junction at junction 8/9.

3.1.10 PROBLEM

Location: EAs E7-A4 and E8-A1 (Drawings HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1042 and 1056 Revs C02 Sheet 42 and 56 of 91) M4 westbound (chainages 43100 and 48100)

Summary: Signing of places of relative safety

An EA (E7-A4) is provided on the westbound M4 at chainage 43100. The next place of relative safety is either the hard shoulder provided through junction 10 or the westbound diverge slip, a spacing of approximately 2.3km. These places of relative safety are not signed and it is not clear if ERT will be provided now that the through junction running has been removed as part of the value engineering exercise. If a driver misses these opportunities to stop then the next EA sign is at chainage 45600 indicating 1½ mile to EA E8-A1 (Ch 48100). The total distance between the two EAs E7-A4 and E8-A1 is approximately 5km which could result in an increase in live lane stop collisions.

Recommendation

It is recommended that additional signing is provided to advise drivers of these places of relative safety such as follow junction 10 for emergency telephone/layby, or that hard shoulder is available intra junction at junction 10.

3.1.11 PROBLEM

Location: EAs E8-A3 and E9-A1 (Drawings HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1029 and 1019 Revs C02 Sheet 29 and 19 of 91) M4 westbound (chainages 52650 and 56200)

Summary: Signing of places of relative safety

An EA (E8-A3) is provided on the westbound M4 at chainage 52650. The next place of relative safety is either the hard shoulder provided through junction 11 or the westbound diverge slip, a spacing of approximately 2.25km. These places of relative safety are not signed and it is not clear if ERTs will be provided now that the through junction running has been removed as part of the value engineering exercise. If a driver misses these opportunities to stop then the next EA sign is at chainage 55400 indicating ½ mile to EA E9-A1 (Ch 56200). This sign is set back from the mainline carriageway behind an area of hatching and could easily be missed. The total distance between the two EAs E8-A3 and E9-A1 is approximately 4.5km which could result in an increase in live lane stop collisions.

Recommendation

It is recommended that additional emergency phones are provided and that signing is provided to advise drivers of places of relative safety, such as the junction 11 diverge, or that hard shoulder is available intra junction at junction 11.

3.1.12 PROBLEM

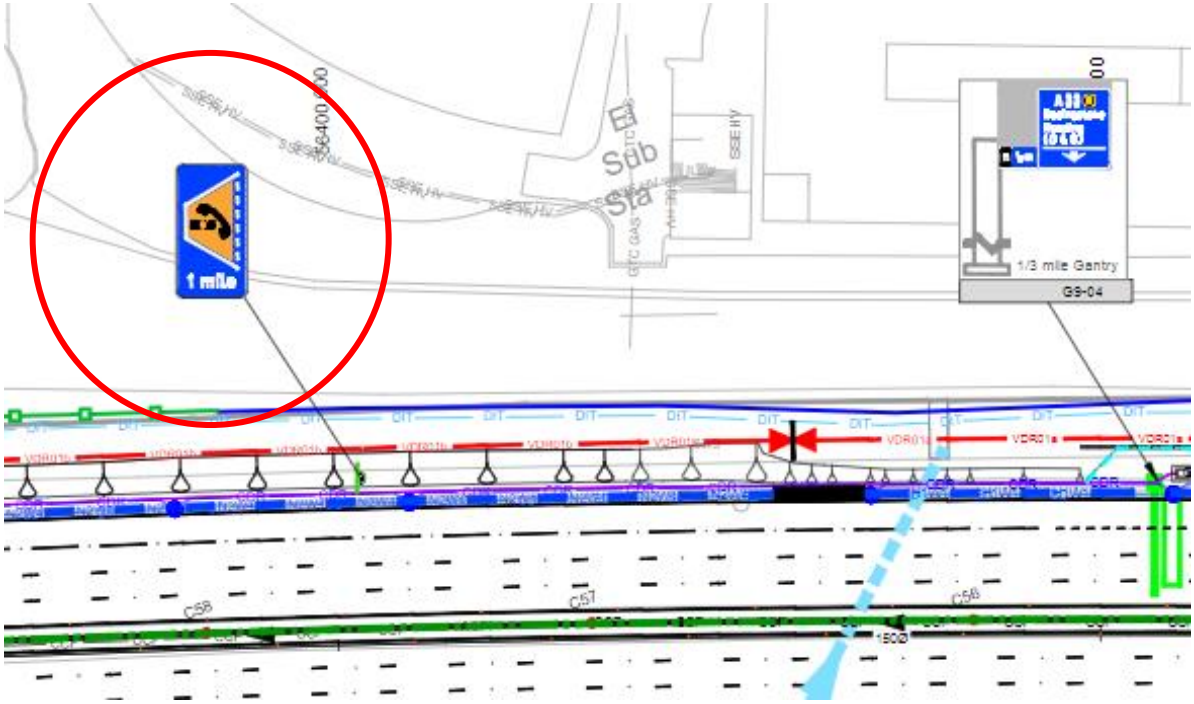
Location: Eastbound EA sign PS-B-67/3_50 (Drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1019 Rev C02 Sheet 19 of 91) M4 westbound (chainage 556400)

Summary: EA sign provided does not correlate with an EA and may result in motorists traveling further to seek assistance

The eastbound 1 mile EA sign PS-B-67/3_50 provided at chainage 56400 does not correlate with an EA, as the next mainline EA is 2.2 miles/3.6km to the east. If the sign is intended to

reference a place of relative safety at junction 11, it is not clear where this is and that drivers would have to leave the mainline carriageway. The use of an EA sign with orange coloring could also be misleading.

This increases the risk of live lane breakdowns which could result in further collisions.



Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1019 Rev C02

Recommendation

It is recommended that the referenced EA is clarified and the sign removed or replaced accordingly. If the sign is referencing a place of relative safety additional signing should be provided to advise drivers, such as 'follow junction 11 for emergency telephone/layby', or that hard shoulder is available intra junction at junction 11.

3.1.13 PROBLEM

Location: EA E9-A1 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1019 Rev C02 Sheet 19 of 91) M4 westbound (chainage 56200)

Summary: No 1 mile EA sign provided could lead to vehicles stopping in the live carriageway.

A westbound 1 mile EA sign for EA E9-A1 has not been provided. Reduced signing for EAs could result in drivers stopping in a live lane due to lack of information increasing the risk of live lane stop collisions.

Recommendation

It is recommended that a 1 mile sign for EA E9-A1 is provided.

3.1.14 PROBLEM

Location: EA E8-A1 (Drawings HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1056 Rev C02 Sheet 56 of 91) M4 westbound (chainage 48100)

Summary: Distance sign consistency

The distance signs provided for EA E9-A1 westbound are a 1½ mile, 2/3 mile and 1/3 mile. A close proximity yard sign has not been provided unlike EA E8-B3 eastbound where a 2/3 mile, 1/3 mile and 300 yard sign has been provided. Excluding a yard sign may confuse some drivers as to the proximity of the EA resulting in late braking/lane changing collisions.

Recommendation

It is recommended that a yard sign is provided for continuity.

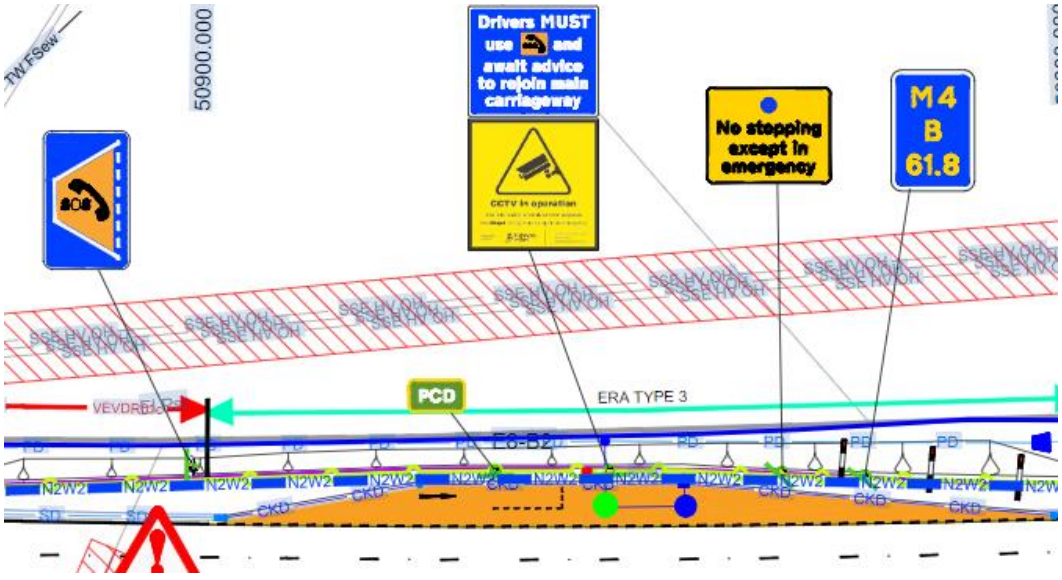
3.1.15 PROBLEM

Location: EA E8-B2 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1034 Rev C02 Sheet 34 of 91) M4 eastbound (chainage 50850)

Summary: Lack of safe place for pedestrians and operatives

EA E8-B2 is provided at chainage 50900 eastbound. At the rear of the EA is a combination of road restraint system (RRS), EA signing, the emergency telephone and 2.5m high environmental barrier. The area behind the RRS appears too narrow (to wait outside the barriers working width) and cluttered to represent a safe place for pedestrians/operatives to be should they have exited their vehicles.

This could result in further collisions and increase the risk of injuries to pedestrians and operatives who may attempt to seek refuge between the RRS and the environmental barrier or should they attempt to find alternative safe areas by walking onto or near the live carriageway.



Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1034 Rev C02

Recommendation

It is recommended that the environmental barrier is set back, allowing for a place of safety outside of the RRS working width.

3.1.16 PROBLEM

Location: EA E7-B4 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1055 Rev C02 Sheet 55 of 91) M4 eastbound (chainage 43300)

Summary: EA on embankment with limited pedestrian restraint may put those exiting their vehicle at risk

EA E7-B4 at chainage 43300 (eastbound) is on an embankment. The RRS drawings indicate that a pedestrian restraint is provided at the top of the slope, but this only covers the area immediately behind the emergency telephone, not the EA tapers. If a vehicle occupant exits the vehicle and crosses the RRS within the tapers (for instance if this is where their vehicle came to rest) they will be vulnerable to slips/falls down the slope.

Recommendation

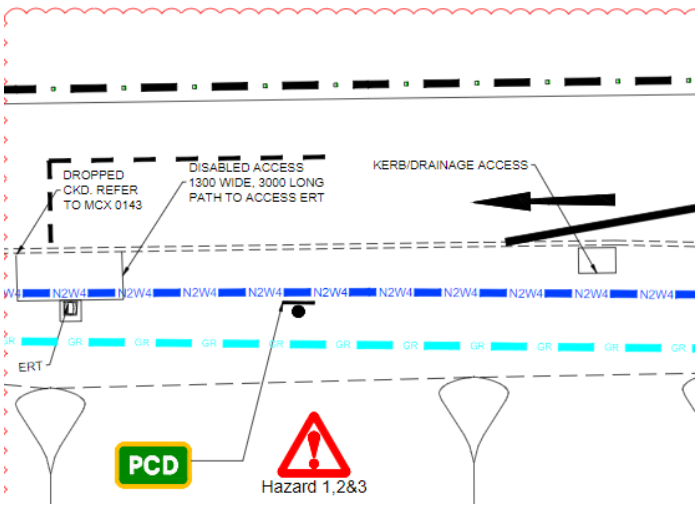
It is recommended that pedestrian restraint is provided (outside of RRS working widths) at the top of the slope for the length of the EA.

3.1.17 PROBLEM

Location: Emergency areas

Summary: Provision of dropped kerbs at ERTs

The police observation platform (POP) specification drawings indicate a 3m dropped kerb at the ERT to enable disabled access to the telephone following the recommendation to alight the vehicle via the passenger side. The EA markings proposed to indicate to drivers where to stop their vehicle may inadvertently block the dropped kerbs, reducing accessibility to the ERT, particularly for those with mobility impairment. It is noted that although drivers are advised to exit their vehicle via the passenger seat both able-bodied drivers and those mobility impaired are likely to struggle to exit most modern UK vehicles in that manner and are likely rather to choose to exit via the driver's side accordingly. There is a risk that in blocking access to the dropped kerbs this could result in a motorist being unable to access the phone without positioning their vehicle in a potentially more vulnerable position closer to the live carriageway.



Extract from drawing HA514451-CHHJ-HGN-S1_MLZZZZZZ_Z-DR-CH-0003 Revision C03

Recommendation

It is recommended that the markings indicating where to stop within the EA are revised to ensure that the dropped kerbs can be accessed.

Emergency Roadside Telephones (ERTs)

3.1.18 PROBLEM

Location: Intra junction ERTs

Summary: Availability of ERTs intra junction may put motorists at risk of collisions

It is not clear from the drawings if existing intra junction ERTs are being retained, specifically where TJR has been removed and hard shoulders are available as places of relative safety. If these sections of hard shoulder are considered as a place of relative safety in terms of the required spacing, ERTs are required. Drivers needing to access a place of relative safety may not be aware of these locations and could continue at slow speeds to the next signed EA, at risk of collisions with vehicles that have not acknowledged a speed differential.

Recommendation

It is recommended that clarification on the status of the intra junction hard shoulder is provided and ERTs included if necessary.

Surfacing

3.1.19 PROBLEM

Location: Various

Summary: Inconsistent use of coloured surfacing in EAs may result in live lane collisions

Inconsistent use of coloured surfacing is provided in the EAs depending on the drawing set provided with the audit brief. Orange surfacing is shown in the sign drawings while the general arrangement drawings show no colour. In accordance with the smart motorway stocktake EAs are to be made more visible by introducing orange surfacing as standard. Omitting the orange surfacing will reduce the visibility of the EAs and may result in drivers missing them, resulting in live lane collisions.

Recommendation

It is recommended that all the EAs within the scheme are surfaced orange.

Landscaping

3.1.20 PROBLEM

Location: Scheme wide

Summary: Vegetation impacting forward visibility

Temporary vegetation clearance is detailed throughout the majority of Package 1 between the edge of carriageway and the highway boundary or environmental barriers. The drawings state that following construction of the final scheme, vegetation is to be 'reinstated as appropriate', although the type of planting is not clear.

The reallocation of carriageway space will result in vehicles in lane 1 being immediately adjacent to the edge of carriageway. It is likely that over time vegetation in the verge, or from outside the highway boundary, will reduce forward visibility to other vehicles and signs. This is likely to be exacerbated where; the carriageway bends to the left, forward visibility is impacted by bridge structures, fencing, barriers or signage, and for drivers of left-hand drive vehicles.

Reduced forward visibility could increase the risk of rear shunts and side impact collisions due to lane changing.

The Audit Team notes from the RSA Brief that there has been a historic lack of routine maintenance particularly affecting overgrown vegetation.

Recommendation

It is recommended that existing and reinstated vegetation (either from inside or outside the highway boundary) does not adversely impact forward visibility to other vehicles or signs at the time of completion and in the future. Forward visibility splays should be included within future maintenance programmes to ensure visibility is retained.

Road Restraint System (RRS)

3.1.21 PROBLEM

Location: Various - scheme wide

Summary: RRS working width impacted by pedestrian restraint barrier

Pedestrian restraint barrier is detailed within the working width of the RRS at a number of EA locations. Examples include EA E9-B3 at chainage 60350 and EA E9-B2 at chainage 57050.

This could increase the severity of a loss of control collision, result in secondary collisions and increase the risk of injuries to pedestrians and operatives who may be between the RRS and the pedestrian restraint barrier.

Recommendation

It is recommended that all pedestrian restraint barrier is located outside the working width of the RRS.

3.1.22 PROBLEM

Location: Chainage 59900 (Drawing HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4009 Rev C04 Sheet 9 of 91)

Summary: RRS working width impacted by environmental barrier

Environmental barrier is detailed within the working width of the RRS at chainage 59900.

This could increase the severity of a loss of control collision, result in secondary collisions and increase the risk of injuries to pedestrians and operatives who may be between the RRS and the pedestrian restraint barrier.

Recommendation

It is recommended that all environmental barrier is located outside the working width of the RRS.

3.1.23 PROBLEM

Location: Various - scheme wide

Summary: RRS impacted by gantry posts and foundations

At a number of locations, RRS drawings show gantry posts and foundations either within the working width or directly tied into RRS. Where a gantry foundation is tied into the RRS, a vehicle being contained is channelled towards the foundation. Examples include chainages 62400, 61500, 56900, 56300, 55630, 53750, 52800, 52150, 52100, 49350, 48300, 42940, 39250, 36650, 35800 and 35080.

These posts, structures or large foundations are substantial and if tied into the RRS or located within the working width, could increase the severity of a loss of control collision.

Recommendation

It is recommended that the RRS at each location has suitable properties to contain and/or channel vehicles beyond large gantry posts and foundations, rather than direct vehicles towards them.

3.1.24 PROBLEM

Location: Various - scheme wide.

Summary: RRS working width impacted by sign posts

At various locations signs and sign posts are detailed within the working width of the RRS. Examples include:

- at the rear of EAs E7-B4, E9-B2 and E9-B3 (chainages 43300, 57100 and 60350)
- marker post B 58.7 eastbound at chainage 47700
- marker post B 50.0 eastbound at chainage 39100

This could increase the severity of a loss of control collision, result in secondary collisions and increase the risk of injuries to pedestrians and operatives who may be standing behind the RRS.

Recommendation

It is recommended that all signs are located outside the working width of the RRS.

3.1.25 PROBLEM

Location: Scheme wide

Summary: Identification of Emergency Crossover Points (ECPs) in the event of an incident

ECPs are provided within the central restraint system at chainages 58600, 51000, 41250 and 38400. It is unclear from the information provided how these will be marked and identifiable to traffic/police officers who may be travelling through congestion or at speed on the opposing carriageway. Issues in identifying the ECP could increase the risk of secondary collisions involving traffic/police officers.

Recommendation

It is recommended that all ECPs are clearly marked and identifiable and that relevant organisations are made aware of their locations.

3.1.26 PROBLEM

Location: A329(M) westbound merge with M4 at chainage 46000 (Drawing HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4048 Rev C04 Sheet 48 of 91)

Summary: RRS omitted on the outside of the bend may not protect errant vehicles

At chainage 46000 the A329(M) merges with the westbound M4 carriageway via a bend with a tight radius. From the drawings provided it is unclear if the RRS on the outside of the bend is being retained and how it would tie into the proposed RRS. The omission of RRS at this location could increase the severity of loss of control collisions of errant vehicles on the radii.

Recommendation

It is recommended that RRS, which ties into the proposed mainline RRS, is provided on the outside of the bend between the A329(M) and westbound M4.

3.1.27 PROBLEM

Location: Eastbound exit from junction 12 at chainage 62100 (Drawing No. HA514451-CHHJ-HSC-S1_MLZZZZZZZZ_Z-DR-CH-2003 Rev C01)

Summary: Removal of existing RRS may not protect errant vehicles leaving the junction

At chainage 62100 the existing RRS is to be removed on the inside of the bend on the eastbound exit from junction 12. However, it has been identified that the proposed RRS along the eastbound onslip should be tying into the existing provision. The removal of RRS at this location could increase the severity of loss of control collisions of errant vehicles on the radii, particularly for those motorists leaving the junction from the northern circulatory.

Recommendation

It is recommended that the existing RRS is retained and ties into the proposed RRS along the eastbound onslip to the M4 mainline carriageway.

3.1.28 PROBLEM

Location: A-chambers on M4 mainline (Drawing No. HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1001-1082)

Summary: Unprotected A-chambers may result in errant vehicles striking road workers

There are a number of proposed A-chambers along the scheme that do not appear to be protected by proposed or existing RRS. An example of this can be found at chainage 59720 where the A-chamber, located north of the M4 eastbound mainline carriageway, is unprotected as the proposed RRS terminates to the west of this location. Details of how these A-Chambers will be accessed have not been provided. There is a risk that operatives working within these areas would be unprotected leading to potential conflict with errant vehicles.

Recommendation

It is recommended that all A-chambers are protected by RRS.

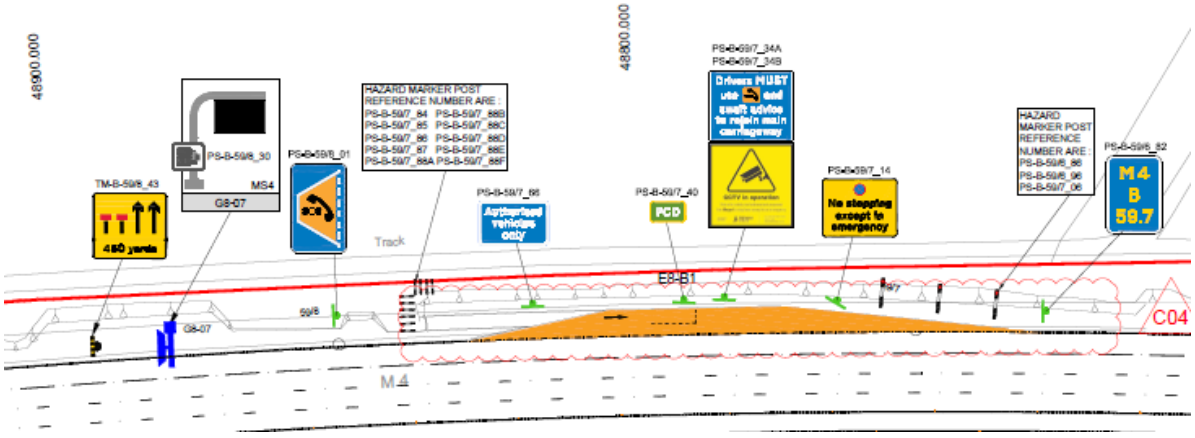
Police Observation Platforms (POPs)/Areas

3.1.29 PROBLEM

Location: Various - scheme wide

Summary: Unauthorised use of Police Observation Platforms/Areas may lead to collisions

At a number of EA's an overlapped break in RRS is provided to accommodate a police observation platform or area. Examples include EA E8-B1 at chainage 48800, E7-B1 at chainage 36800 and E8-A2 at chainage 50550.



Extract from drawing HSN-S1_ZZZZZZZZ_Z-DR-CH-12040 Revision C04

In addition there is a break in the RRS at chainage 37300 eastbound that coincides with the access to an existing POP. It is unclear if the POP is to remain as part of the scheme.

Unauthorised use of these areas, by vehicles or occupants exiting a vehicle, increases the risk of collisions involving static vehicles, occupants outside of their vehicle and vehicles re-joining the carriageway.

Recommendation

It is recommended that all police observation platforms/areas are clearly signed and demarcated to discourage use by unauthorised vehicles and occupants.

3.1.30 PROBLEM

Location: EA E7-B1 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1073 Rev C02 Sheet 73 of 91) M4 eastbound (chainage 36800)

Summary: Potential mis-use of police observation platforms

A police observation platform has been provided within eastbound EA E7-B1 and is surfaced in red. The police observation platform in westbound EA E7-A3 has not been surfaced in red and may result in misuse if it is not clear that it is only for authorised drivers.

Recommendation

It is recommended that the surfacing of police observation platforms is the same for consistency and to avoid mis-use by unauthorised drivers.

Access

3.1.31 PROBLEM

Location: Various – scheme wide

Summary: Footways and stepped accesses impeded by rails, restraints and barriers

Footways and stepped accesses are provided through the scheme in order to facilitate future maintenance and inspections. A number of the footways and stepped accesses appear to cross through/over guard rails, restraint systems and barriers (such as environmental barrier). Chainage 61200 westbound provides an example.

This could lead to operatives having to climb over rails, restraints and barriers to get access or increase the potential for operatives within RRS working widths or the carriageway. This could lead to secondary collisions, should an errant vehicle leave the carriageway at these locations.

Recommendation

It is recommended that all footways and stepped accesses are accessible by operatives and are located outside of RRS working widths.

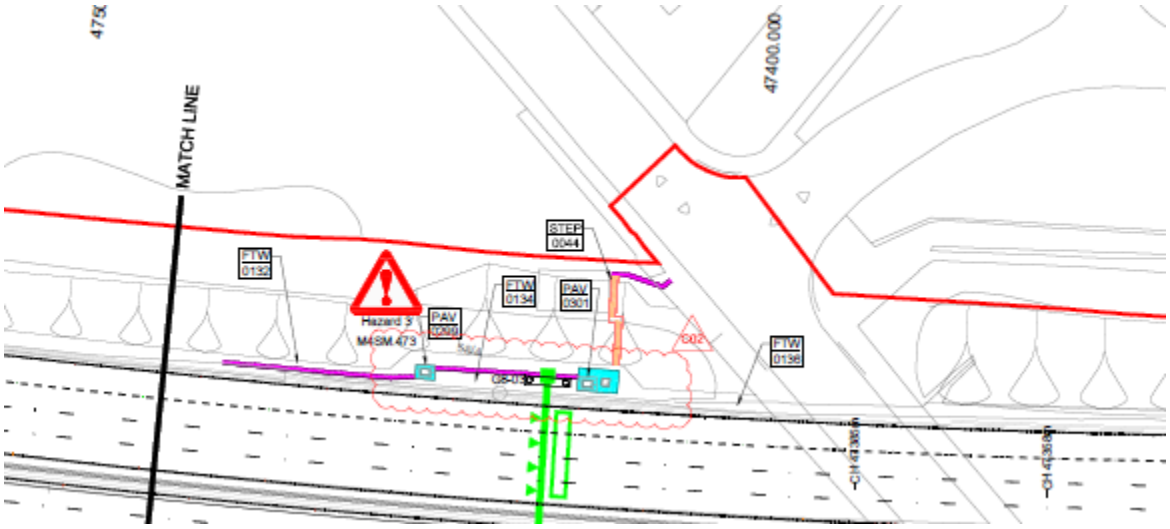
3.1.32 PROBLEM

Location: Reading Road (Drawing HKF-S1_ZZ000000_Z-DR-CH-11044 Rev C02 Sheet 44 of 91) M4 eastbound (chainage 47420)

Summary: Potential unauthorised access to the M4 carriageway

The kerbs and footways drawings detail a new maintenance access to the M4 carriageway, via a footway and access steps, at chainage 47420. It is unclear how the access will interact with the existing Reading Road footway and the post and rail fence. The direct, paved access to the M4 at this location could result in unauthorised use of the access and increase the

potential for pedestrians to be alongside or within the M4 carriageway. In turn this increases the potential for collisions involving pedestrians.



Extract from drawing HKF-S1_ZZ000000_Z-DR-CH-11044 Revision C2

Recommendation

It is recommended that all operative access footways and steps that interact with public footways include controlled access and are clearly signed to enforce this.

Skid Resistance

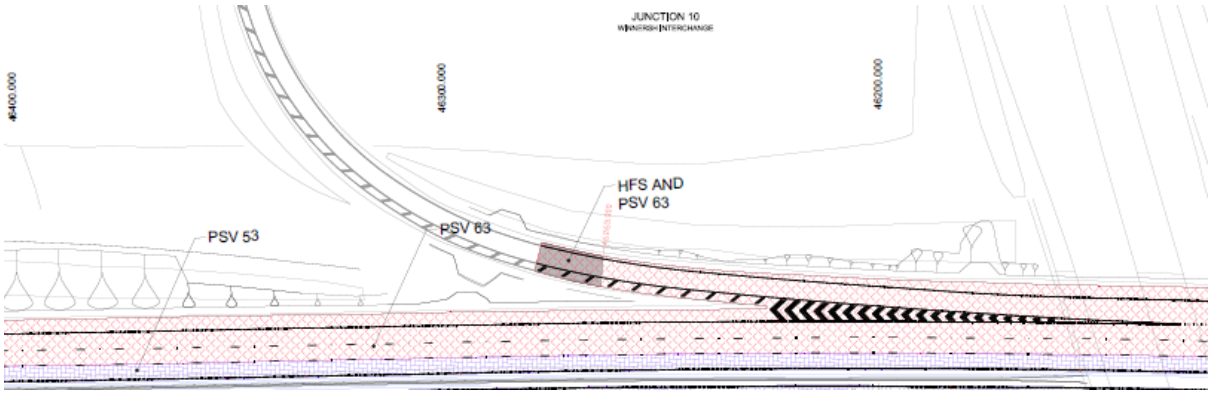
3.1.33 PROBLEM

Location: Various merge and diverge slip roads

Summary: Unintended effects of new short lengths of high friction surfacing (HFS)

HFS is provided for very short lengths on a number of junction merge and diverge slip roads. These short lengths tie in to the existing, often worn, provision. This is particularly of note on the A329 (M) northbound to eastbound merge slip (chainage 46300).

The proposed HFS is likely to have a considerably greater braking coefficient than the existing and will be much more visible. This may confuse motorists resulting in late braking and an increased risk of loss of control collisions particularly for motorcyclists.



Extract from drawing HPV-S1_ML000000_Z-DR-CH-0747 Revision C01

Recommendation

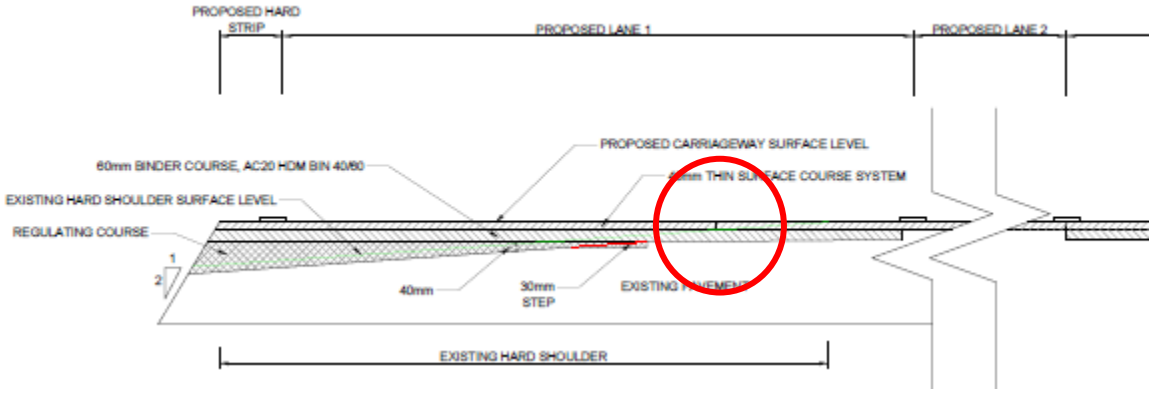
It is recommended that where HFS ties into an existing provision, new HFS is provided for the full length of the existing provision.

3.1.34 PROBLEM

Location: Various

Summary: Surface joints in wheel tracks

Throughout the scheme there are short lengths of lane one and lane two subject to different surfacing arrangements to the surrounding lanes (most often pavement type P1 – resurfacing). The pavement and cross section drawings provided indicate that a surface course joint may be present within the lane extents and in a wheel track. Given that lanes one and two are subject to the highest volume of vehicles, particularly heavy vehicles, there is increased potential for this joint to fail over time. This can reduce the quality of the surface, effect vehicles under braking conditions and may hold standing water, increasing the risk of loss of control collisions. The Audit Team also noted that some sections of the surfacing reinstatement appeared to disturb or influence the direction of travel, and that this is likely to have a greater impact on powered-two-wheelers.



Extract from drawing HA514541-CHHJ-HPV-SZ_ZZZZZZZZ_Z-DE-CH-0001 Revision C01

Recommendation

It is recommended that all pavement joints are located outside of wheel tracks.

3.2 Junctions

Traffic Signals

3.2.1 PROBLEM

Location: Various entry slip roads

Summary: Ramp metering measures on entry slip roads could lead to collisions

Ramp metering is being retained but the ramp metering layout, markings, surfacing and signing are often unclear. Stop lines are not shown and details regarding the signal equipment have not been provided. This could lead to driver confusion, hesitation and late braking resulting in shunt type collisions.

Recommendation

It is recommended that stop lines are proposed at ramp metering locations and all details are provided to confirm the layouts and how they interface with the proposed merges.

3.3 Road Signs, Carriageway Markings and Lighting

Road Signs

3.3.1 PROBLEM

Location: Scheme wide

Summary: Lack of post and foundation details may present a risk to road users

Sign post and foundation details have not been provided. There are a number of instances where signs and posts appear to be unprotected. If these sign posts are not passively safe it could increase the risk and severity of injuries should a vehicle leave the carriageway.

Recommendation

It is recommended that all unprotected sign posts are passively safe.

3.3.2 PROBLEM

Location: Remotely operated temporary traffic management signs

Summary: Lack of sign face, post and foundation details

Remotely operated temporary traffic management signs are proposed at locations throughout the Package 1 section. No details have been provided regarding the size of sign faces, posts or foundations associated with these signs. Signs of an inappropriate size could result in driver confusion (if too small), conflict with vehicle restraint systems or impact on forward visibility to other permanent signs.

Recommendation

It is recommended that all remotely operable temporary traffic management signs are of appropriate size, are positioned outside the working width of vehicle restraint systems and do not impact on forward visibility to permanent signs.

3.3.3 PROBLEM

Location: Various – scheme wide

Summary: Inconsistent provision of road layout merge/diverge signs

Informatory road layout merge/diverge signs are not provided at every junction or at Reading services. This includes merge/diverges that are somehow compromised by having short offside merging arrangements or subject to departures. As an example, informatory road layout merge/diverge signs such as PS-B-73/0A and B and PS-B-72/8_60 are provided at the J12 eastbound merge and provide information on the merge layout for drivers on the slip road and the mainline carriageways. This is repeated in part at J10, but not at J11 and J8/9, despite similar layouts. This is particularly concerning due to the short offside merge length associated with the eastbound carriageway.

This could result in driver confusion, increasing the risk of shunt or side-swipe collisions associated with vehicles immediately merging/diverging to/from the M4 carriageway.

Recommendation

It is recommended that informatory road layout merge/diverge signs are provided at each merge/diverge.

3.3.4 PROBLEM

Location: Various - scheme wide

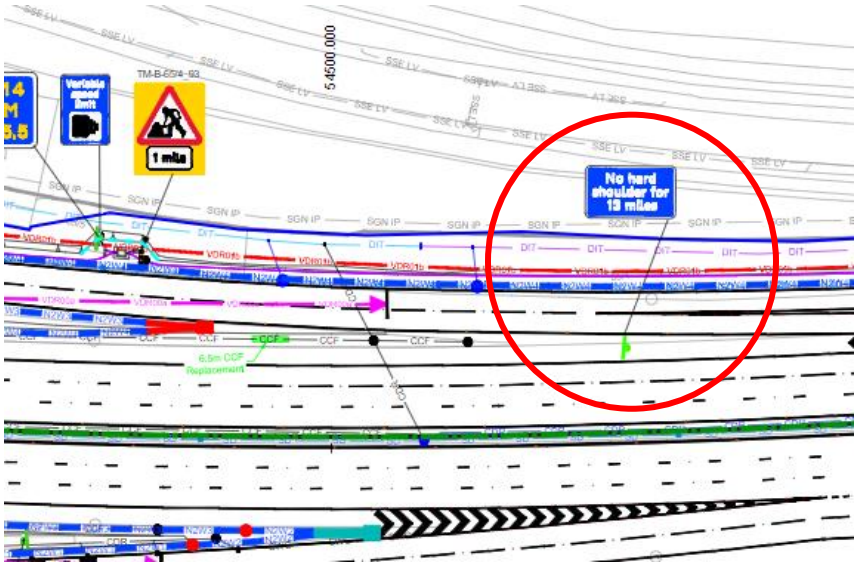
Summary: Signs located in front of the RRS or in gaps in the RRS

A number of signs are located in front of the RRS or in gaps in the RRS provision. It is unclear from the information provided whether the signs and post arrangements are passively safe. Examples include:

- sign TM-B-73/3_17 at chainage 62400
- sign PS-A-45/2_68 at chainage 34300
- marker post B 53.0 (eastbound) at chainage 42000
- '*No hard shoulder for 13 miles'* sign (eastbound) at chainage 54400
- '*No hard shoulder for 5 miles'* sign (westbound) at chainage 55200
- '*No hard shoulder for 4 miles'* sign (eastbound) at chainage 34000
- Marker post A 45.0 (westbound) at chainage 34100
- Marker post M4 K 66.0 WB on-slip from Junction 11 at chainage 5520
- Sign PS-B-45/3_68 on EB offslip nosing to Junction 8/9

In the event of a vehicle leaving the carriageway they could strike or be led into the signs and post arrangements, potentially increasing the severity of the collision or generating a secondary collision.

With respect to marker post B 53.0 (circled below) this sign would also prevent a vehicle using the gap in the event of a breakdown in order to limit the effect of a live lane breakdown collision.



Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1024 Rev C03

Recommendation

It is recommended that all signs and post arrangements are either located behind RRS (outside of the working width) or are passively safe.

3.3.5 PROBLEM

Location: Reading Motorway Service Area (MSA) merges and diverges (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12011 Rev C04 Sheet 11 of 91) M4 eastbound and westbound (chainage 59200)

Summary: Existing signs removed

At the merges and diverges to/from Reading MSA the existing bend warning signs, chevrons, advisory speed limits and motorway regulations signs have been removed. This could result in drivers being unaware of the tight bends, speed limits and start/end of motorway regulations increasing the potential for loss of control collisions and inappropriate speeds.

Recommendation

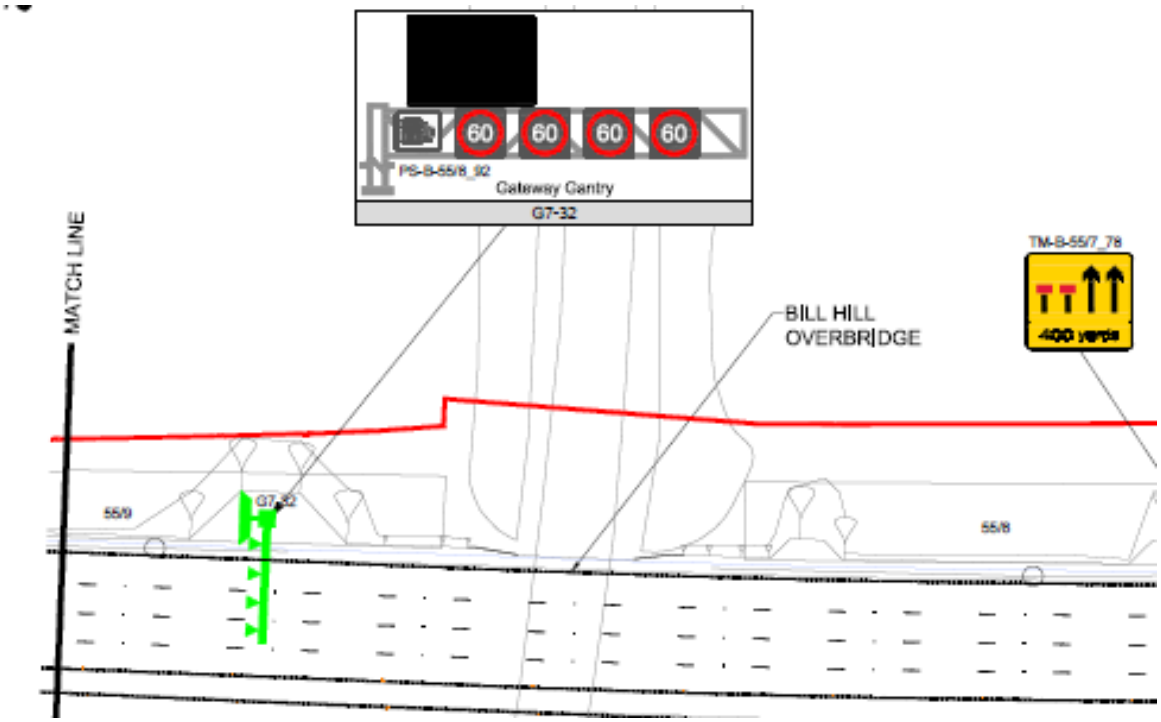
It is recommended that existing signing of the bends, chevrons, advisory speed limits and motorway regulations signs are retained at all of the Reading MSA merges and diverges.

3.3.6 PROBLEM

Location: Various - scheme wide single span gantries

Summary: Gantry signs not aligned over the offside lane (lane 4)

The plans provided show gantries that appear not to extend across the whole carriageway while including signs relevant to the offside lane (LBS4 4). This includes but is not limited to eastbound gantries G7-32 (chainage 44900), G7-31 (chainage 44750) and G7-23 (chainage 41750) and westbound gantries G7-21 (chainage 41100), G7-22 (chainage 53600) and G7-31 (chainage 44750). This could result in driver confusion, particularly with regards to 'red-x' emergency lane closures and lane designation, increasing the risk of secondary and lane change collisions.



Extract from drawing showing G7-32 (chainage 44900),

Recommendation

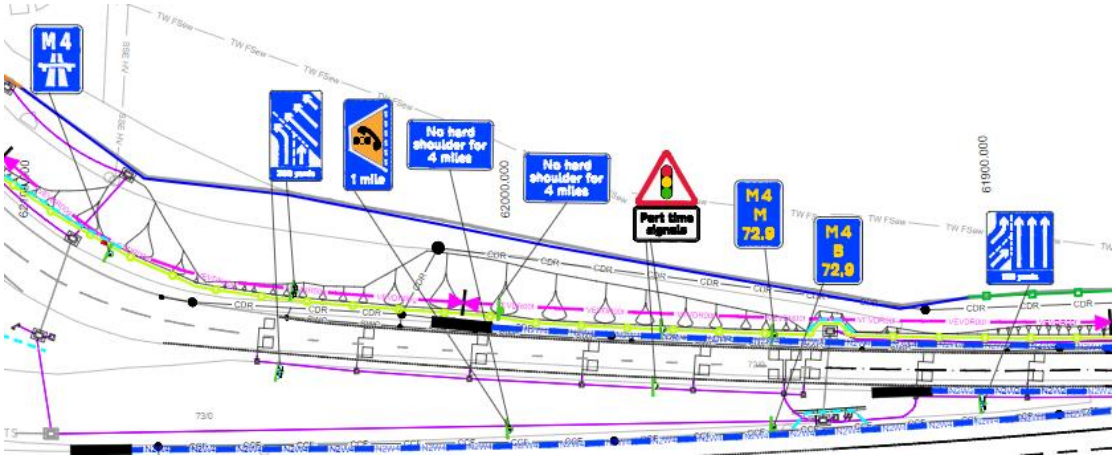
It is recommended that all gantries cover the full carriageway width, with signs aligned over the centre of each running lane.

3.3.7 PROBLEM

Location: Junction 12 eastbound merge (Drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1003 Rev C02 Sheet 3 of 91 chainage 62000)

Summary: Sign clutter resulting in reduced visibility to sign faces

Nine signs are provided in the nearside verge of the eastbound merge at junction 12. The number of signs and the spacing between them is likely to result in information overload and reduced visibility to sign faces. This could result in drivers being unaware of hazards or the upcoming merge layout. In turn this could lead to rear shunt type collisions at the ramp metering or side impact collisions at the merge.



Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1003 Rev C02

Recommendation

It is recommended that the number of signs is rationalised where possible and that adequate clear forward visibility is provided to all sign faces.

3.3.8 PROBLEM

Location: Various – scheme wide

Summary: Signs impacting visibility to downstream sign faces

At a number of locations it appears that signs impact the visibility to other sign faces downstream. Examples include;

- EA 1½ miles sign PS-B-70/4_97 at chainage 59540 which is masked by the existing Reading Services sign
- TM sign TMA47/4_84 at chainage 36500 which is masked by EA sign PS-A-47/4_70
- various signs around chainage 53400 eastbound
- ½ mile EA sign(westbound) at chainage 35200 could obscure downstream route confirmatory sign
- 1 mile EA sign (westbound) at chainage 58700 could be obscured by preceding 200 yard sign

- TTM 850yds lane closure sign masked by EA 300yds sign PS-A-63/2_45 at chainage 52300

This could result in drivers missing information, increasing the potential for collisions.

Recommendation

It is recommended that adequate clear forward visibility is provided to all sign faces.

3.3.9 PROBLEM

Location: Various – scheme wide

Summary: Visibility to sign faces reduced if mounted too low

The mounting heights of signs are unknown. At certain locations signs are proposed downstream of vertical features such as barriers, pedestrian barriers, bridge parapets etc. This could result in sign faces being fully or partially obscured if mounted too low, increasing the potential for a wide range of collisions due to drivers missing information. Locations include:

- PS-B-71/3_50 at chainage 60400
- PS-B-68/0_58 at chainage 51700
- EA sign (westbound) at chainage 50500.

Recommendation

It is recommended that all signs are mounted at suitable heights to ensure adequate forward visibility is provided.

3.3.10 PROBLEM

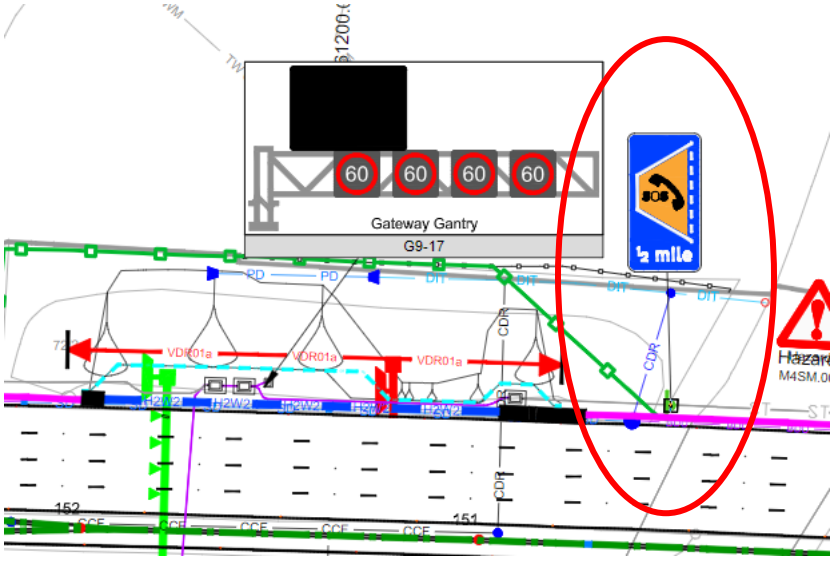
Location: Various – scheme wide

Summary: Visibility to sign faces partially or fully obscured by orientation of environmental barrier and other fencing

At certain locations the alignment of environmental barrier or other fencing could result in sign faces being partially or fully obscured, increasing the potential for a wide range of collisions due to drivers missing information. These locations include:

- Lane merge sign (eastbound) at chainage 62000
- No hard shoulder sign (eastbound) at chainage 62000
- Lane merge sign (eastbound) at chainage 61750
- ½ mile EA sign (eastbound) at chainage 61200 (shown below)
- Deer warning sign and services distance sign (eastbound) at chainage 61000
- 1 mile EA sign (eastbound) at chainage 56400
- 1 mile EA sign (eastbound) at chainage 52500
- ½ mile EA sign (eastbound) at chainage 51650
- EA sign (eastbound) at chainage 48900
- 500 yards EA sign (eastbound) at chainage 39300
- Lane designation sign (eastbound) at chainage 35500
- 300 yards EA sign (westbound) at chainage 38000
- Deer warning sign (westbound) at chainage 47000
- Route confirmatory sign (westbound) at chainage 47200
- Services 6 mile sign (westbound) at chainage 48700
- 1 mile EA sign (westbound) at chainage 48900

- TTM 1 mile road works warning sign (westbound) at chainage 55100
- EA sign (westbound) at chainage 50500
- ½ mile EA sign (westbound) at chainage 51800
- Motorway and merge 100 yards on the junction 11 westbound merge slip chainage 55000
- Variable speed limit sign (westbound) at chainage 55200
- 300 yard EA sign (westbound) at chainage 57700.



Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1005 Rev C02

Recommendation

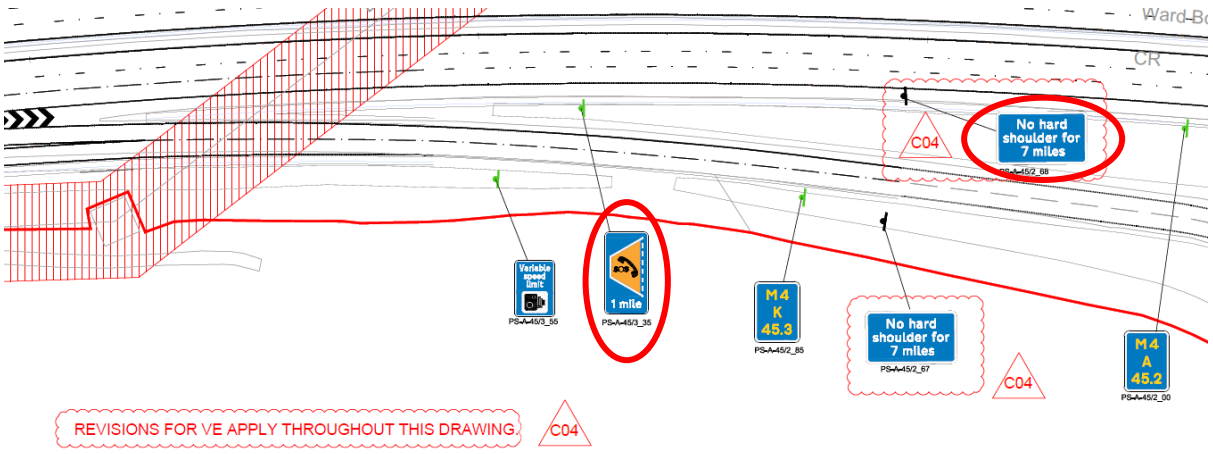
It is recommended that signs are either relocated so that sign faces are not obscured or mounted at suitable heights to ensure adequate forward visibility is provided.

3.3.11 PROBLEM

Location: Junction 8/9 westbound merge (Drawing HSN-S1_ZZZZZZZZ_Z-DR-CH-12080 Revision Rev C04 Sheet 80 of 91 chainage 34400)

Summary: Proposed signs may restrict visibility for merging vehicles

An emergency telephone one mile ahead sign (PS-A-45/3_35) is provided on the westbound merge nosing and a no hard shoulder sign (PS-A-45/2_68) is provided to the east of this. Given the alignment of the carriageway, these signs may reduce visibility to the mainline for merging vehicles, resulting in increased collisions at the merge.



Extract from drawing HSN-S1_ZZZZZZZZ_Z-DR-CH-12080 Revision C04

Recommendation

It is recommended that these signs are relocated out of the visibility splays of merging vehicles.

3.3.12 PROBLEM

Location: Junction 10 eastbound diverge (Drawing HSN-S1_ZZZZZZZZ_Z-DR-CH-12046 Rev C04 Sheet 46 of 91 chainage 46700)

Summary: Position and orientation of bend warning sign may lead to confusion

A bend warning sign (PS-B-57/6_28) is provided on the nosing between the M4 carriageway and the eastbound diverge on to the A329 (M) Reading. The position and orientation of the sign face may result in driver confusion as to which route is subject to the warning, increasing the risk of rear shunts on the M4 if vehicles slow or loss of control collisions on the bend.

Recommendation

It is recommended that the bend warning sign is relocated and orientated away from the mainline carriageway.

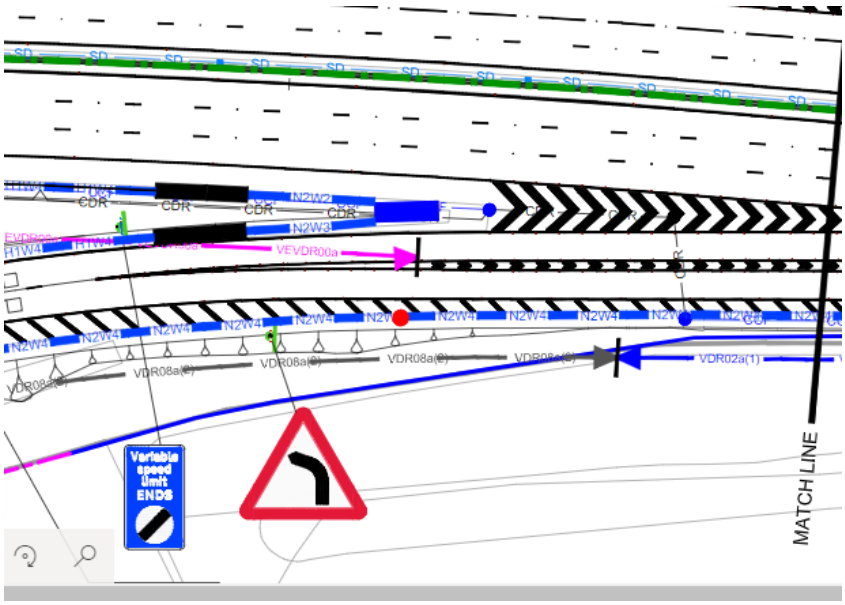
3.3.13 PROBLEM

Location: Junction 8/9 east and westbound diverge (Drawing HSN-S1_ZZZZZZZZ_Z-DR-CH-12081 Rev C04 Sheet 81 of 91 chainage 33900) and junction 10 westbound diverge (Drawing HSN-S1_ZZZZZZZZ_Z-DR-CH-12049 Rev C04 Sheet 49 of 91 chainage 45400)

Summary: Position and orientation of variable speed limit ends sign may lead to confusion

Variable speed limit ends sign is provided on the nosing between the M4 carriageway and the junction 8/9 east and westbound diverges. The position and orientation of the sign face may result in driver confusion as to which route is subject to the end of the variable speed limit, increasing the risk of inappropriate speeds and collisions.

At the junction 10 westbound diverge the same sign provision is shown.



Extract from drawing HA514451-HGN-S1_ML000000_Z-DR-CH-1049 Rev C02

Recommendation

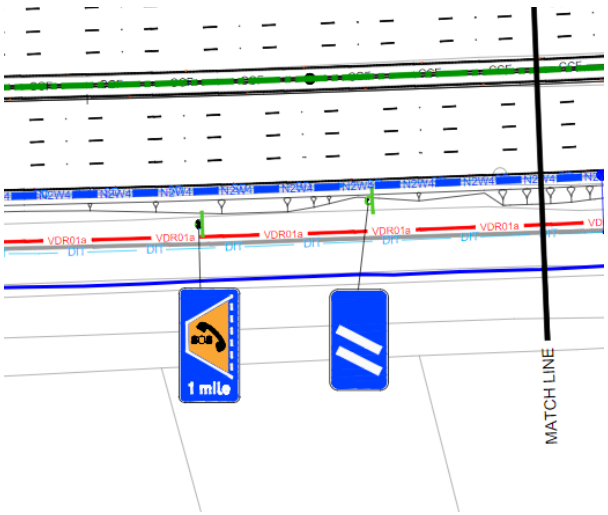
It is recommended that the variable speed limit ends sign is relocated to the nearside and orientated away from the mainline carriageway.

3.3.14 PROBLEM

Location: Chainage 58650 westbound (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12012 Rev C04 Sheet 12 of 91)

Summary: Visibility to EA/emergency roadside telephone sign compromised

EA/emergency roadside telephone sign PS-A-69/6_45 is provided in the nearside verge but is positioned approximately 25m in front of the countdown marker sign PS-A-69/6_19. Visibility to the EA sign is likely to be compromised which could lead to drivers being unaware of the next EA. This may result in drivers seeking alternative refuge in the diverge increasing the risk of shunt collisions and collisions with drivers outside of their vehicle.



Extract from drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12012 Rev C04

Recommendation

It is recommended that the signs are repositioned ensuring adequate forward visibility is provided.

3.3.15 PROBLEM

Location: Chainage 38350 eastbound (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12069 Rev C04 Sheet 69 of 91)

Summary: Visibility to EA/ERT sign compromised

EA/ERT one mile sign PS-B-49/2_98 is provided in the nearside verge but is likely to be obscured by the substantial footing for gantry sign G7-15 40m to the west. This could lead to drivers being unaware of the next EA and result in drivers seeking alternative refuge increasing the risk of shunt collisions and collisions with drivers outside of their vehicle.

Recommendation

It is recommended that the sign is repositioned ensuring adequate forward visibility is provided.

3.3.16 PROBLEM

Location: Chainage 48850 eastbound (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12040 Rev C04 Sheet 40 of 91)

Summary: Visibility to EA/ERT sign compromised

EA sign PS-B-59/8_01 is provided in the nearside verge at the nosing of EA E8-B1 but is likely to be obscured by the substantial footing/post for MS sign G8-07 30m to the west. This could lead to drivers being unaware of the EA and result in drivers missing the EA and seeking alternative refuge. This increases the risk of shunt collisions and collisions with drivers outside of their vehicle.

Recommendation

It is recommended that the sign is repositioned ensuring adequate forward visibility is provided.

3.3.17 PROBLEM

Location: Chainage 53400 eastbound (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1027 Rev C02 Sheet 27 of 91)

Summary: Visibility to route confirmatory sign compromised

Forward visibility to the eastbound route confirmatory sign could be affected by the substantial footing/post for MS sign G8-19 at chainage 53400. This could reduce visibility to the sign and increase the likelihood of shunt collisions.

Recommendation

It is recommended that the sign is repositioned ensuring adequate forward visibility is provided.

3.3.18 PROBLEM

Location: Junction 12 westbound diverge (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12003 Rev C04 Sheet 3 of 91)

Summary: Lack of lane designation signs and carriageway markings

The junction 12 westbound diverge consists of two lanes. Neither lane designation signs or carriageway markings have been provided on the two lane approach, which then flares to four lanes at the circulatory. This may result in the potential for late lane changing manoeuvres and result in side impact or shunt collisions.

Recommendation

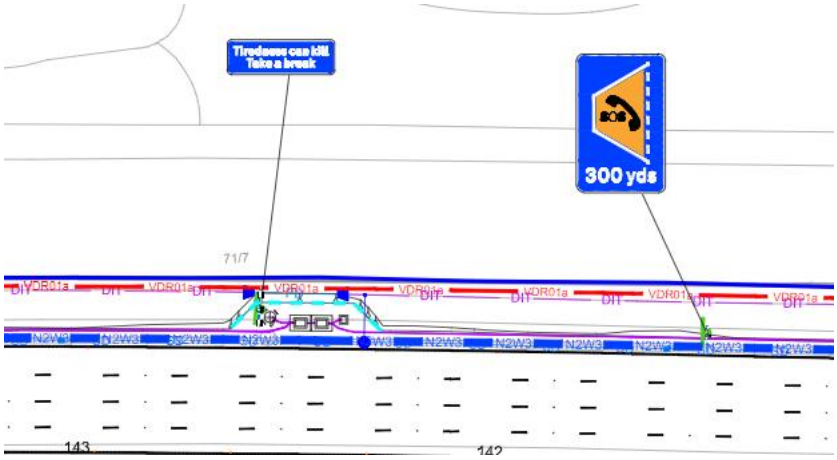
It is recommended that sufficient carriageway markings and lane destination signage is provided to inform motorists of the road layout ahead.

3.3.19 PROBLEM

Location: Chainage 60700 eastbound (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12007 Rev C04 Sheet 7 of 91) and 58000 westbound (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12014 Rev C04 Sheet 14 of 91)

Summary: Position of '*Tiredness can kill take a break'* signs

A '*Tiredness can kill take a break'* sign is located immediately before the 300 yard sign for EA E9-B3 and immediately before EA E9-A2. Drivers may be tempted or consider the EAs as suitable places in which to stop rather than continuing on to Reading MSA. Unauthorised use of the EAs without use of the ERT will result in drivers having to re-join the live carriageway merging with fast traffic increasing the risk of lane changing collisions.



Extract from drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12007 Rev C04

Recommendation

It is recommended that the '*Tiredness can kill take a break'* signs are repositioned to avoid confusion with the EA.

It is recommended that lane designation signs and carriageway markings are provided on the diverge.

3.3.20 PROBLEM

Location: Various

Summary: Signs located at vulnerable locations, such as diverge nosings and the carriageway

A number of signs are located at vulnerable locations and it is not clear if the signs and post arrangements are passively safe. Examples include:

- '*No hard shoulder for 13 miles'* sign eastbound at chainage 54400.
- '*No hard shoulder for 4 miles'* sign eastbound at chainage 34000
- 1 ½ mile EA sign (eastbound) J10 nosing at chainage 45800.
- A404(M) and A308(M) sign (eastbound) J8/9 diverge at chainage 34400.
- Route direction sign junction 12 (eastbound) chainage
- '*No hard shoulder for 5 miles'* sign (westbound) at chainage 55200.
- '*No hard shoulder for 7 miles'* sign (westbound) at chainage 34300.

In the event of vehicle leaving the carriageway they could strike the signs and post arrangements, potentially increasing the severity of the collision.

With respect to marker post B 53.0 this sign would also prevent a vehicle using the gap in the event of a breakdown in order to limit the effect of a live lane breakdown collision.

Recommendation

It is recommended that all signs and post arrangements are either located behind RRS (outside of the working width) or are passively safe.

3.3.21 PROBLEM

Location: Chainage 62000 westbound (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12003 Rev C04 Sheet 3 of 91)

Summary: No variable speed limit ends sign at junction 12 westbound diverge

A variable speed limit ends sign is not provided on the westbound diverge at junction 12. A national speed limit sign is provided at the top of the westbound diverge slip but orientated towards circulatory traffic rather than traffic approaching the junction on the diverge. Drivers may not be aware of the end of variable speed limit or the speed limit at the junction potentially increasing driver confusion and potential for collisions on the diverge.

Recommendation

It is recommended that variable speed limit ends signs are provided and the speed limit on the local highway network is clearly shown.

3.3.22 PROBLEM

Location: Chainage 55400 (westbound)

Summary: Visibility of ½ mile EA sign

The ½ mile EA sign at chainage 55400 is located adjacent to the merge from junction 11 where there is a wide hatched area to the nearside. This results in the ½ mile sign being set back from the mainline and approximately 20m from LBS4. Drivers could miss the sign and be unaware of the proximity of the next EA potentially resulting in unnecessary live lane stops.

Recommendation

It is recommended that the sign is relocated as far west as the tolerance in terms of distances permits to maximise its target value from the mainline .

3.3.23 PROBLEM

Location: West of EA E7-A4 at chainage 43100 (Drawing No. HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12056 Rev C04)

Summary: Vehicle located within EA may impact on forward visibility of downstream TTM sign

At chainage 43150 a '450 yards lane closure' TTM sign (TM-A54/0_88) is located at the western end of EA E7-A4. Should the EA be in use, particularly by a large sized vehicle, this may mask the TTM sign to oncoming westbound motorists. This could result in drivers missing information, causing late lane changing on the approach to the lane closures and increasing the potential for collisions.

Recommendation

It is recommended that adequate clear forward visibility is provided to the TTM sign as far west as the tolerance in terms of distances permits.

3.3.24 PROBLEM

Location: Eastbound M4 mainline at chainage 39300 (Drawing No. HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12066 Rev C04

Summary: EA sign may be missed by oncoming motorists.

At chainage 39300 an EA '500 yards' sign (PS-B-50/2_07) is located directly adjacent to gantry G7-17 on the eastbound M4 mainline. There is a risk that this sign may be missed by approaching motorists given it is set back away from the carriageway, and could lead to drivers being unaware of the next EA. This may result in drivers seeking alternative refuge increasing the risk of shunt collisions and collisions with drivers outside of their vehicle.

Recommendation

It is recommended that the sign is repositioned ensuring adequate forward visibility is provided, as far as the tolerance in terms of distances permits.

Carriageway Markings

3.3.25 PROBLEM

Location: Junction 8/9 eastbound diverge chainage 34400 (Drawing HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12080 Rev C03 Sheet 80 of 91)

Summary: Inconsistency between lane designation signing and carriageway makings

On the eastbound approach to junction 8/9 proposed signing indicates that the A404 (M) is only accessible from lane one (lane drop) and the A308 (M) from both the lane drop and diverge, but on the diverge slip road existing carriageway markings indicate only the A404 (M) is accessible from the lane drop while both destinations are accessible from the diverge. This

increases the potential for confusion and late lane changes (particularly from lane one) resulting in side impact collisions.

Recommendation

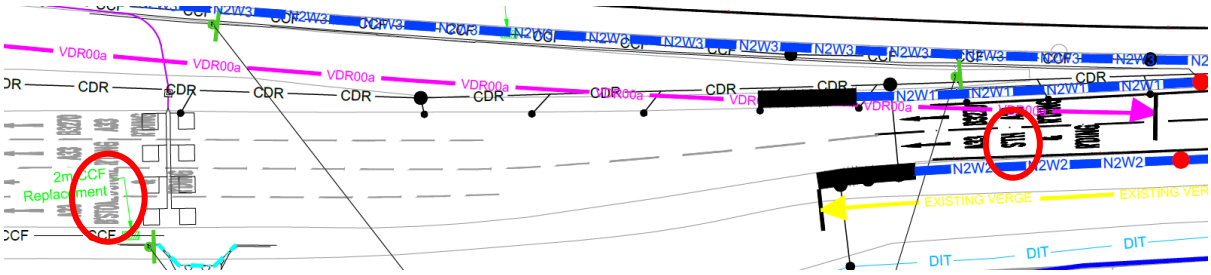
It is recommended that the carriageway markings and signing on approach to the junction 8/9 eastbound diverge are revised to be consistent.

3.3.26 PROBLEM

Location: Junction 11 westbound diverge chainage 54500 (Drawing HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1024 Rev C03 Sheet 24 of 91)

Summary: Inconsistency between lane designation carriageway makings

On the westbound approach to junction 11, proposed carriageway markings in lane one of the two lane diverge includes the use of 'A33 STH & R'DING', but the existing carriageway markings within the four lane section of the diverge use 'A33 B'STOKE' or 'A33 B'STOKE & R'DING'. The use of A33 South carriageway markings could be confusing and result in lane changes on the diverge, increasing the risk of collisions.



Extract from drawing HGN-S1_ML000000_Z-DR-CH-1024 Revision C03

Recommendation

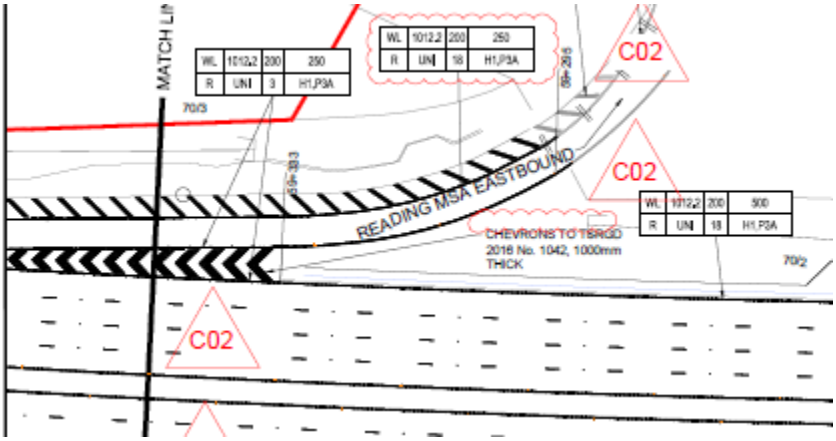
It is recommended that the carriageway markings in lane one of the two lane diverge are revised to include reference to Basingstoke, which provides consistency between the approach signage and existing markings on the diverge.

3.3.27 PROBLEM

Location: Reading MSA chainage 52900 (Drawing HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1211 Rev C02 Sheet 11 of 91)

Summary: Removal of 'SLOW' carriageway markings

The eastbound and westbound diverge lanes to the Reading MSA are to be resurfaced. The existing 'SLOW' markings are not detailed to be reinstated following the resurfacing. Given the short diverge length and tight left-hand bends the removal of the 'SLOW' markings could result in late braking and vehicle loss of control.



Extract from drawing HMK-S1_ML000000_Z-DR-CH-1211 Revision C02

Reading Motorway Services eastbound diverge lane - image captured October 2018

Recommendation

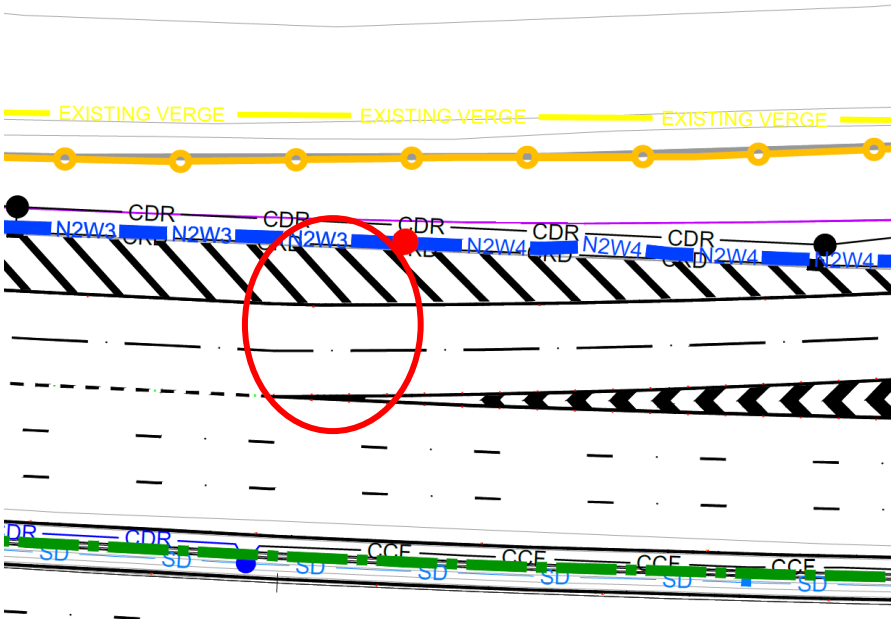
It is recommended that 'SLOW' carriageway markings to TSRGD Diagram 1024 are provided on the diverge lanes to the Reading MSA.

3.3.28 PROBLEM

Location: Junction 11 eastbound diverge (Drawing HGN-S1_ML0000000_Z-DR-CH-1022 Rev C03 Sheet 22 of 91) chainage 55300

Summary: Lane carriageway making configuration may lead to side-swipe collisions

The lane warning markings separating the nearside and offside eastbound offslip approach to junction 11 consists of a notable localized deviation opposite the diverge nosing arrangement. There is a risk that motorists exiting the M4 mainline carriageway and negotiating the localized deviation at speed may lead to poor lane discipline and side-swipe collisions (see excerpt).



Extract from drawing HGN-S1_ML0000000_Z-DR-CH-1022 Rev C03

Recommendation

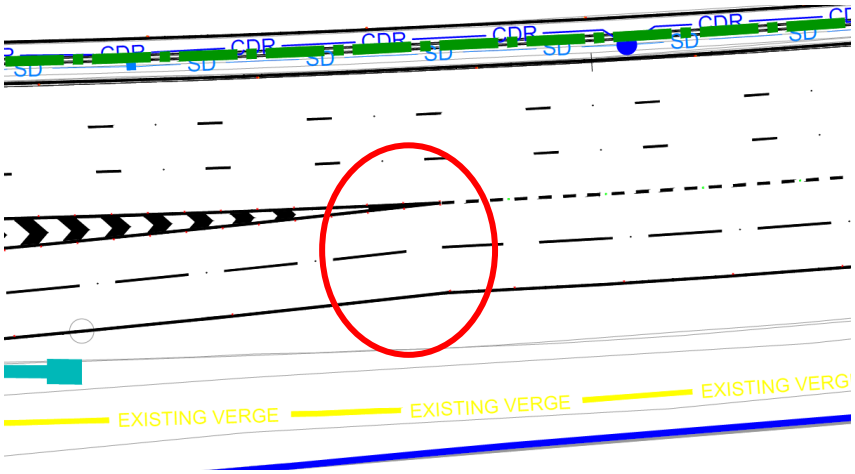
Ensure that the warning markings provide a smooth left-hand bend transition.

3.3.29 PROBLEM

Location: Junction 11 westbound diverge (Drawing HGN-S1_ML0000000_Z-DR-CH-1024 Rev C03 Sheet 24 of 91) chainage 54400

Summary: Lane carriageway making configuration may lead to side-swipe collisions

The lane warning markings separating the nearside and offside westbound offslip approach to junction 11 consists of a notable localized deviation. There is a risk that motorists exiting the M4 mainline carriageway and negotiating the localized deviation at speed may lead to poor lane discipline and side-swipe collisions (see excerpt).



Extract from drawing HGN-S1_ML0000000_Z-DR-CH-1024 Rev C03

Recommendation

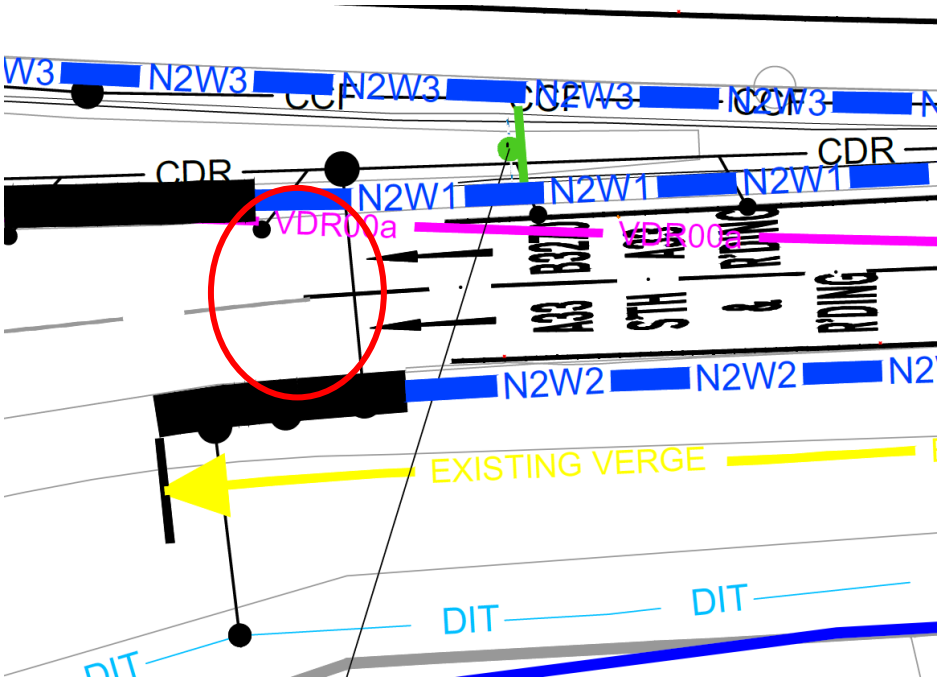
Ensure that the warning markings provide a smooth left-hand bend transition.

3.3.30 PROBLEM

Location: M4 Junction 11 westbound diverge (Drawing HGN-S1_ML0000000_Z-DR-CH-1024 Rev C03 Sheet 24 of 91) chainage 54560

Summary: Lane carriageway making configuration may lead to side-swipe collisions

The lane warning markings separating the nearside and offside westbound offslip approach to junction 11 prior to the two lanes merging into four consists of a notable localized double-bend deviation. There is a risk that motorists exiting the M4 mainline carriageway and negotiating the localized double-bend deviation at speed may lead to poor lane discipline and side-swipe collisions (see excerpt).



Extract from drawing HGN-S1_ML0000000_Z-DR-CH-1024 Rev C03

Recommendation

Ensure that the warning markings where they expand from two lanes to four provide a smooth transition.

Lighting

3.3.31 PROBLEM

Location: Gantry signs

Summary: Lighting of signs

It is unclear how a number of irregularly shaped gantry signs faces, such as G7-31 at junction 10, are to be lit. Inappropriate illumination could result in the sign faces being difficult to read, resulting in late vehicle movements and increased risk of side impact collisions. If the lighting provided is visible on the opposing carriageway this could result in glare and/or driver confusion, leading to collisions.

Recommendation

It is recommended that gantry signs are suitably lit and do not impact on the opposing traffic lanes.

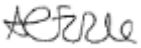
4 Audit Team Statement

We certify that we have examined the documents listed in this report. The examination has been carried out with the sole purpose of identifying any features of the design that could be removed or modified in order to improve the safety of the scheme. The problems identified in this report together with associated safety improvement suggestions that we recommend should be studied for implementation. No member of the audit team has been involved with the scheme design.

We certify that this Road Safety Audit has been carried out in accordance with GG 119.

Signed on behalf of Jacobs and Arcadis.

AUDIT TEAM LEADER

Name:	Alison Foale	Signed: 
Position:	Senior Road Safety Engineer	Dated: 20/10/2020
Organisation:	Jacobs	
Address:	The Square, Temple Quay, Redcliffe, Bristol, BS1 6DG	

AUDIT TEAM MEMBERS

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Name:	Charles Hutchinson	Signed: 
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Organisation:	Arcadis Consulting (UK) Ltd	
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5 Appendix A – List of Drawings and Documents Supplied

Drawings		
Drawing No.	**Rev**	**Title**
MAINLINE		
Series 0100 General		
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1000 to 1021	C02	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1022	C03	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1023	C04	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1024	C03	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1025 to 1030	C02	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1031	C01	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ML000000_Z-DR-CH-1032 to 1082	C02	General Arrangement - Sheets 0 to 82
HA514451-CHHJ-HGN-S1_ZZZZZZZZZZ_Z-DR-CH-0011	C01	Verge Options Sheets 1 to 15
HA514451-CHHJ-HGN-S1_ZZZZZZZZZZ_Z-DR-CH-0012 to 0013	C02	Verge Options Sheets 1 to 15
HA514451-CHHJ-HGN-S1_ZZZZZZZZZZ_Z-DR-CH-0014 to 0025	C01	Verge Options Sheets 1 to 15
HA514451-CHHJ-HGN-S1_ML000000_C-DE-CH-0001	C04	Typical Central Reserve Cross Sections – Sheets 1 to 5
HA514451-CHHJ-HGN-S1_ML000000_C-DE-CH-0002 to 0004	C06	Typical Central Reserve Cross Sections – Sheets 1 to 5
HA514451-CHHJ-HGN-S1_ML000000_C-DE-CH-0005	C02	Typical Central Reserve Cross Sections – Sheets 1 to 5
HA514451-CHHJ-HGN-S1_MLZZZZZZ_Z-DR-CH-0001	C02	ERA/POP Details Sheets 1 to 4
HA514451-CHHJ-HGN-S1_MLZZZZZZ_Z-DR-CH-0002 to 0003	C03	ERA/POP Details Sheets 1 to 4
HA514451-CHHJ-HGN-S1_MLZZZZZZ_Z-DR-CH-0004	C02	ERA/POP Details Sheets 1 to 4
HA514451-CHHJ-HGN-S1_ML000000_Z-DE-CH-0001	C06	ERA Details Sheets 1 to 5
HA514451-CHHJ-HGN-S1_ML000000_Z-DE-CH-0002 to 0005	C02	ERA Details Sheets 1 to 5
HA514451-CHHJ-HGN-SZ_MLZZZZZZZZ_Z-DR-CX-10001 to 10010	C02	Typical Details Sheets 1 to 10
HA514451-CHHJ-HGN-SZ_MLZZZZZZZZ_Z-DR-CX-10011 to 10015	C03	Typical Details Sheets 11 to 15
HA514451-CHHJ-HAC-SZ_DS_ZZZZZZZ-DR-CH-0001	P13	Departures schematics
HA514451-CHHJ-HAC-SZ_DS_ZZZZZZZ-DR-CH-0002	P16	Departures schematics
HA514451-CHHJ-HAC-SZ_DS_ZZZZZZZ-DR-CH-0003	P14	Departures schematics
HA514451-CHHJ-HAC-SZ_DS_ZZZZZZZ-DR-CH-0004	P16	Departures schematics

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HAC-SZ_DS_ZZZZZZZ-DR-CH-0005 to 0007	P18	Departures schematics
HA514451-CHHJ-HAC-SZ_DS_ZZZZZZZ-DR-CH-0008	P14	Departures schematics
Series 0200: Site Clearance		
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2001	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2002	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2003	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2004 to 2005	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2006 to 2007	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2008	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2009	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2010	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2011	C05	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2012	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2013	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2014	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2015	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2016 to 2018	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2019	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2020	C04	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2021 to 2022	C04	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2023	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2024	C04	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2025	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2026	C04	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2027	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2028	C01	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2029 to 2034	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2035	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2036	C02	Site Clearance - Sheets 1 to 82

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2037 to 2038	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2039	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2040	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2041	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2042	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2043 to 2044	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2045 to 2046	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2047	C04	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2048 to 2050	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2051	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2052	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2053	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2054	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2055 to 2057	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2058	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2059 to 2062	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2063	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2064 to 2067	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2068	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2069 to 2070	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2071	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2072 to 2073	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2074	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2075 to 2077	C02	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2078 to 2079	C03	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2080	C05	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2081	C06	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HSC_S1_MLZZZZZZZZ_Z-DR-CH-2082	C04	Site Clearance - Sheets 1 to 82
HA514451-CHHJ-HFE-SZ_ZZZZZZZZ_Z-DE-CH-0001	C02	Standard Detail - EI Located Within Proposed Ecological Fencing

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HFE-SZ_ZZZZZZZZ_Z-DE-CH-0002	C02	Standard Detail - Proposed Ecological Fencing with Gate
HA514451-CHHJ-HFE-SZ_ZZZZZZZZ_Z-DE-CH-0003	C02	Standard Detail - Tie-in between Fencing and Structure
HA514451-CHHJ-HFE-SZ_ZZZZZZZZ_Z-DE-CH-0004	C02	Standard Detail - Environmental Barrier & Ecological Proofing
Series 0300: Fencing		
HA514451-CHHJ-HFE-S1_ZZ000000_Z-DR-CH-3001 to 3002	C03	Fencing GA Drawings, Sheets 1 to 82
HA514451-CHHJ-HFE-S1_ZZ000000_Z-DR-CH-3003 to 3082	C03	Fencing GA Drawings, Sheets 1 to 82
Series 0400: Road Restraint System (Vehicle and Pedestrian)		
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4000	C03	Road Restraint Systems Sheet 0 of 91 (Legend and Notes)
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4001	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4002 to 4004	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4005 to 4006	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4007 to 4009	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4010	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4011	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4012	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4013	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4014 to 4015	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4016 o 4020	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4021	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4022 to 4024	C05	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4025	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4026 to 4031	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4032	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4033	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4034	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4035	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4036	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4037 to 4042	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4043	C03	Road Restraint Systems Sheets 1 to 82

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4044	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4045	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4046 to 4051	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4052	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4053 to 4054	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4055	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4056 to 4064	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4065	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4066	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4067	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4068 to 4069	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4070	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4071 to 4072	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4073 to 4074	C05	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4075 to 4076	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4077	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4078	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4079	C03	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4080	C04	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4081	C07	Road Restraint Systems Sheets 1 to 82
HA514451-CHHJ-HRR-S1_ML000000_Z-DR-CH-4082	C04	Road Restraint Systems Sheets 1 to 82
Series 0500: Drainage and Service Ducts		
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5000	P01	Existing Drainage, Legend & Notes, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5100	C02	Proposed Drainage, Legend & Notes, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5101 to 5102	C01	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5103 to 5119	C03	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5120 to 5121	C04	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5122 to 5124	C06	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5125	C04	Proposed Drainage Sheets 1 to 82, Contract 1

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5126 to 5128	C03	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5129 to 5172	C03	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5173 to 5174	C05	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5175 to 5177	C04	Proposed Drainage Sheets 1 to 82, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5178 to 5179	C04	Proposed Drainage Sheets 1 to 91, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5180	C03	Proposed Drainage Sheets 1 to 91, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5181 to 5182	C04	Proposed Drainage Sheets 1 to 91, Contract 1
HA514451-CHHJ-HDG-S1_DGZZZZZZZZ_Z-DR-CD-5183 to 5191	C01	Proposed Drainage Sheets 1 to 91, Contract 1
HA514451-CHHJ-HDG-SZ_DGZZZZZZZZ_Z-DR-CD-5201 to 5210	C02	Drainage Construction Details
Series 0600: Earthworks		
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1002 to 1004	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1005	C06	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1006	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1007	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1008 to 1011	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1012	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1013 to 1014	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1015 to 1017	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1018	C06	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1019	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1029	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1030	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1031	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1032	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1033	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1034	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1035	C06	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1036	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1037	C06	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1038 to 1039	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1040	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1041 to 1044	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1045 to 1046	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1047	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1048	C06	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1049	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1050	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1051	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1052	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1053 to 1055	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1056	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1057	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1058	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1059	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1060 to 1063	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1064 to 1065	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1066	C02	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1067 to 1069	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1070	C03	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1071	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1072 to 1073	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1074	C06	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1075 to 1076	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1077 to 1078	C04	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1079	C05	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1080	C02	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HGT-SZ_EWZZZZZZ_Z-DR-CE-1082	C02	Contract 1 J8/9 to J12 Earthwork General Arrangement Drawings (Sheets 1 to 82)
Series 0700: Pavements		
HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-0701 to 0719	C01	Pavements PSV, Sheets 1 to 82, Contract 1
HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-0729 to 0782	C01	Pavements PSV, Sheets 1 to 82, Contract 1
HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-7003 to 7019	C02	Pavements
HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-7020 to 7081	C02	Pavements
HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-7081	C04	Pavements
HA514451-CHHJ-HPV-S1_ML000000_Z-DR-CH-7082`	C02	Pavements
HA514451-CHHJ-HPV-SZ_ML000000_Z-DE-CH-0001	C01	Typical Pavement Cross Sections
HA514451-CHHJ-HPV-SZ_ZZZZZZZZ_Z-DE-CH-0002	C01	Typical Underbridge Deck Widening Details
HA514451-CHHJ-HPV-SZ_ZZZZZZZZ_Z-DE-CH-0005	C01	Typical Pavement Widening Details
Series 1100: Kerbs, Footways & Paved Areas		
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11001	C02	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11002 to 11021	C02	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11022	C03	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11023	C04	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11024	C03	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11025 to 11071	C02	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11072	C02	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11073 to 11080	C02	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11081	C05	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
HA514451-CHHJ-HKF-S1_ZZ000000_Z-DR-CH-11082	C02	Kerbs, Footways and Paved Areas Sheets 1 to 82, Contract 1
Series 1200: Traffic Signs & Road Markings		
HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12001 to 12019	C04	Master Traffic Signs Sheets 1 to 82 Contract 1 (1:500)
HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12020-28	C04	Master Traffic Signs Sheets 1 to 82 Contract 1 (1:500)
HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12029-12072	C04	Master Traffic Signs Sheets 1 to 82 Contract 1 (1:500)
HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12073 to 12074	C05	Master Traffic Signs Sheets 1 to 82 Contract 1 (1:500)
HA514451-CHHJ-HSN-S1_ZZZZZZZZ_Z-DR-CH-12075 to 12082	C04	Master Traffic Signs Sheets 1 to 82 Contract 1 (1:500)
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-1035 to 1050	P02	Individual Verge Mounted Traffic Signs Contract 1 - Eastbound

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-1051 to 1064	P02	Individual Verge Mounted Traffic Signs Contract 1 - Westbound
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-1093 to 1099	P02	Individual Verge Mounted Driver Location Traffic Signs Contract 1 - Eastbound
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-1100 to 1106	P02	Individual Verge Mounted Driver Location Traffic Signs Contract 1 - Westbound
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-0042 to 0050	P01	Individual Gantry Mounted Traffic Signs Contract 1
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-1114 to 1117	P01	Gantry Mounted Camera Enforcement Traffic Signs Contract 1 – Eastbound
HA514451-CHHJ-HSN-SZ_ML000000_Z-DR-CH-1118 to 1121	P01	Gantry Mounted Camera Enforcement Traffic Signs Contract 1 – Westbound
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1201 to 1221	C02	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1222	C03	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1223	C04	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1224	C03	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1225-1267	C02	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1268	C03	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1269 to 1279	C02	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1280	C03	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1281	C05	Road Marking Layout - Sheets 1 to 82
HA514451-CHHJ-HMK-S1_ML000000_Z-DR-CH-1282	C02	Road Marking Layout - Sheets 1 to 82
Series 1300: Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts		
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5001 to 5002	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5003	C03	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5004	C04	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5005 to 5006	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5007	C03	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5008	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5009	C03	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5010 to 5011	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5012	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5013 to 5014	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5015 to 5016	C01	Lighting Duct Arrangement - Sheet 1 to 82

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5017 to 5020	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5021	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5022	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5023	C03	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5024	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5025	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5026	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5027 to 5029	C04	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5030	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5031	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5032	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5033 to 5034	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5035 to 5037	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5038 to 5039	C04	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5040	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5041	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5042 to 5043	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5044	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5045	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5046 to 5049	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5050	C03	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5051	C06	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5052 to 5054	C01	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5055	C02	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5056	C04	Lighting Duct Arrangement - Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-5057 to 5069	C01	Lighting Duct Arrangement - Sheet 1 to 82
Series 1400: Electrical Work for Road Lighting and Traffic Signs		
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14002 to 14005	C02	Lighting Electrical Arrangement Sheet 1 to 82

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14007 to 14009	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14011	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14013 to 14014	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14017 to 14019	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14020	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14022	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14023	C03	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14024	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14026 to 14030	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14032	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14035	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14038 to 14039	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14041	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14044	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14046 to 14049	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14050 to 14051	C03	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14055 to 14056	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14074 to 14076	C02	Lighting Electrical Arrangement Sheet 1 to 82
HA514451-CHHJ-HEL-S1_ZZZZZZZZ_Z-DR-EE-14080 to 14082	C02	Lighting Electrical Arrangement Sheet 1 to 82
Series 1500: Motorway Communications		
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1501 to 1502	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1503	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1504	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1505	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1506	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1507 to 1508	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1509	C10	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1510	C09	Technology Layout Geo Layout / Duct Schematic

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1511	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1512	C06	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1513	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1514	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1515	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1516	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1517 to 1518	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1519 to 1521	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1522	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1523	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1524	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1525 to 1527	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1528 to 1530	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1531	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1532	C07	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_ZDR-EC-1533	C08	Technology Layout Geo Layout / Duct Schematic
HA514451-CHHJ-HMC-S1_TNZZZZZZZZ_Z-DR-ZX-1500 to 1503	C01	Legends
HA514451-CHHJ-HSR-S1_LR000000_B-DR-CH-1001 to 1006	C01	Cutbush Comms
Series 1700: Structures		
Non-widening Underbridges		
HA514451-CHHJ-SBR-S1_BR00001003-DR-CB-0101	C02	Hazes Service Culvert - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001003-DR-CB-0601	C02	Hazes Service Culvert - Verge and Environmental Barrier Details
HA514451-CHHJ-SBR-S1_BR00001006-DR-CB-0101	C01	Billingbear Brook Culvert - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001006-DR-CB-0601	P01	Bilinbear Brook Culvert- Verge and Retaining Wall details
HA514451-CHHJ-SBR-S1_BR00001016-DR-CB-0101	C02	Emmbrook Culvert - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001017-DR-CB-0101	C02	Slip Road 3 Culvert - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001018-DR-CB-0101	C05	Southern Region Winnersh Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001018-DR-CB-0601	C05	Southern Region Winnersh Underbridge - Central Reserve Abutment and Verge Details

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-SBR-S1_BR00001019-DR-CB-0101	C05	Reading Road Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001019-DR-CB-0601	C05	Reading Road Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001020-DR-CB-0101	C06	King Street Lane Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001020-DR-CB-0601	C06	King Street Lane Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001021-DR-CB-0101	C05	Mill Lane Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001021-DR-CB-0601	C05	Mill Lane Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001024-DR-CB-0101	C02	River Loddon Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001024-DR-CB-0601	C02	River Loddon Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001035-DR-CB-0101	C05	Mortimer Line Railway Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001035-DR-CB-0601	C05	Mortimer Line Railway Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001039-DR-CB-0101	C04	Wellmans Farm Access Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001039-DR-CB-0601	C04	Wellmans Farm Access Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001040-DR-CB-0101	C04	River Kennet Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001040-DR-CB-0601	C04	River Kennet Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001041-DR-CB-0101	C03	Holy Brook Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001041-DR-CB-0601	C04	Holy Brook Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001042-DR-CB-0101	C04	Western Region Theale Underbridge - General Arrangement
HA514451-CHHJ-SBR-S1_BR00001042-DR-CB-0601	C03	Western Region Theale Underbridge - Central Reserve Abutment and Verge Details
HA514451-CHHJ-SBR-S1_BR00001043-DR-CB-0101	C02	Beansheaf Farm Culvert - General Arrangement
HA514451-CHHJ-SBR-S1_BR0000996-DR-CB-0101	C02	Stud Green Culvert - General Arrangement
HA514451-CHHJ-SBR-S1_BR00036035-DR-CB-0101	C02	Culvert 18 - General Arrangement
HA514451-CHHJ-SBR-S1_BR00036035-DR-CB-0601	C01	Culvert 18 - Verge and Extension Details
HA514451-CHHJ-SBR-S1_BR00036037-DR-CB-0101	C02	Culvert 20 - General Arrangement
HA514451-CHHJ-SBR-S1_BR00036038-DR-CB-0101	C02	Culvert 21 - General Arrangement
HA514451-CHHJ-SBR-S1_BR00036054-DR-CB-0101	C02	Culvert 42 - General Arrangement
HA514451-CHHJ-SBR-S1_BR00036056-DR-CB-0101	C02	Culvert 44 - General Arrangement
HA514451-CHHJ-SBR-S1_BR00036057-DR-CB-0101	C02	Culvert 38 - General Arrangement
Pier Encapsulation		

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-SBR-S1_BR00001000-DR-CB-0201	C02	Littlefield Green - Pier Encapsulation Concrete Outline
HA514451-CHHJ-SBR-S1_BR00001002-DR-CB-0201	C03	Beenhams Heath - Pier Encapsulation Concrete Outline
HA514451-CHHJ-SBR-S1_BR00001004-DR-CB-0201	C03	Hammonds Wood - Pier Encapsulation Concrete Outline
HA514451-CHHJ-SBR-S1_BR00001007-DR-CB-0201	C02	Straight Mile - Pier Encapsulation Concrete Outline
HA514451-CHHJ-SBR-S1_BR00001008-DR-CB-0201	C02	Bill Hill - Pier Encapsulation Concrete Outline
HA514451-CHHJ-SBR-S1_BR00001026-DR-CB-0201	C02	Shinfield Road - Pier Encapsulation Concrete Outline
HA514451-CHHJ-SBR-S1_BR00001034-DR-CB-0201	C02	Poundgreen Road - Pier Encapsulation Concrete Outline
Widening Underbridge		
HA514451-CHHJ-SBR-S2_BR00000978-DR-CB-0100	C05	Thames Bray Underbridge Widening - General Notes
HA514451-CHHJ-SBR-S2_BR00000978-DR-CB-0101	C03	Thames Bray Underbridge Widening - General Arrangement Existing
HA514451-CHHJ-SBR-S2_BR00000978-DR-CB-0102	C05	Thames Bray Underbridge Widening - General Arrangement Proposed (Sheet 1 of 2)
HA514451-CHHJ-SBR-S2_BR00000978-DR-CB-0103	C05	Thames Bray Underbridge Widening - General Arrangement Proposed (Sheet 2 of 2)
Gantry Superstructure		
HA514451-RAM-SGY-S1_GYN000G702-DR-CB-0001	C03	G7-02 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G704-DR-CB-0001	C02	G7-04 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G704-DR-CB-0002	C03	G7-04 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G708-DR-CB-0001	C01	G7-08 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G713-DR-CB-0001	C01	G7-13 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G715-DR-CB-0001	C03	G7-15 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G715-DR-CB-0002	C02	G7-15 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G721-DR-CB-0001	C01	G7-21 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G723-DR-CB-0001	C01	G7-23 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G726-DR-CB-0001	C01	G7-26 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G729-DR-CB-0001	C01	G7-29 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G729-DR-CB-0002	C01	G7-29 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G731-DR-CB-0001	C01	G7-31 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G732-DR-CB-0001	C01	G7-32 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G801-DR-CB-0001	C01	G8-01 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G803-DR-CB-0001	C01	G8-03 Gantry Superstructure General Arrangement - Sheet 1 of 2

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-RAM-SGY-S1_GYN000G803-DR-CB-0002	C01	G8-03 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G805-DR-CB-0001	C01	G8-05 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G805-DR-CB-0002	C01	G8-05 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G809-DR-CB-0001	C03	G8-09 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G814-DR-CB-0001	C01	G8-14 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G814-DR-CB-0002	C01	G8-14 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G817-DR-CB-0001	C02	G8-17 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G820-DR-CB-0001	C02	G8-20 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G822-DR-CB-0001	C02	G8-22 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G902-DR-CB-0001	C03	G9-02 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G902-DR-CB-0002	C02	G9-02 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G904-DR-CB-0001	C02	G9-04 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G907-DR-CB-0001	C02	G9-07 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G910-DR-CB-0001	C01	G9-10 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G910-DR-CB-0002	C01	G9-10 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G913-DR-CB-0001	C03	G9-13 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G916-DR-CB-0001	C02	G9-16 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN000G917-DR-CB-0001	C02	G9-17 Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN000G917-DR-CB-0002	C02	G9-17 Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN000G919-DR-CB-0001	C02	G9-19 Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN00G705a-DR-CB-0001	C02	G7-05a Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN00G710a-DR-CB-0001	C02	G7-10a Gantry Superstructure General Arrangement
HA514451-RAM-SGY-S1_GYN00G822a-DR-CB-0001	C03	G8-22a Gantry Superstructure General Arrangement - Sheet 1 of 2
HA514451-RAM-SGY-S1_GYN00G822a-DR-CB-0002	C02	G8-22a Gantry Superstructure General Arrangement - Sheet 2 of 2
HA514451-RAM-SGY-S1_GYN00G822b-DR-CB-0001	C01	G8-22b Gantry Superstructure General Arrangement
3000 Landscaping and Ecology		
HA514451-CHHJ-ELS-S1_ZZZZZZZZ_Z-DR-LD-1001 to 1004	C01	Vegetation Clearance Sheets 01 to 116
HA514451-CHHJ-ELS-S1_ZZZZZZZZ_Z-DR-LD-1005 to 1089	C02	Vegetation Clearance Sheets 01 to 116

Drawings		
Drawing No.	**Rev**	**Title**
HA514451-CHHJ-ELS-S1_ZZZZZZZZ_Z-DR-LD-1090 to 1096	C03	Vegetation Clearance Sheets 01 to 116
HA514451-CHHJ-ELS-S1_ZZZZZZZZ_Z-DR-LD-1097 to 1100	C02	Vegetation Clearance Sheets 01 to 116
HA514451-CHHJ-ELS-S1_ZZZZZZZZ_Z-DR-LD-1101 to 1116	C01	Vegetation Clearance Sheets 01 to 116
HA514451-CHHJ-ELS-S1_ZZZZZZZZ_Z-DR-LD-1117	C02	Vegetation Clearance Key

Documents		
Document No. / Reference	**Date**	**Title**
HA514451-CHHJ-HGN-SZ_ZZZZZZZZ_Z-DD-ZZ-0001	-	Design Strategy Record
514451-MUH-00-ZZ-RP-HW-300354	7th January 2015	Stage 1 RSA
514451-MUH-00-ZZ-RP-PM-300395	27th February 2016	Stage 1 RSA Designer's Response
HA514451-CHHJ-GEN-SZ_ZZZZZZZZZZ_Z-RP-ZZ-0001	September 2017	Interim Stage 1&2 RSA
HA514451-CHHJ-GEN-SZ_ZZZZZZZZZZ_Z-RP-ZZ-0002	September 2017	Designer's Response
514451-MUH-00-ZZ-RP-PM-300128	November 2014	Traffic Forecasting Report (SGAR3) M4 Junctions 3 to 12 Smart Motorway
HA514451-CHHJ-GEN-SZ_ZZZZZZZZZZ-RP-ZZ-0002	4th September 2017	Combined Product: Operating Regime, Implications on Core Responders and Compliance Strategy Report
HA514451-CHHJ-GEN-SZ_ZZZZZZZZZZ-SG-OP-0002.	October 2017	Maintenance and Repair Strategy Statement' for the Smart Motorway, this is reference
514451-00-ZZ-RP-TR-400074	September 2015	Non-Motorised User (NMU) Report of Survey
HA514451-CHHJ-GEN-SZ_ZZZZZZZZZZ-RE-ZX-0001	Current	Departures Tracker
HA514451-CHHJ-HGN-S1_ZZZZZZZZ_Z-RP-ZZ-0001	December 2018	Stage 2 RSA (Draft)
HA514451-CHHJ-HGN-S1_ZZZZZZZZ_Z-RP-ZZ-0002	March 2019	Stage 2 RSA Designer's Response (Draft)

6 Appendix B – Location Plan

© OpenStreetMap contributors

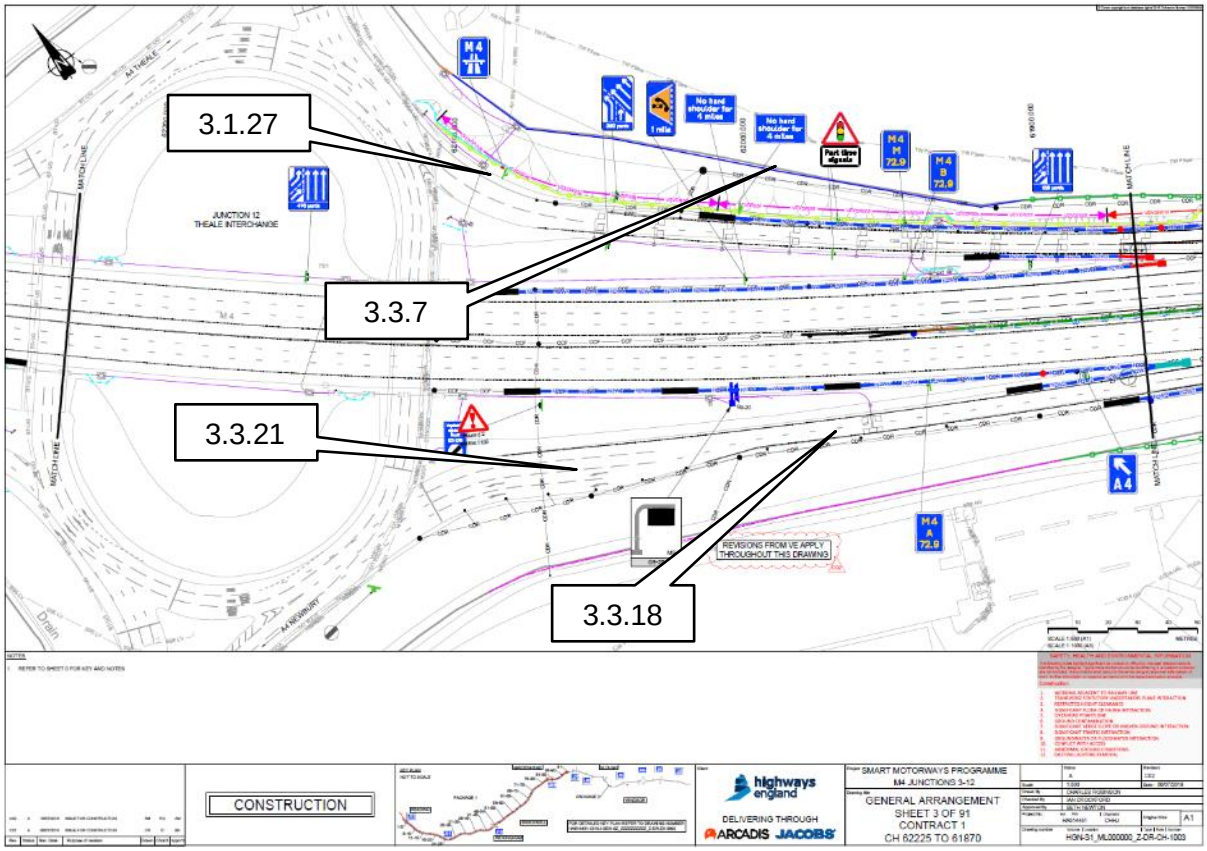
Red overlay represents RSA extents.

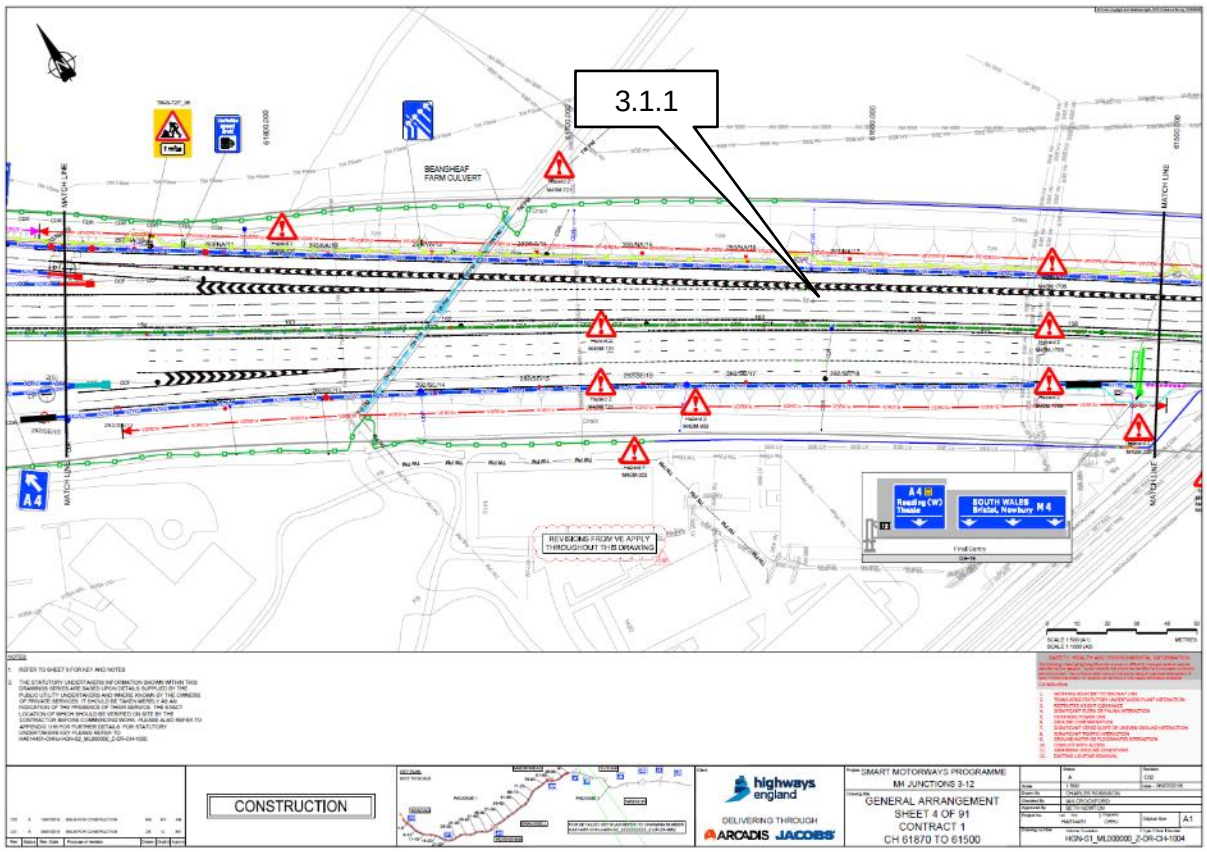
7 Appendix C – Problem Locations

Problems that occur throughout the scheme or at multiple/extended locations are not included within the problem location plans. This includes problems:

- 3.1.2
- 3.1.3
- 3.1.4
- 3.1.7
- 3.1.8
- 3.1.9
- 3.1.10
- 3.1.11
- 3.1.13
- 3.1.17
- 3.1.18
- 3.1.19
- 3.1.20
- 3.1.21
- 3.1.23
- 3.1.24
- 3.1.25
- 3.1.28
- 3.1.29
- 3.1.31
- 3.1.33
- 3.1.34
- 3.2.1
- 3.3.1
- 3.3.2
- 3.3.3
- 3.3.4
- 3.3.6
- 3.3.8
- 3.3.9
- 3.3.10
- 3.3.13
- 3.3.19
- 3.3.20
- 3.3.31

The problem locations are detailed on the General Arrangement drawings. It is of note that the actual problem may not be visible on the General Arrangement drawings as not all scheme elements are visible.


3.1.27
3.3.7
3.3.21
3.3.18
JUNCTION 12
THEALE INTERCHANGE
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 9-12
GENERAL ARRANGEMENT
SHEET 3 OF 91
CONTRACT 1
CH 62225 TO 61870
HGN-31_ML000000_Z-DR-CH-1003


3.1.1
BEANSHEAF FARM CULVERT
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
A4 (M)
Reading (W)
Theale
SOUTH WALES
Bristol, Newbury
M4
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 9-12
GENERAL ARRANGEMENT
SHEET 4 OF 91
CONTRACT 1
CH 61870 TO 61500
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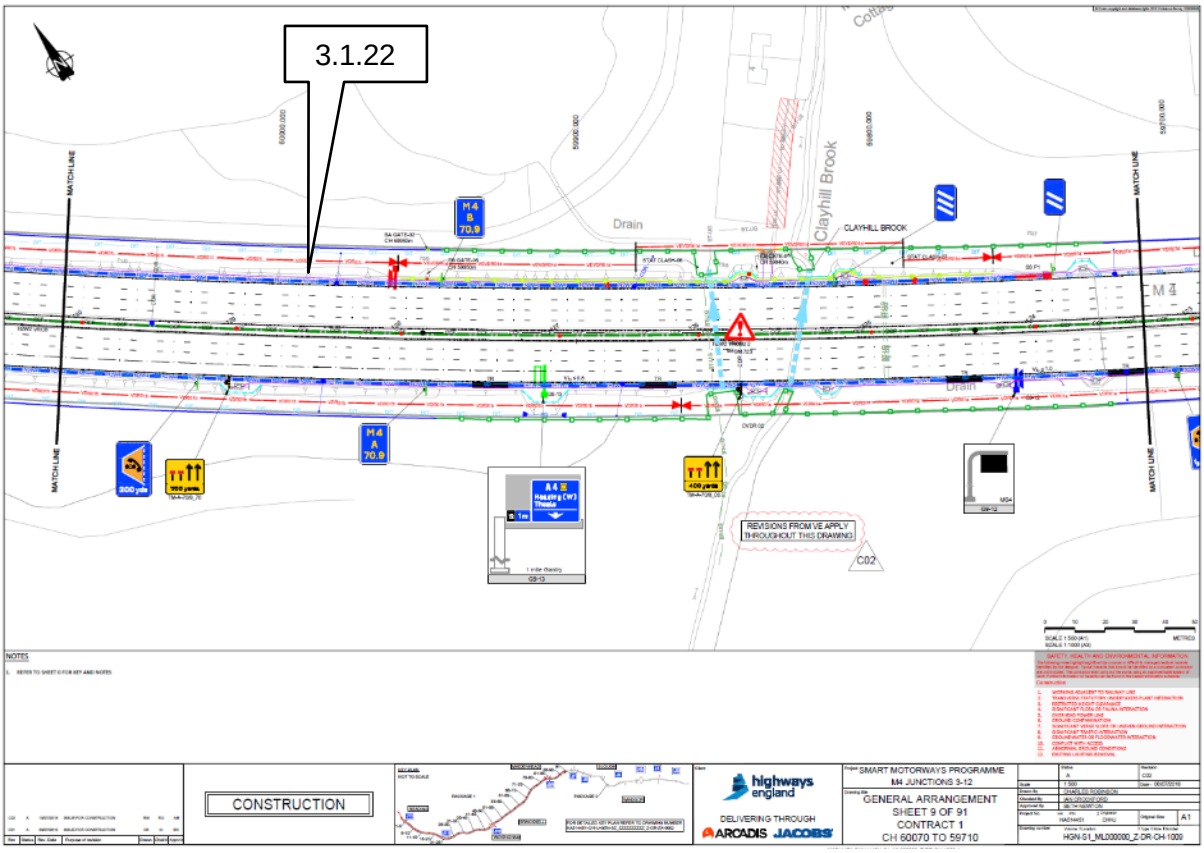
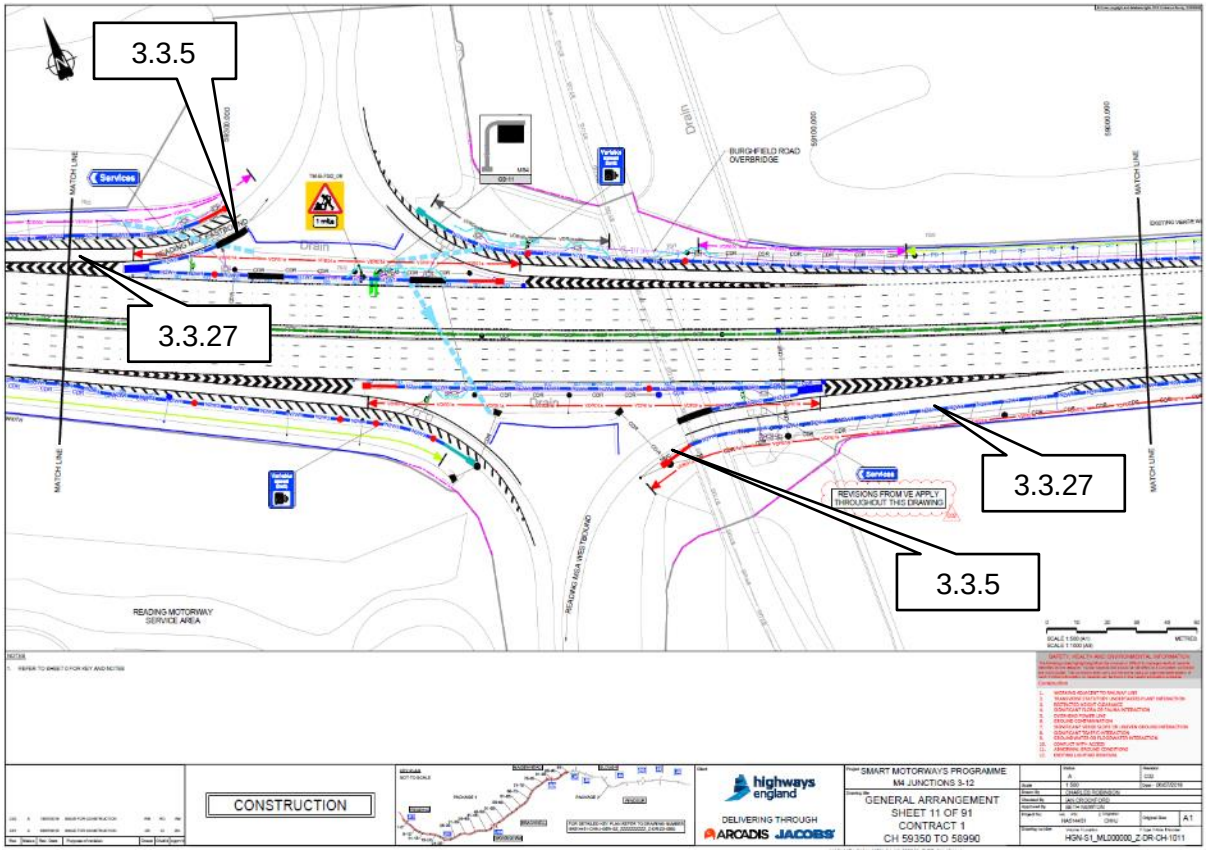
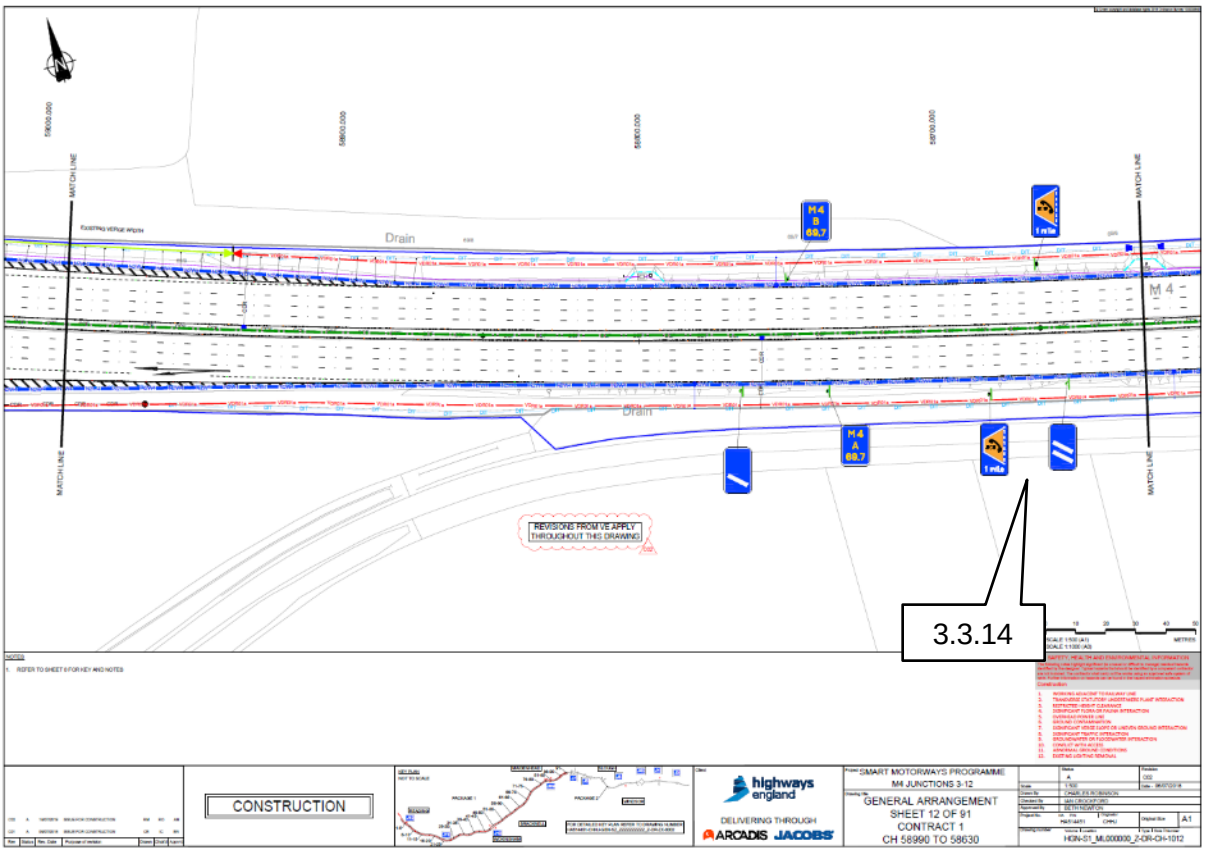
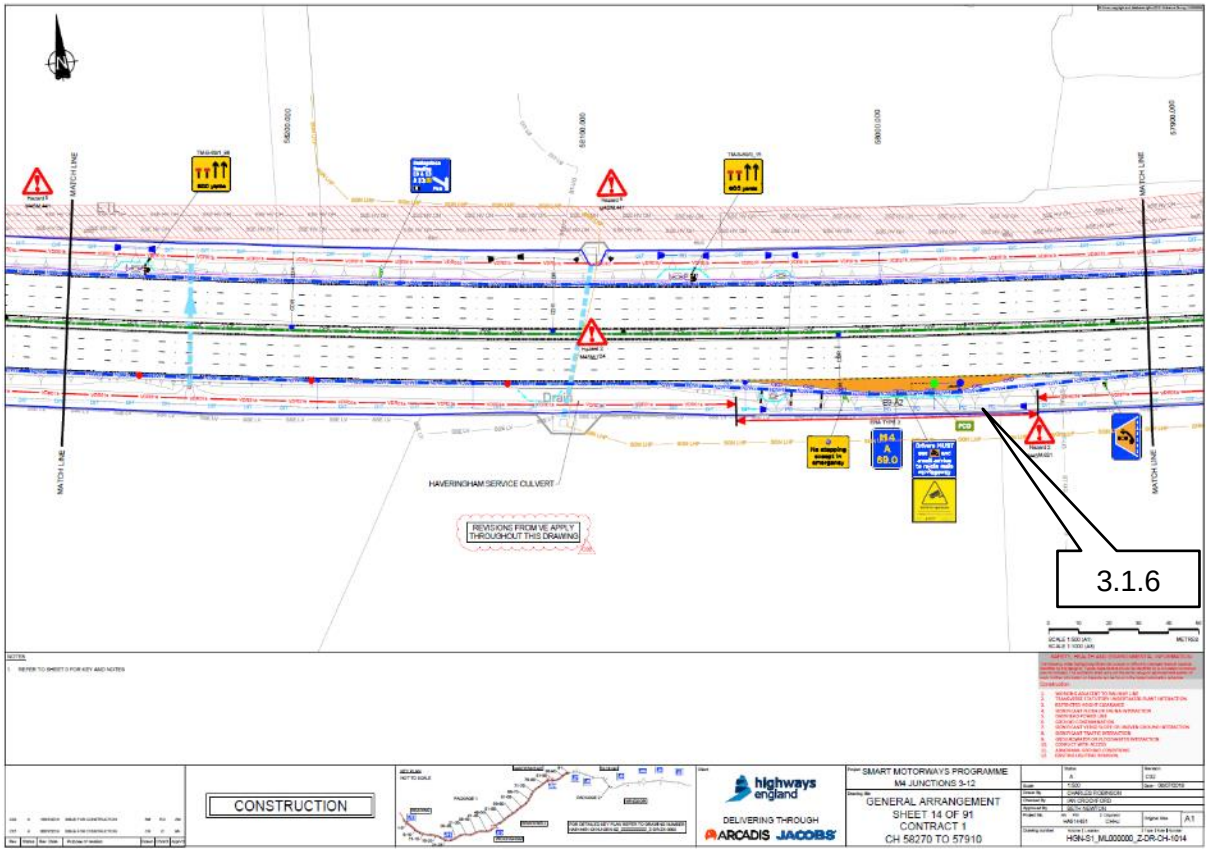
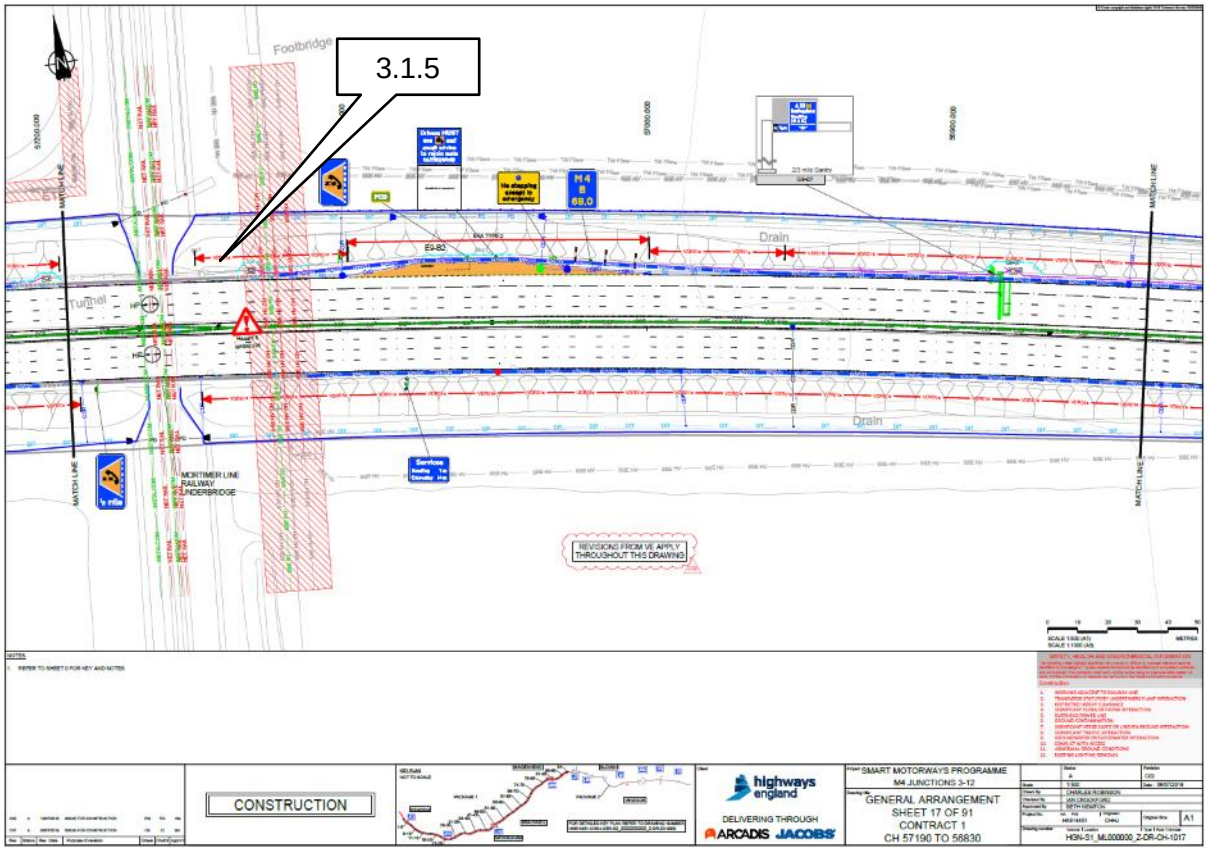
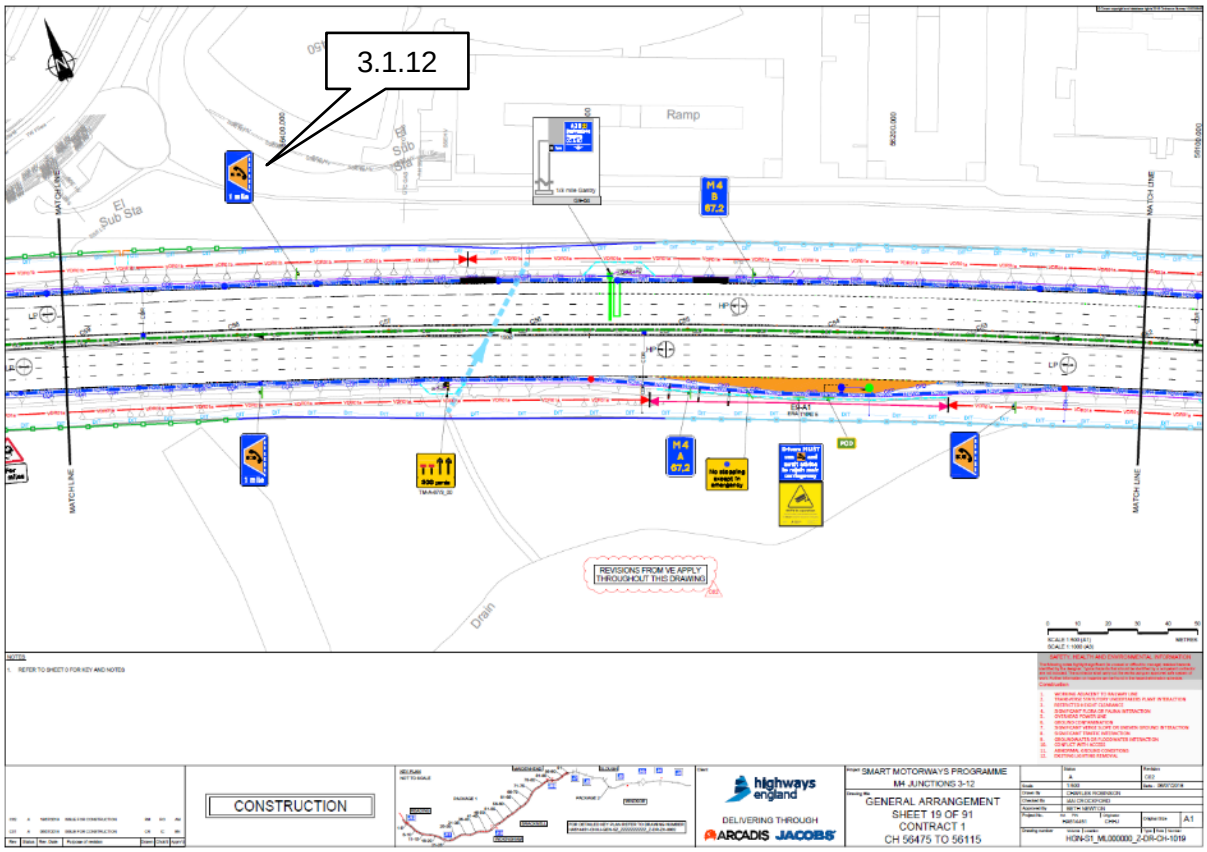

3.1.22
MATCH LINE
Clayhill Brook
Drain
CLAYHILL BROOK
M4
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
C02
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 9 OF 91
CONTRACT 1
CH 60070 TO 59710
HGN-S1_ML000000_Z-DR-CH-1009

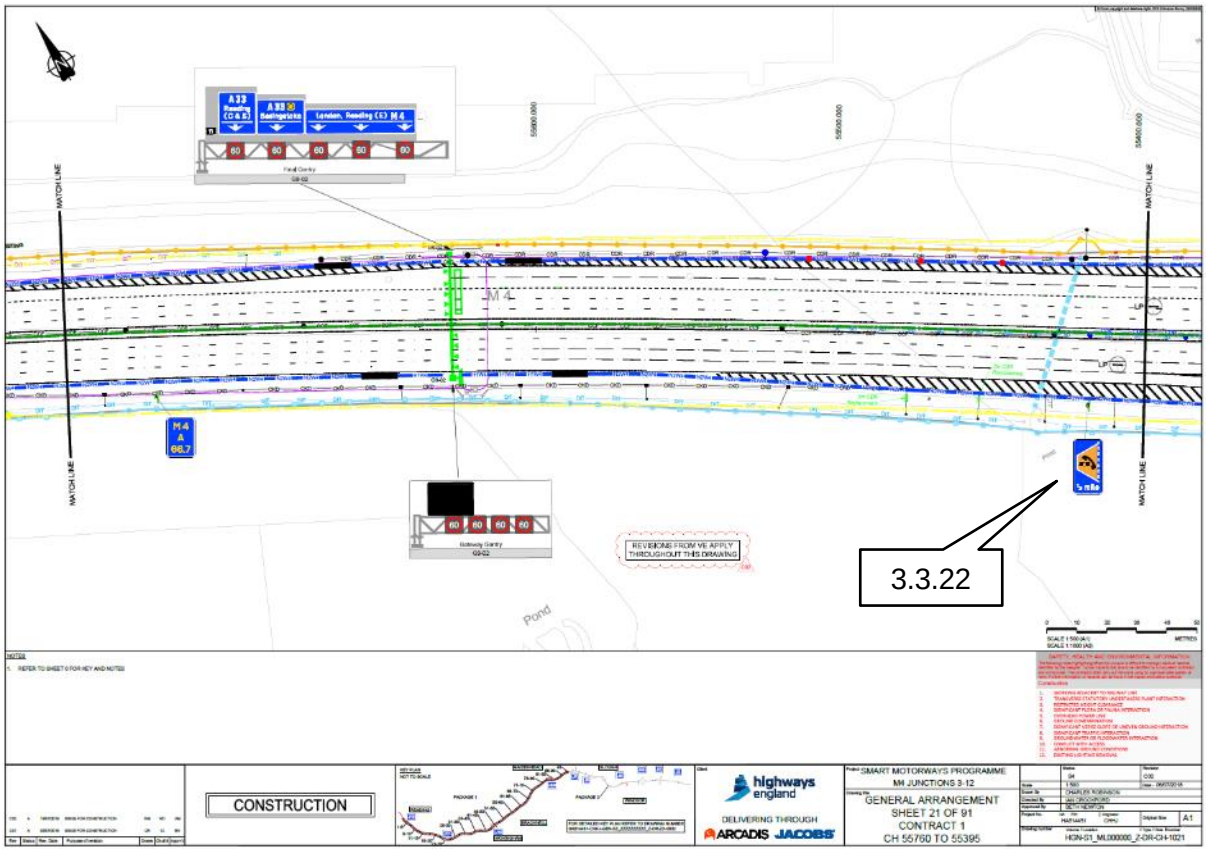

3.3.5
3.3.27
3.3.27
3.3.5
MATCH LINE
Services
BURGHFIELD ROAD OVERBRIDGE
Drain
READING MOTORWAY SERVICE AREA
READING AREA WEST BOUND
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 11 OF 91
CONTRACT 1
CH 59350 TO 58990
HGN-S1_ML000000_Z-DR-CH-1011

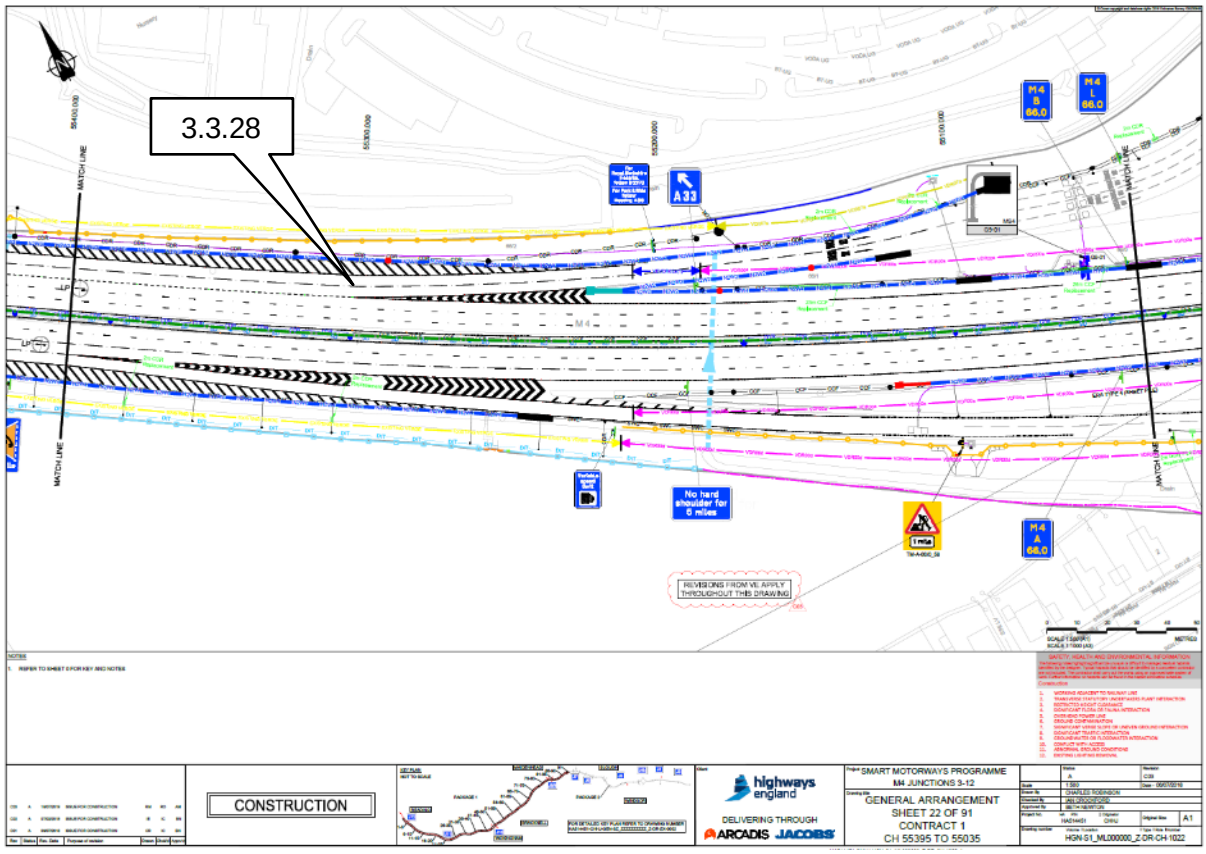

3.3.14
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 12 OF 91
CONTRACT 1
CH 58990 TO 58630
HGN-S1_ML000000_Z-DR-CH-1012

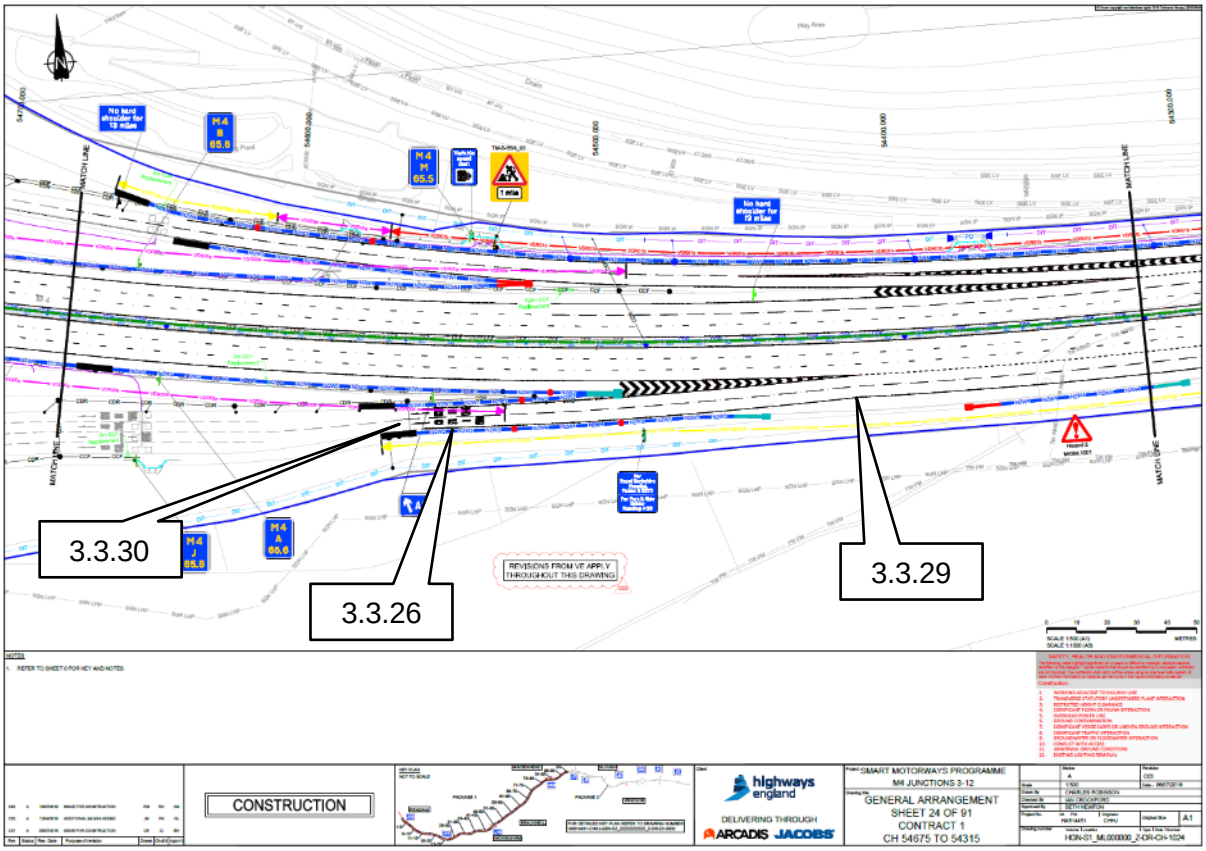

3.1.6
HAVERINGHAM SERVICE CULVERT
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 14 OF 91
CONTRACT 1
CH 58270 TO 57910
HGN-S1_ML000000_Z-DR-CH-1014

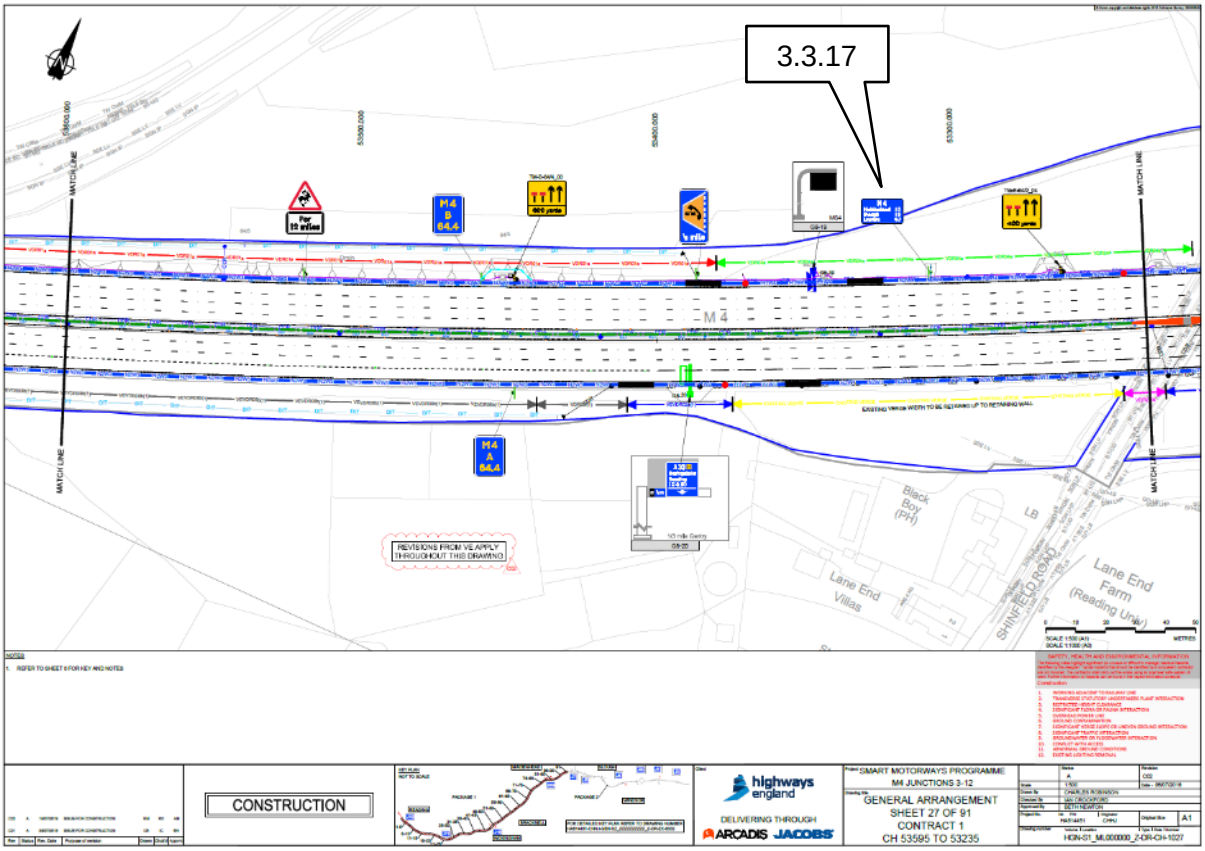

3.1.5
Footbridge
Drain
Tunnel
MORTIMER LINE RAILWAY UNDERBRIDGE
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 17 OF 91
CONTRACT 1
CH 57190 TO 56830
HGN-S1_ML000000_Z-DR-CH-1017

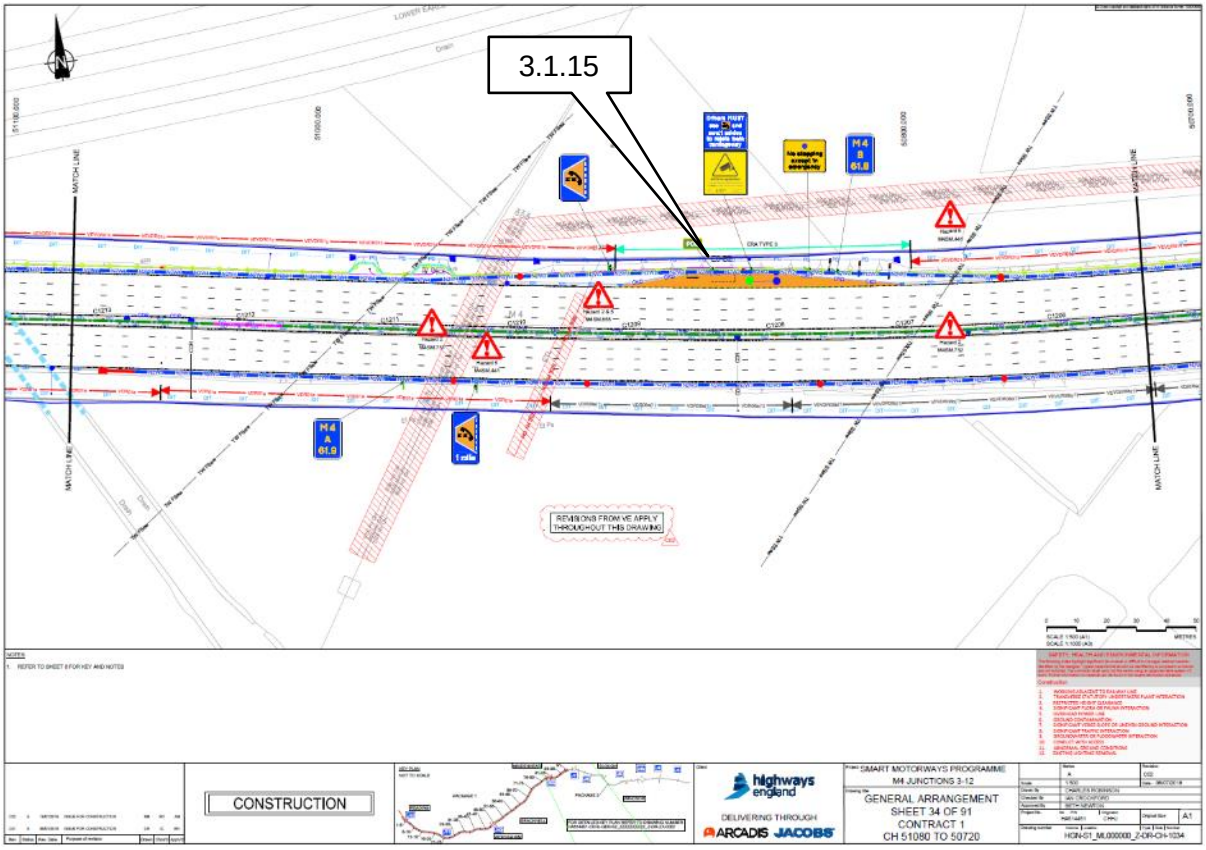

3.1.12
Ramp
Drain
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 19 OF 91
CONTRACT 1
CH 56475 TO 56115
HGN-S1_ML000000_Z-DR-CH-1019

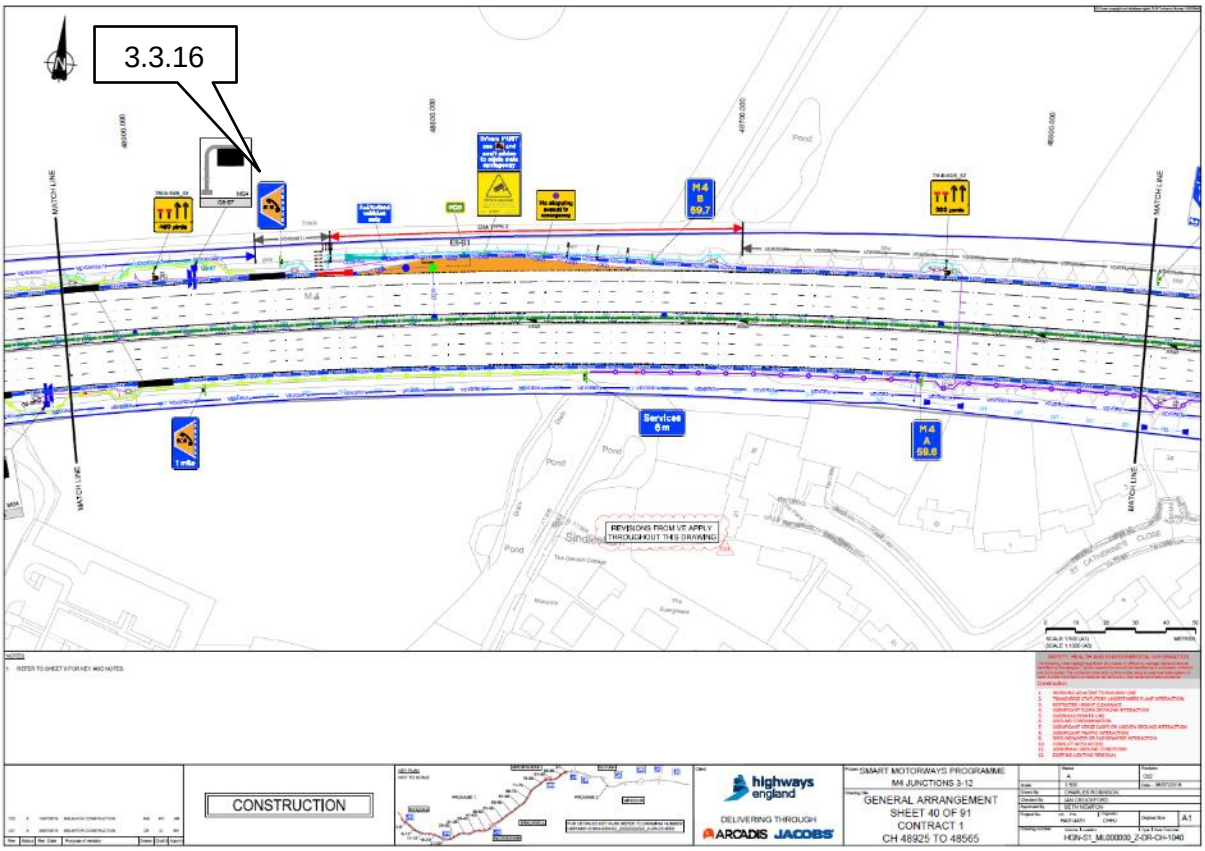

3.3.22
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 8-12
GENERAL ARRANGEMENT
SHEET 21 OF 91
CONTRACT 1
CH 55760 TO 55395
HGN-S1_ML000000_Z-DR-CH-1021

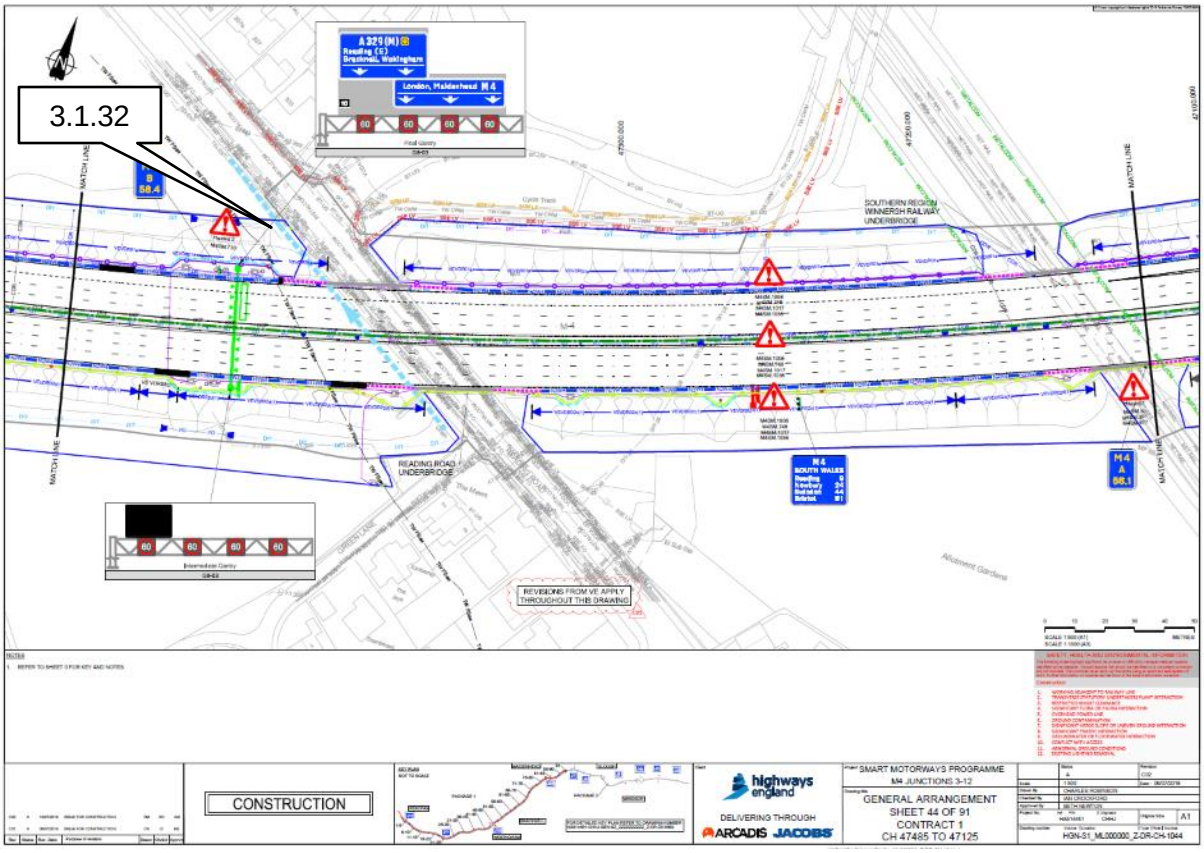

3.3.28
No hard shoulder for 6 miles
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 8-12
GENERAL ARRANGEMENT
SHEET 22 OF 91
CONTRACT 1
CH 55395 TO 55035
HGN-S1_ML000000_Z-DR-CH-1022

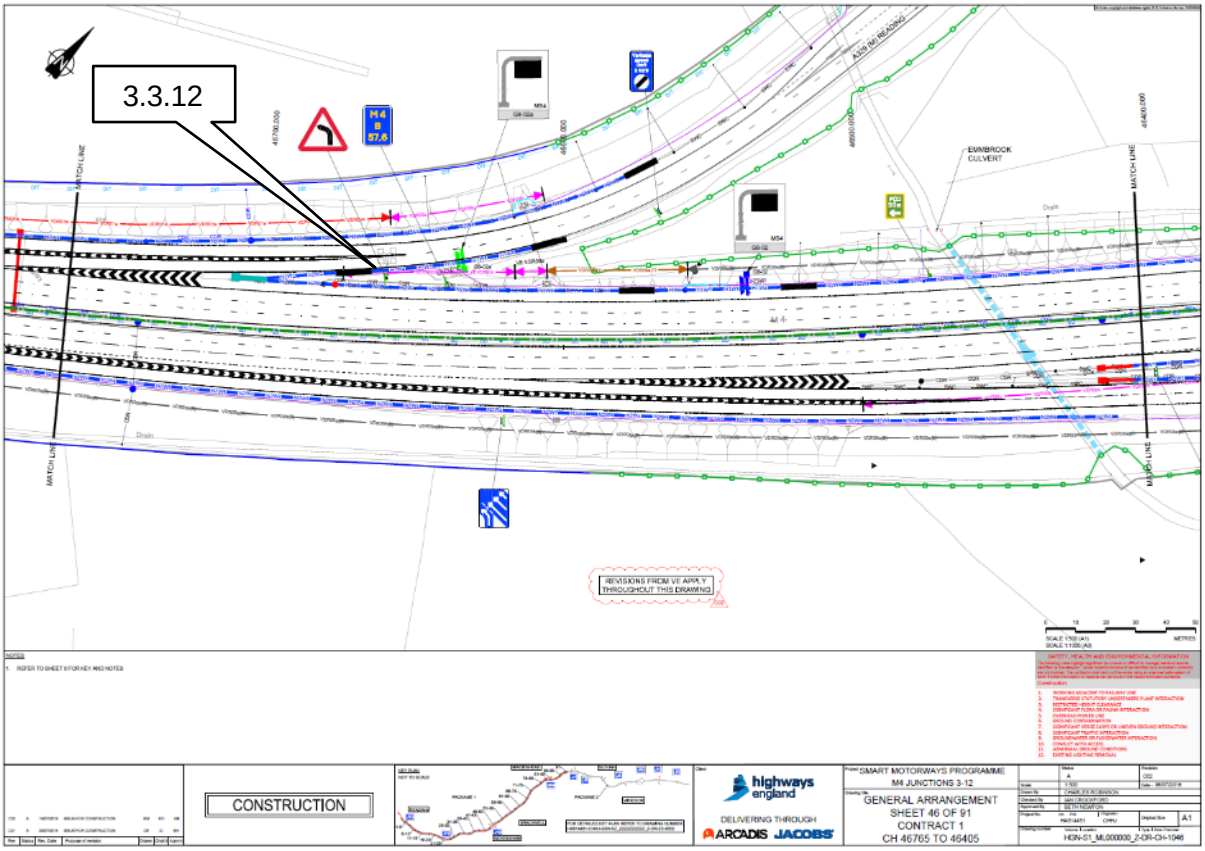

3.3.30
3.3.26
3.3.29
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 24 OF 91
CONTRACT 1
CH 54675 TO 54315
HGN-S1_ML0000000_Z-DR-CH-1024

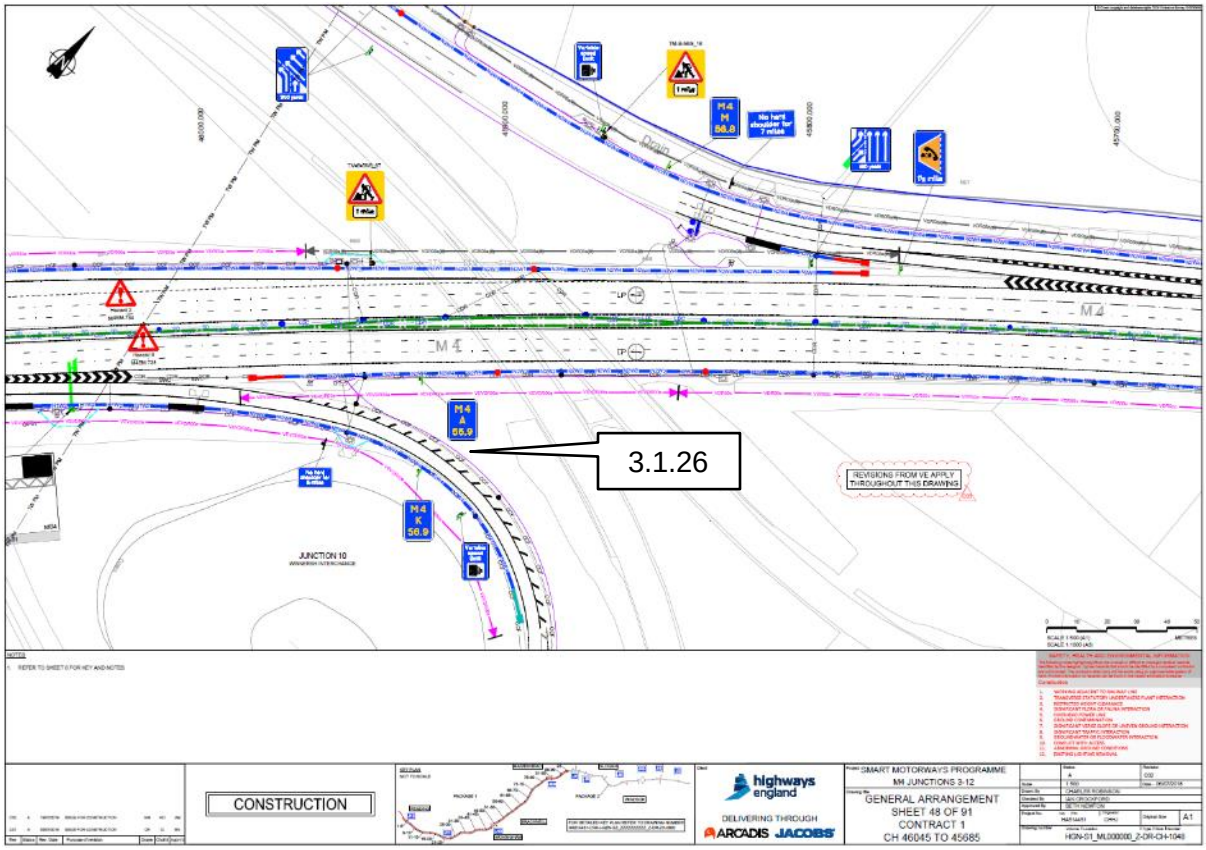

3.3.17
M4
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 27 OF 91
CONTRACT 1
CH 53595 TO 53235
HGN-S1_ML0000000_Z-DR-CH-1027

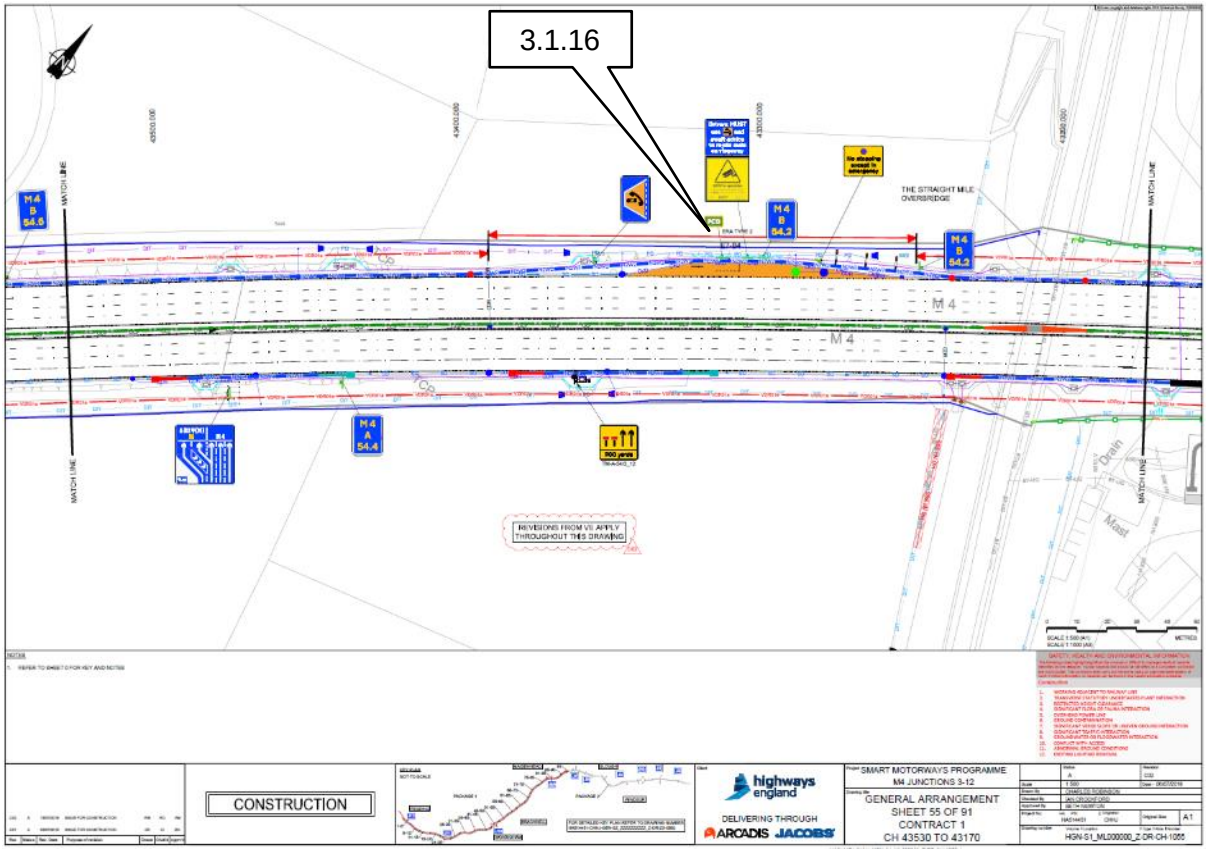

3.1.15
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 34 OF 91
CONTRACT 1
CH 51080 TO 50720
HGN-S1_MI_000000_Z-DR-CH-1034

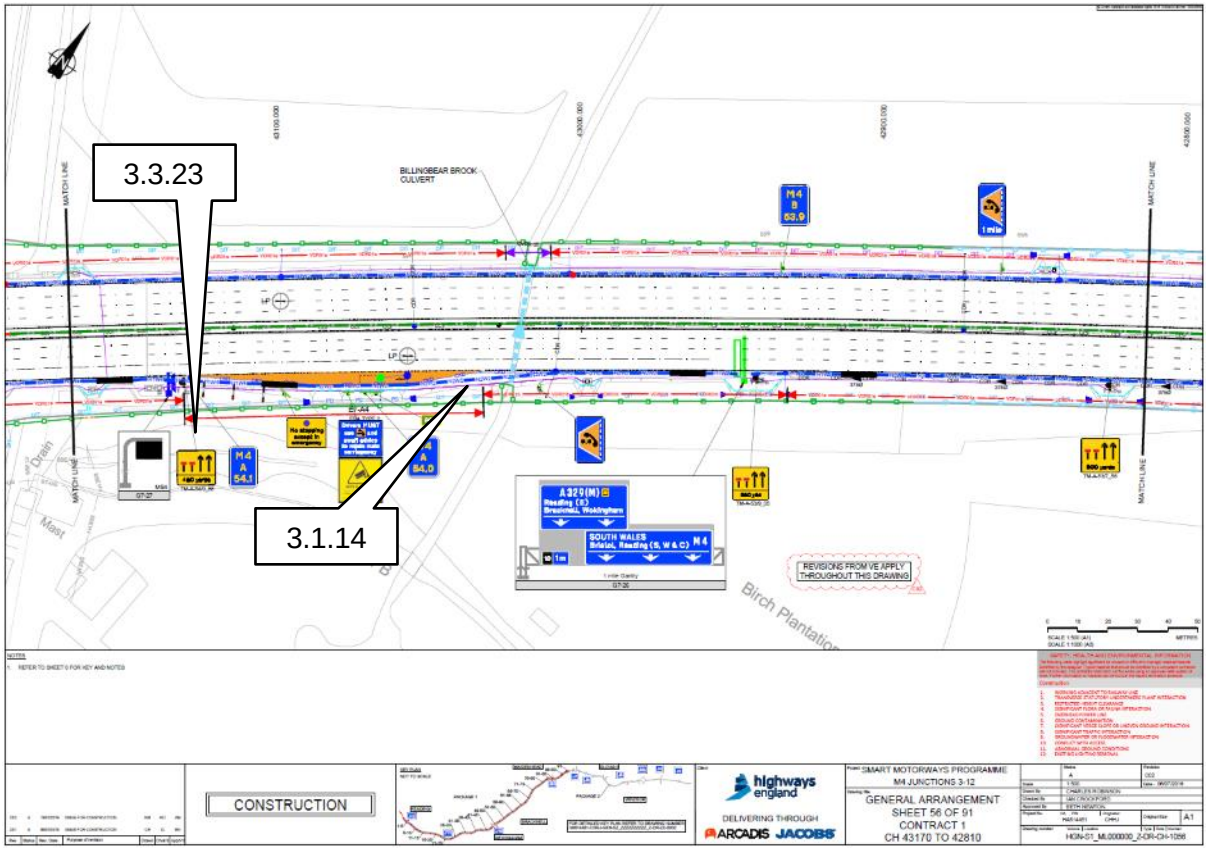

3.3.16
Services 6m
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 40 OF 91
CONTRACT 1
CH 48925 TO 48565
HGN-S1_MI_000000_Z-DR-CH-1040

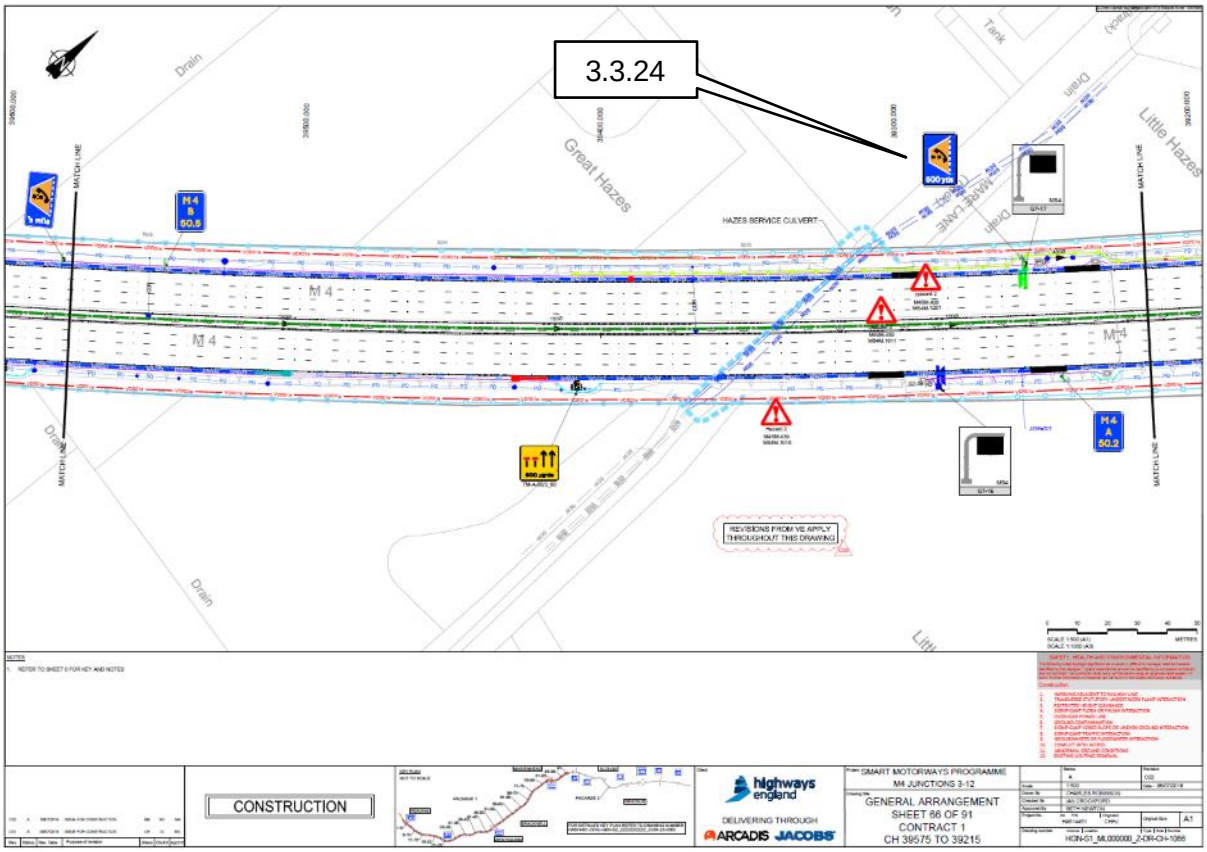

3.1.32
CONSTRUCTION
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 44 OF 91
CONTRACT 1
CH 47485 TO 47125
highways england
DELIVERING THROUGH
ARCADIS JACOBS

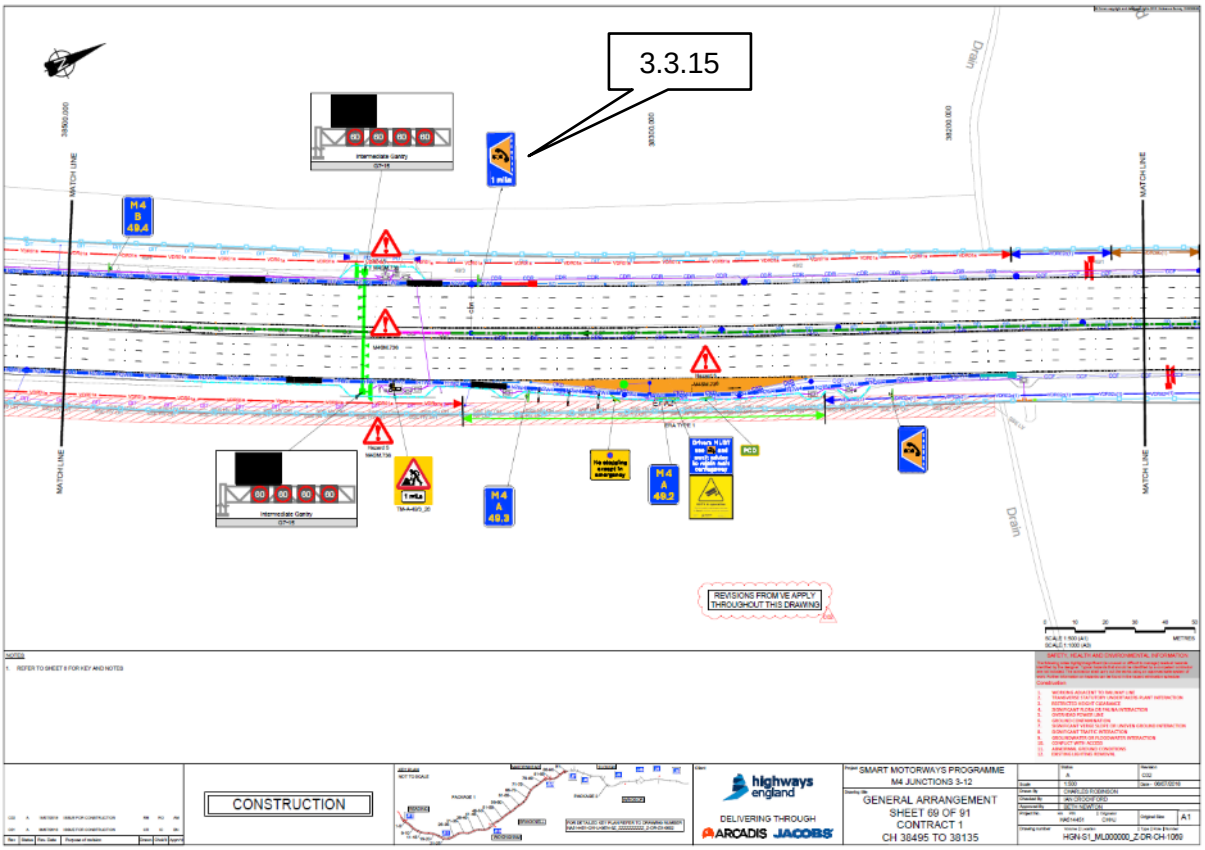

3.3.12
CONSTRUCTION
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 46 OF 91
CONTRACT 1
CH 46765 TO 46405
highways england
DELIVERING THROUGH
ARCADIS JACOBS

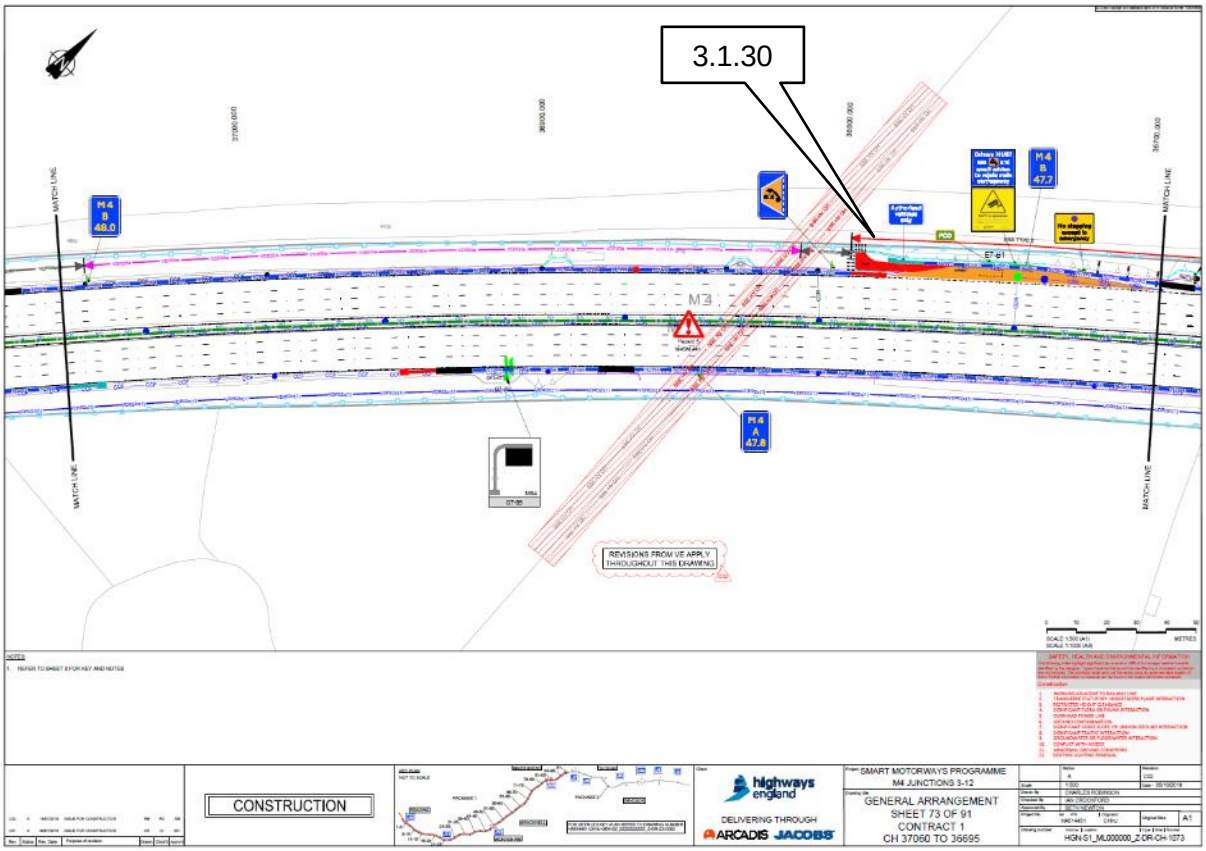

3.1.26
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 9-12
GENERAL ARRANGEMENT
SHEET 48 OF 91
CONTRACT 1
CH 46045 TO 45685

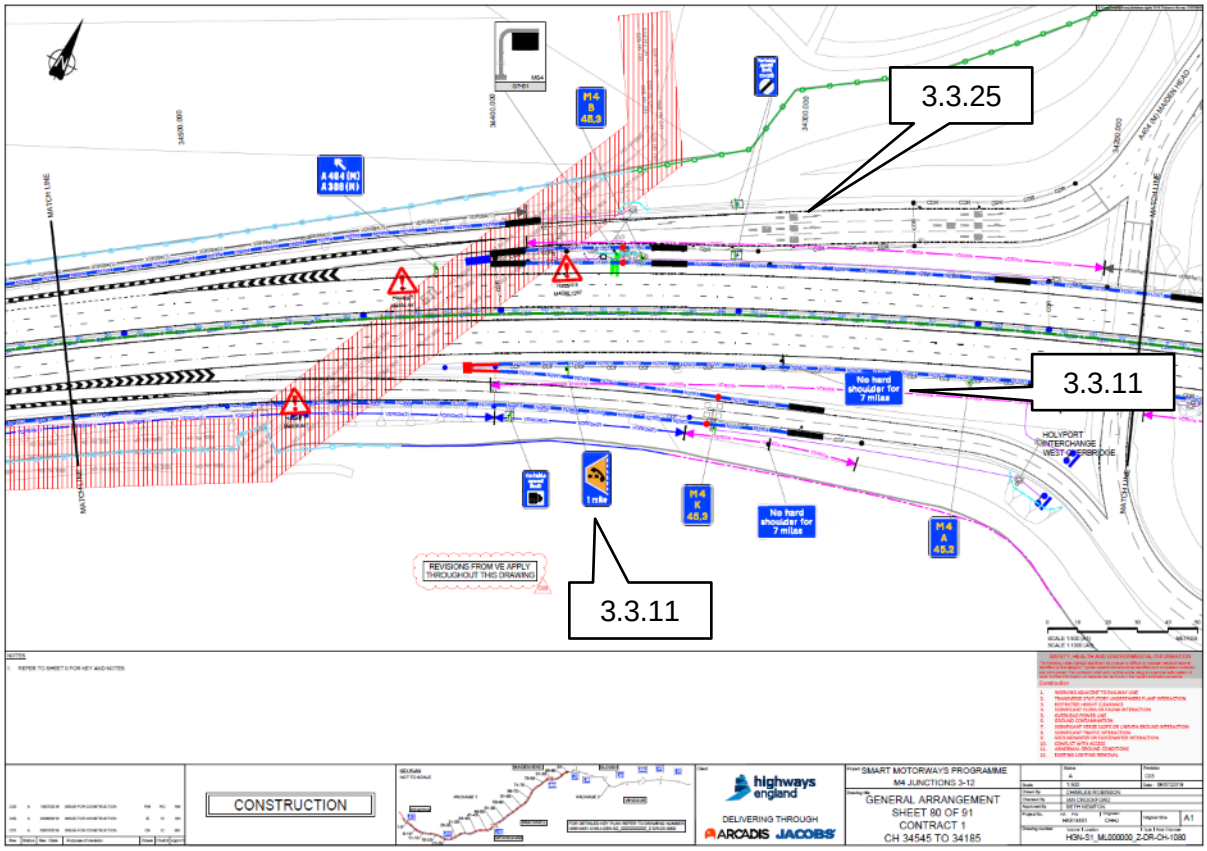

3.1.16
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 9-12
GENERAL ARRANGEMENT
SHEET 55 OF 91
CONTRACT 1
CH 43530 TO 43170


3.3.23
3.1.14
BILLINGBEAR BROOK CULVERT
M4 B 59.9
1 mile
M4 A 54.1
M4 A 54.0
A329(M)
Reading (E)
Bracknell, Wokingham
SOUTH WALES
Bristol, Reading (S, W & C) M4
1 mile
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
Birch Plantation
Drain
Mast
MATCH LINE
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 56 OF 91
CONTRACT 1
CH 43170 TO 42810


3.3.24
Great Hazes
HAZES SERVICE CULVERT
Little Hazes
Drain
Tank
M4 B 50.5
M4 A 50.2
M4
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
MATCH LINE
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 66 OF 91
CONTRACT 1
CH 39575 TO 39215


3.3.15
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 69 OF 91
CONTRACT 1
CH 38495 TO 38135
HGN-S1_ML0000000_Z-DR-CH-1069


3.1.30
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 73 OF 91
CONTRACT 1
CH 37060 TO 36695
HGN-S1_ML0000000_Z-DR-CH-1073


3.3.25
3.3.11
3.3.11
No hard shoulder for 7 miles
No hard shoulder for 7 miles
M4 B 48.9
M4 K 48.9
M4 A 45.2
1 mile
REVISIONS FROM VE APPLY THROUGHOUT THIS DRAWING
HOLYPORT INTERCHANGE WEST CARRIAGEWAY
MATCH LINE
CONSTRUCTION
highways england
DELIVERING THROUGH
ARCADIS JACOBS
SMART MOTORWAYS PROGRAMME
M4 JUNCTIONS 3-12
GENERAL ARRANGEMENT
SHEET 80 OF 91
CONTRACT 1
CH 34545 TO 34185
HGN-S1_ML000000_Z-DR-CH-1080