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INTERNATIONAL ROAD SAFETY
SOLUTIONS • MANAGEMENT

M27 Southampton Junction 8
Highways England
Stage 2 Road Safety Audit

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1. Introduction

1.1 Scheme Description

The Audit Brief provides the following general description of the scheme under this Stage 2 Road Safety Audit:

The aim of the M27 Junction 8 works is to reduce existing levels of delays and congestion on the M27 junction 8 and Windhover roundabout, increase capacity, improve safety for road users, improve accessibility for non- motorised users and minimise environmental impacts on sensitive receptors.

Details of the proposed M27 Southampton Junction 8 scheme on junction 8 itself include:

- Localised junction widening around the circulatory carriageway and on the on-slip and off-slip roads
- Introduction of traffic signals, including provisions for walkers, cyclists, and horse riders (WCH).
- An additional lane around the circulatory carriageway and an additional lane on the approaches to the roundabout
- A new WCH path will link M27 junction 8 with Windhover roundabout and onwards to A3024 Bursledon Road.

Details of the proposed M27 Southampton Junction 8 scheme on A27 Windhover roundabout include:

- Localised junction widening around the circulatory carriageway and the entry / exit lanes.
- Signal improvements, including provisions for WCH.
- An additional lane around the circulatory carriageway with an extra entry lane added at the A3024.

Details of the proposed M27 Southampton Junction 8 scheme on Bert Betts Way, A27 Providence Hill, and A27 West End Road include:

- A new 3m wide shared WCH route will be provided to the south of A3024 Bert Betts Way (connecting to M27 junction 8) and across the centre of the roundabout from A27 West End Road to A27 Providence Hill.

1.2 Audit Brief

This report has been produced in a response to a request from Eric Hill of Sweco UK Ltd, on behalf of Highways England, to undertake a Stage 2 Road Safety Audit of the proposed highway works.

The composition of the Audit Team was approved by the Overseeing Organisation (Highways England) and reported to the Audit Team via email received from Sweco on 29/06/2021.

The Road Safety Audit Brief was prepared by Sam Irving of Sweco UK Ltd on behalf of Grahams Construction Ltd, and the Overseeing Organisation, Highways England. The approved Audit Brief was provided by Sweco UK Ltd to the RSA Team on the 08/07/2021, by email. The Audit Team considers that the Audit Brief and information provided is acceptable for this Stage 2 Road Safety Audit to be carried out.

The Audit Team membership was as follows:

- Audit Team Leader: Kevin Seymour BSc, PG Dip TS, MCIHT, MSoRSA, AMIHE, HE RSA Cert Comp
- Audit Team Member: John Aldridge BA (Hons), MSc, MCIHT

This Road Safety Audit was undertaken in accordance with the requirements of the Road Safety Audit Brief approved by Highways England on the 29th June 2021.

The Road Safety Audit desktop study took place on the 9th & 10th July 2021 and comprised an examination of the submitted drawings and documentation listed in **Appendix A**.

The drawing documents provided for the Road Safety Audit Team comprised of the following:

- General Arrangement Drawings
- Maintenance boundary drawing
- Fencing
- Road Restraint Systems
- Drainage
- Kerbs, footways and paved areas
- Road markings
- Traffic Signs
- Earthworks
- Pavement formation
- Lighting
- Duct and Electrical layout
- Bert Betts Way retaining wall

The Road Safety Audit Team were also provided with a copy of the Stage 1 RSA report, brief and RSA 1 Designers response. A Departures from Standard list, crash data history, traffic flows, WCH Strategy document.

Following a request to Sweco UK Ltd for further information, the RSA Team were provided the following:

- Pavement treatment detail
- VRS Schedule
- Traffic signal details

Following UK Government protocols put in place as a result of the current Covid-19 pandemic, the Audit Team visited the site of the proposed works on Monday 12/07/2021 between 14:00hrs and 16:00hrs (in daylight). During this initial part of the site visit the weather was clear, and the road surface was dry. Traffic conditions were moderate and free flowing. Limited pedestrian activity was identified, although there was cycle activity observed at various locations around Windhover roundabout. These amounted to around 12 cycle movements during the on-site inspection. Photographs of the site were taken (on-foot) at accessible areas.

The initial foot inspection undertaken of the accessible areas was followed by a drive through the site. The drive through of the two roundabout circulatory areas, Bert Betts Way and surrounding local authority roads connecting to Windhover roundabout was conducted in dry conditions. To observe road conditions in the pm peak, a drive through of the roundabout circulatory areas and the connecting on and off-slips of junction 8 was conducted between 16:30hrs-17:00hrs. During this period there was torrential rain and standing water on the carriageway. No congestion was observed.

The terms of reference for this Road Safety Audit are the Highways England departmental standard DMRB GG 119 Road Safety Audit Rev: 2. 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.

The comments and suggestions for road safety improvements made in this report seek to address matters that might have an adverse effect on road safety in the context of the chosen design. No attempt has been made to comment on the justification of the scheme. Consequently, the auditors accept no responsibility for the design or construction of this scheme.

All of the issues raised in this report are considered to be required for action. The comments contained in the report are based on safety related concerns and as such the Scheme Promoter and the Design Organisation will need to consider carefully how to respond to each of the issues.

It is the Scheme Promoter's responsibility to ensure that all problems raised by the Audit Team are given due consideration. To assist with this the Design Organisation must prepare an RSA Response Report for the problems and recommendations contained in this audit.

1.3 Crash Data

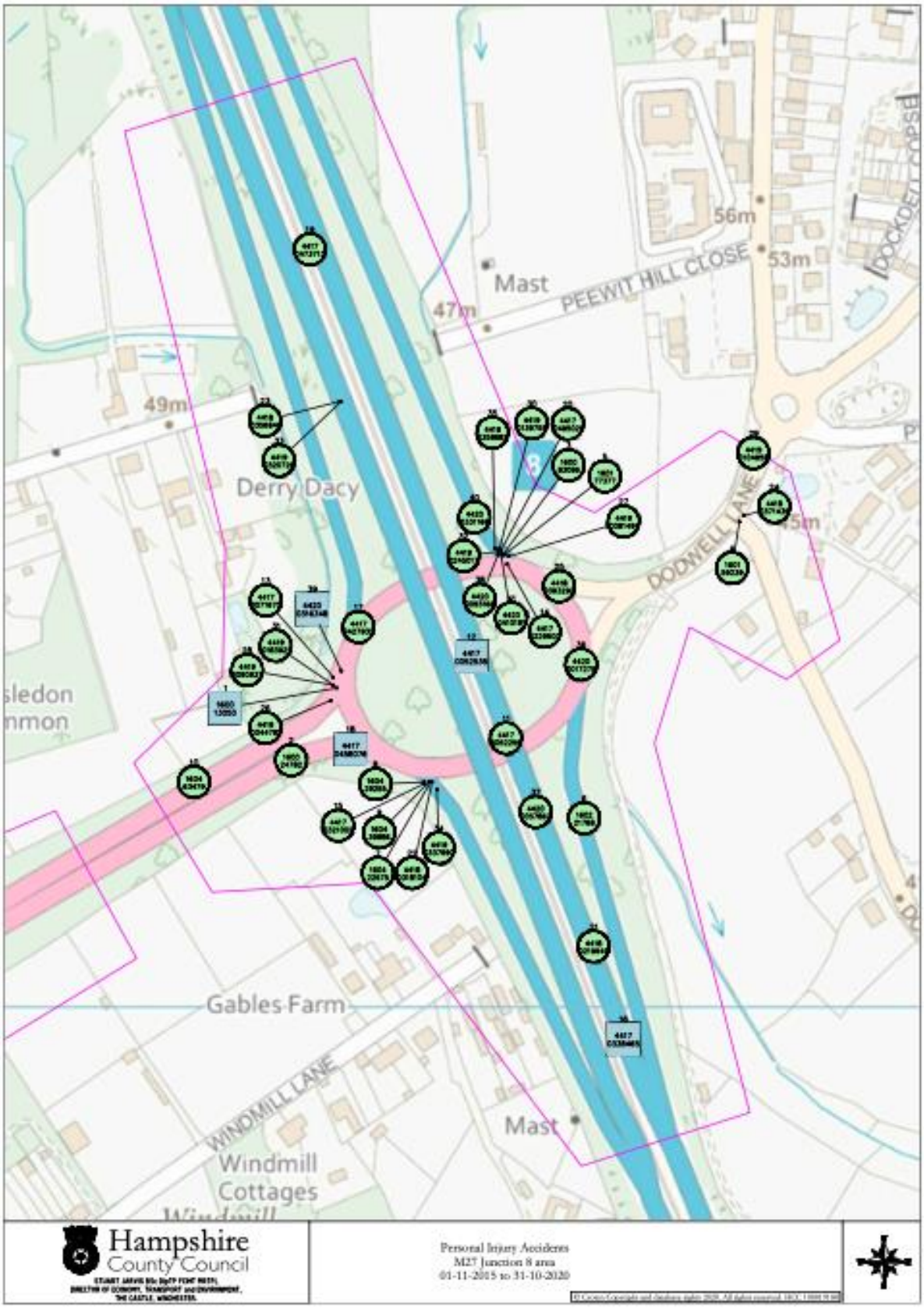
Crash data for Windhover roundabout and the M27 Junction 8 has been provided to the road safety audit team. The data includes a plot of injury crashes and a summary of the contributory factors recorded at the crash types. The crash data covers a 5 year period from the 1 November 2015 to the 31st October 2020.

During the 5 year period under analysis there were 41 crashes recorded at the location of junction 8 and approaches (no crashes in 12015). The crash numbers and crash severity are outlined in Table 1.1. The crash locations are shown in the plot diagram shown in Figure 1.1.

Table 1.1: Crash Severity 2015-2020 M27 Junction 8

	2016	2017	2018	2019	2020	Total
Serious	1	3	0	0	1	5
Slight	9	7	5	10	5	36
Total	10	10	5	10	6	41

Figure 1.1: Plot of crashes 2015-2020 M27 Junction



A brief summary of the crash history at Junction 8 M27, indicates that the majority of the crashes have occurred on the M27 southbound off-slip on the approach to the roundabout circulatory with 11 crashes recorded at this location over 5 years out of a total 41. Other approaches to the roundabout at junction 8 also included a high cluster of crashes with 7 crashes on the eastbound approach to the M27 junction 8 roundabout from Bert Betts Way, including two serious crashes. On the north bound off slip on the approach to the roundabout circulatory there were 6 crashes.

Overall at junction 8, 30 of the crashes were described as rear shunt type crashes, therefore representing 73% of the crashes at this location. There were no crashes involving cyclists or pedestrians at this location, although there were 8 motorcycles recorded in the crash data.

At Windover roundabout and the junction approaches there has been 36 serious and slight injury crashes recorded during the 5 years of data analysed between 2015-2020. No fatal crashes were recorded. The crash data severity by year is shown in Table 1.2. The crash data locations are plotted in Figure 1.2.

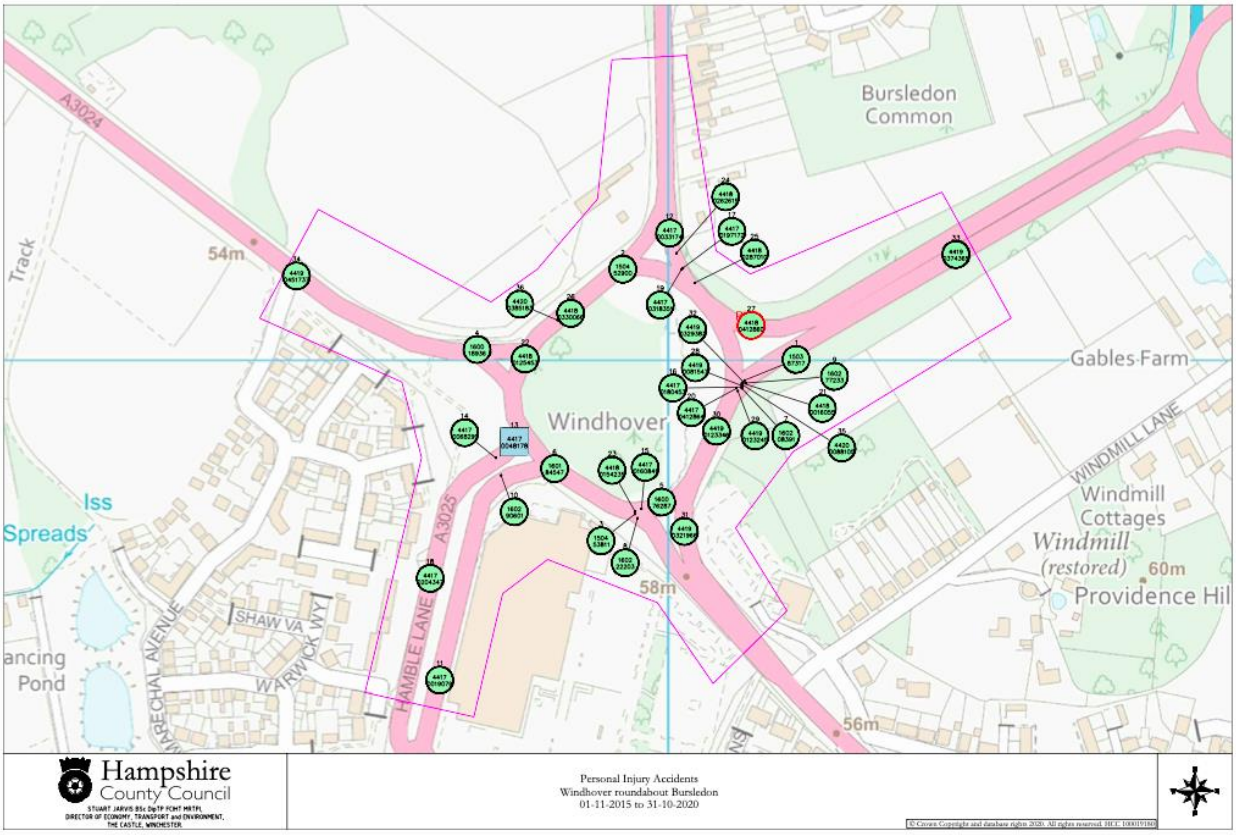
Table 1.2: Crash Severity 2015-2020 Windover Roundabout

	2015	2016	2017	2018	2019	2020	Total
Serious	0	0	1	0	0	0	1
Slight	3	7	9	7	7	2	35
Total	3	7	10	7	7	2	36

Crashes recorded on the Windover Roundabout and surrounding approach roads indicate a high cluster of crashes on the Bert Betts Way westbound approach to the roundabout circulatory. A total of 11 of the 36 recorded injury crashes occurred at this approach to the roundabout. A cluster of 5 crashes occurred at both the West End Road southbound approach to the roundabout and the Providence Hill west bound approach to the circulatory. The remaining recorded injury crashes were distributed throughout the scheme extents. The most common crash type was rear shunt type crashes with 20 of the 35 recorded (57%). Loss of control crashes represented the second most common crash type at Windhover roundabout with 20% of the total. Five motorcycles were involved in crashes and 1 cyclist. Three of the recorded injury crashes mentioned vehicle rollover.

It should be noted that the number and severity of crashes reported in 2020 may be unreflective of previous years and trends because of changes in travel patterns in 2020 where government advice due to COVID, instructed people to stay at home, therefore resulting in a significant reduction in vehicle based journeys.

Figure 1.2: Plot of crashes 2015-2020 Windover Roundabout



2 Departures from Standard

A Departures from Standards checklist has been produced to record all departure from standard to ensure that all Highways England roads and bridges are designed in accordance with Standards.

A Departures from Standard Checklist (HE551514-SWE-HAC-ZZ-SH-CH-50001000) was provided to the audit team as part of the Audit Brief.

Details of the potential Departures from Standards were reported. These are summarised in Table 2.1

Table 2.1_ Departures from Standard Checklist

Number	Location	Detail
WHVR - DEP 0001	A3024 Bursledon Road approach	Reduction in vertical curvature Sag = 15 on the approach to Windhover roundabout. Desirable minimum 20.
WHVR - DEP 0002	A3024 Bursledon Road to West End Road (circulatory)	Reduction in vertical curvature Crest = 17 (one step below) on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0003	A3024 Bert Betts Way Approach	Reduction in vertical curvature Crest = 17 on the approach to Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0004	A3024 Bert Betts Way to Providence Hill (Circulatory)	Reduction in vertical curvature Crest = 8 (three steps below) on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0005	A3024 Bert Betts Way to Providence Hill (Circulatory)	Reduction in vertical curvature Crest = 21 (one step below) on the exit from Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0006	Providence Hill Exit	Reduction in vertical curvature Sag = 15 (one step below) on the exit from Windhover roundabout. Desirable minimum 20.
WHVR - DEP 0007	Providence Hill Approach	Reduction in vertical curvature Crest = 10 on the approach to Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0008	Providence Hill to Hamble Lane (Circulatory)	Reduction in vertical curvature Crest = 10 (two step below) on the exit from Windhover

Number	Location	Detail
		roundabout. Desirable minimum 30.
WHVR - DEP 0009	Hamble Lane Exit	Reduction in vertical curvature Sag = 13 (one step below) on the exit from Windhover roundabout. Desirable minimum 20.
WHVR - DEP 0010	Hamble Lane Approach	Reduction in vertical curvature Crest = 13 on the exit from Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0011	Circulatory	Reduction in vertical curvature Crest = 10 on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0012	Circulatory	Reduction in vertical curvature Crest = 5 (+ three steps) on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0013	Windhover Circulatory	Reduction in vertical curvature Sag = 5 (+ three steps) on the circulatory of Windhover roundabout. Desirable minimum 20.
WHVR - DEP 0014	Windhover Circulatory	Reduction in vertical curvature Crest = 10 on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0015	Bursledon Road Island Exit	Reduction in vertical curvature Crest = 12 on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0016	West End Road Island Circulatory	Reduction in vertical curvature Crest = 10 on the circulatory of Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0017	Hamble Lane Island Approach	Reduction in vertical curvature Sag = 13 (one step below) on the approach to Windhover roundabout. Desirable minimum 20.
WHVR - DEP 0018	Hamble Lane Island Approach / Circulatory	Reduction in vertical curvature Crest = 6.5 on the approach to Windhover roundabout. Desirable minimum 30.
WHVR - DEP 0019	A27 West End Road to BBW	Reduction in vertical curvature Crest = 23.5 (one step below) on the exit from Windhover

Number	Location	Detail
		roundabout. Desirable minimum 30.
WHVR - DEP 0020	Windhover Circulatory	Reduction in vertical curvature Sag = 12.5 (two steps) on the circulatory of Windhover roundabout. Desirable minimum 20.
WHVR - DEP 0022	Hamble Lane Approach	Entry with = 15.8m on the approach to Hamble Lane. Maximum entry width allowed is 15m.
BBW-DEP 0001	Bert Betts Way westbound carriageway	Reduction in hard strip to 0.5m on Bert Betts Way westbound to reduce the amount of verge widening, earthwork footprint and vegetation clearance
DEP-3-003	Junction 8 - M27 SW corner Northbound exit slip road	The existing off-side hard strip is 0.4m wide while TD 27 sets the standard at 1.0m wide. We are proposing to keep this existing hardstrip to avoid impacting on the existing slopes in the earthworks towards the M27 Mainline. From our topographic survey, the existing slope is 1:2 and a stabilising solution would be needed if that changed to a steeper gradient.
DEP-3-004	Junction 8 - M27 NE corner southbound exit slip road	The existing off-side hard strip is 0.4m wide while TD 27 sets the standard at 1.0m wide. We are proposing to keep this existing hardstrip to avoid impacting on the existing slopes in the earthworks towards the M27 Mainline. From our topographic survey, the existing slope is 1:2 and a stabilising solution would be needed if that changed to a steeper gradient.
DEP-3-005	Junction 8 - M27 SW corner Northbound exit slip	The proposed lane width for all 3 lanes is to be 3.3m instead of the standard 3.65m from TD 27. The existing lane widths on this northbound exit slip road are taken from our topographic survey as 2.9m. We are proposing an improvement of the existing cross section to the largest extent available to avoid

Number	Location	Detail
		the need for additional land take in private land.
DEP-3-006	Junction 8 - M27 SW corner Northbound exit slip	The proposed near-side hardstrip is reduced from 1.0m to 0.6m for the last 30m in the approach of Junction 8, instead the 1.0m wide set in TD 27. We are proposing an improvement of the existing cross section to the largest extent available to avoid the need for additional land take in private land.
J8 - DEP 0001	J8 Circulatory Ch 210-220	Reduction in vertical curvature Sag = 13 on the circulatory of Junction 8. Desirable minimum 20.
J8 - DEP 0002	J8 Circulatory Ch 360-380	Reduction in vertical curvature Crest = 17 on the circulatory of Junction 8. Desirable minimum 30.
J8 - DEP 0003	Northbound Diverge to Bert Betts Way Ch 170-180	Reduction in vertical curvature Crest = 17 on the approach to Junction 8. Desirable minimum 30.
J8 - DEP 0004	Northbound Diverge to Bert Betts Way Ch 210-270	Reduction in vertical curvature Sag = 14.9 on the exit from Junction 8. Desirable minimum 20. Design out to 1SB with 13K Curve?
J8 - DEP 0005	Dodwell Lane Splitter Island Ch 90-130	Reduction in vertical curvature Sag = 6.87 on the exit from Junction 8. Desirable minimum 20.
J8 - DEP 0006	Bert Betts Way Splitter Ch 290-370	Reduction in vertical curvature Sag = 18 on the exit from Junction 8. Desirable minimum 20.
J8 - DEP 0007	Bert Betts Way Splitter Ch 375-395	Reduction in vertical curvature Crest = 17 on the circulatory of Junction 8. Desirable minimum 30.
J8 - DEP 0008	Bert Betts Way Splitter Ch 405-460	Reduction in vertical curvature Sag = 11 on the approach to Junction 8. Desirable minimum 20.

Number	Location	Detail
J8 - DEP 0009	Bert Betts Way to Northbound Merge Ch 240-310	Reduction in vertical curvature Sag = 10 on the approach to Junction 8. Desirable minimum 20.
J8 - DEP 0010	Bert Betts Way to Northbound Merge Ch 310-350	Reduction in vertical curvature Crest = 21.7 on the circulatory of Junction 8. Desirable minimum 30.
J8 - DEP 0011	Northern Slips Island Ch 20-40	Reduction in vertical curvature Crest = 17 on the circulatory of Junction 8. Desirable minimum 30.
J8 - DEP 0012	Northern Slips Island Ch 90-105	Reduction in vertical curvature Crest = 10 on the circulatory of Junction 8. Desirable minimum 30.
J8 - DEP 0013	Southbound Diverge to Dodwell Lane Ch 160-220	Reduction in vertical curvature Sag = 9 on the exit from Junction 8. Desirable minimum 20.
J8 - DEP 0014	Southbound Diverge to Dodwell Lane Ch 220-280	Reduction in vertical curvature Crest = 12 on the exit from Junction 8. Desirable minimum 30.
J8 - DEP 0015	NB diverge slip road Ch 117-150	Reduction in vertical curvature Sag = 13. Desirable minimum 20.
J8 - DEP 0016	SB diverge slip road Ch 50-160	Reduction in vertical curvature Sag = 14 & Crest = 17. Desirable minimum 20 and 30 respectively.
J8 - DEP 0017	Dodwell Lane Approach	Reduction in vertical curvature Crest = 8 on the approach to Junction 8. Desirable minimum 30.
NMU - DEP 0001	Bert Betts Way	Constrained cross section. Increasing the width for the vertical features will increase the verge widening, earthwork footprint and vegetation clearance
NMU - DEP 0002	Hamble Lane Splitter Island	Due to existing carriageway levels the cross fall proposed on the NMU route on the splitter island is 5%. This is an area where there could be slow moving cycle traffic due to the presence of toucan crossings

Number	Location	Detail
NMU - DEP 0003	Dodwell Lane	Due to existing levels into the two field accesses the cross fall proposed on the NMU route is 8% for a short section.
NMU - DEP 0004	Hamble Lane to Bursledon Road footway	Reduction in vertical curvature sag = 3. Desirable minimum 5.
NMU - DEP 0005	Hamble Lane to Bursledon Road footway	Reduction in vertical curvature Crest = 4. Desirable minimum 6.
NMU - DEP 0006	Connection to Hamble Lane footway	Reduction in vertical curvature sag = 3. Desirable minimum 5.
N/A	M27 J8 SB&NB Off & On-slips - Resurfacing/Widening	To permit the use of Hot Rolled Asphalt as the surface course for the resurfacing of the M27 slip roads.
N/A	M27 J8 NB Off-slip - Widening	To permit the use of non-standard materials to allow narrow widening using lean mix concrete to facilitate the construction of widening to the M27 NB offslip as part of the M27 J8 project.
N/A	A3024 Bert Betts Way EB approach to M27 J8	The adoption of the Institution of Civil Engineer's Specification for Piling and Embedded Retaining Walls (ICE SPERW) 3rd Edition, 2016 as the Series 1600 of the SHW is not compliant with the latest Eurocode execution standards as required by CD 350 Clause 6.1 and 6.1.1.

3 Items Raised at Previous Stage 1 Road Safety Audit

A Stage 1 Road Safety Audit for the M27 Junction 8 project was completed by Jacobs in April 2019. A total of 32 issues were raised within the Stage 1 Road Safety Audit report. From these raised issues, 26 have been accepted by the Design Team, or alternative measure accepted by the Design Team. Where these issues have not been updated in the accompanying drawings for this Road Safety Audit report, the issues have been raised again in Section 4 of this report.

There were 6 items raised by the Road Safety Audit Team which were dismissed by the Design Team. Where these issues are still considered a road safety concern by the Road Safety Audit Team, they have been raised again within Section 4 of this report.

It should be noted that there was no Overseeing Organisation response provided for the Stage 1 Road Safety Audit report within Road Safety Audit brief and supporting documents provided to the Stage 2 Road Safety Audit team.

4 Items Raised at this Road Safety Audit

This section describes the road safety related issues identified by the Audit Team during this Stage 2 Road Safety Audit. A reference key plan showing the general layout of the scheme is shown at **Appendix B**.

4.1 General

PROBLEM 4.1.1

Location: Throughout the extent of the project works

Drawing: N/A

Summary: The absence of directional signs for walkers/cyclists/horse riders (WCH) may result in incorrect route selection resulting in additional road crossing and unexpected movements by these users and risk of collisions with motorised users.

Description:

As part of the scheduled works at Windhover roundabout and the surrounding area, including M27 junction 8, an improved infrastructure is being introduced for WCH users. The improvements to the network for vulnerable road users may result in an increased number of these road users using the area, with some users perhaps unfamiliar with the surroundings. Unfamiliar road users may experience difficulty in navigating around the shared cycle and pedestrian network as the proposed network does not necessarily follow a logical route destination layout, with some movements requiring users to cross to the centre of the roundabout, and other destinations requiring users to utilise the outer circulatory of the roundabout. Uncertainly for vulnerable road users on the appropriate route selection for onward journey may result in users crossing the road network additional times to try to establish the correct route therefore exposing themselves to an additional risk of vehicle strikes whilst crossing.

Recommendation:

It is recommended that finger posts are introduced around the shared WCH route to aid way-finding.

PROBLEM 4.1.2

Location: Eastbound carriageway on Dodwell Lane

Drawing: HE551514-SWE-HKF-ZZ-DR-CH-50003

Summary: Change in the road layout ahead resulting in No Right Turn, may lead to driver confusion and an increased likelihood of rear shunt type crashes.

Description:

For vehicles travelling east along Dodwell Lane the existing right minor turning to the south to the road also known as Dodwell Lane will no longer be permitted. As part of the works a central median will be constructed and a No Right Turn sign introduced. Instead vehicles will need to proceed to the nearby roundabout to the east and U turn to reach the minor turning to Dodwell Lane.

The change in the road layout and permitted turning movements may confuse some road users who may slow or stop at the right turning location to assess the situation. This may result in an increased likelihood of rear shunt type crashes.

Recommendation:

It is recommended that a temporary road sign is introduced to warn drivers of the closure of the central median and advising of the need to U turn at the roundabout.

PROBLEM 4.1.3

Location: Various

Drawing: HE551514-SWE-HDG-ZZ-DR-CD-50001-50005

Summary: Open drainage ditches alongside the edge of the carriageway may create a hazard to an errant vehicle.

Description:

As part of the upgrade works there are sections of open ditch proposed alongside the edge of the carriageway, most prevalent within the inner circulatory of the Windhover roundabout. There is a danger therefore that an errant vehicle may leave the carriageway and enter the ditch area. This may result in an increased likelihood of vehicle rollover.

Recommendation:

It is recommended that the side slopes of the ditches are eased to 1 in 5 or flatter, made into swales or the ditches are backfilled and a pipe system introduced.

4.2 Signing & Lining Measures

PROBLEM 4.2.1

Location: Bert Betts Way eastbound approach to the M27 junction 8 roundabout

Drawing No: HE551514-SWE-HSN-ZZ-DR-CH-50002

Summary: Incorrect lane positioning due to unclear carriageway text and supporting road sign may increase the likelihood of side swipe type crashes.

Description:

On the eastbound approach to the M27 junction 8 roundabout on Bert Betts Way, carriageway markings indicate that lane 1 (on the two lane approach) support straight ahead, and left turn movements to Hedge End and the M27, Figure 4.1. As vehicles proceed eastwards towards the proposed traffic signals an additional 3rd lane is provided. The direction to Hedge End is marked as lane 2 & lane 3 only. There is a danger that if traffic is queuing back from the traffic signals that the text markings on the carriageway will be covered showing the three lane text markings. Unfamiliar drivers may therefore utilise lane 1 of the three lanes assuming this is the marked direction to Hedge End. As drivers approach closer to the circulatory any drivers positioned in lane 1 for Hedge End noting their incorrect lane selection, may attempt to select lane 2 therefore increasing the potential for side swipe type crashes.

Figure 4.1: Carriageway Text Markings

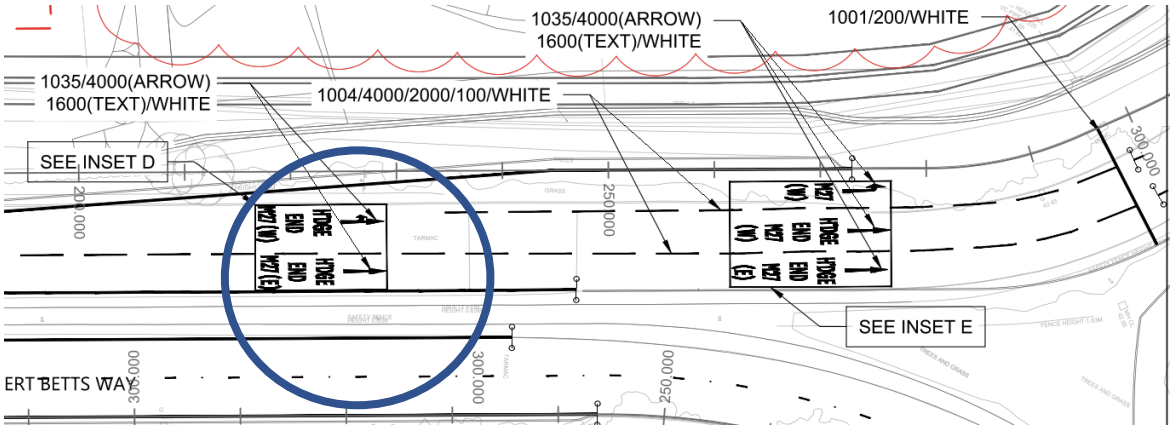
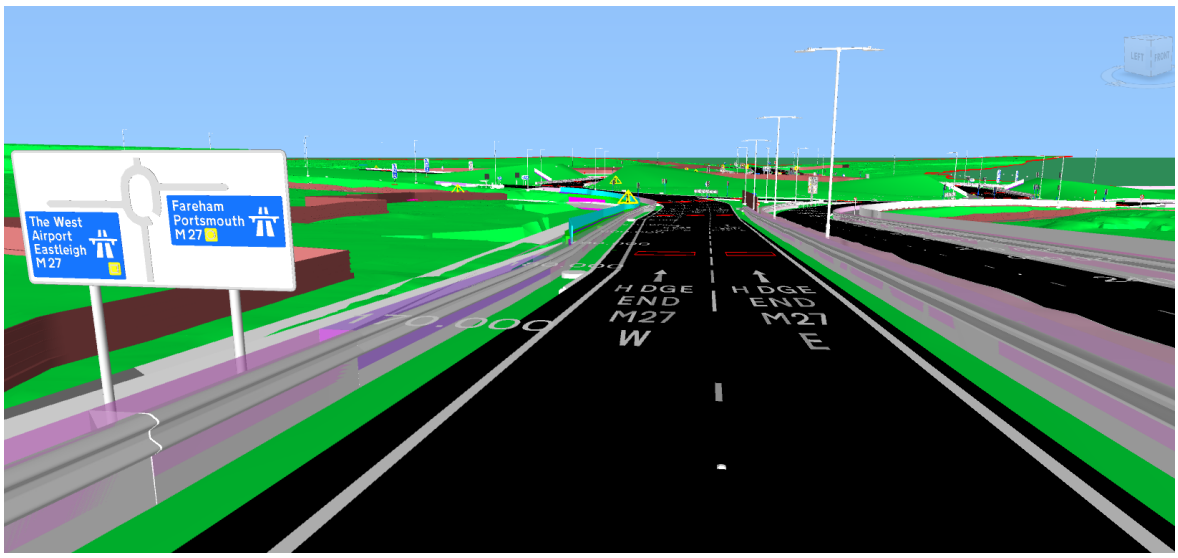


Figure 4.2: Map Type directional sign and carriageway markings



Recommendation:

It is recommended that a dedicated lane advance direction sign is included on the Bert Betts Way approach to the junction 8 roundabout circulatory to supplement the carriageway markings and to provide greater clarity of lane selection for route destination. Note Traffic Signs Sheet 2 of 5 drawing ref: HE551514-SWE-HSN-ZZ-DR-CH-50002 indicates sign ES2-08 on the eastbound approach to the traffic signals. This sign is not shown on the sign schedule, but it is assumed this sign is the map type sign showing the roundabout ahead with route directions (see Figure 4.2), and therefore does not fully aid drivers with lane selection.

For additional clarity, the removal of the road markings proposed in INSET D above, and replacement with an additional set of the proposed markings shown in INSET E may aid route finding. A similar approach on the westbound approach to Windhover roundabout may also be adopted.

PROBLEM 4.2.2

Location: M27 junction 8 roundabout circulatory

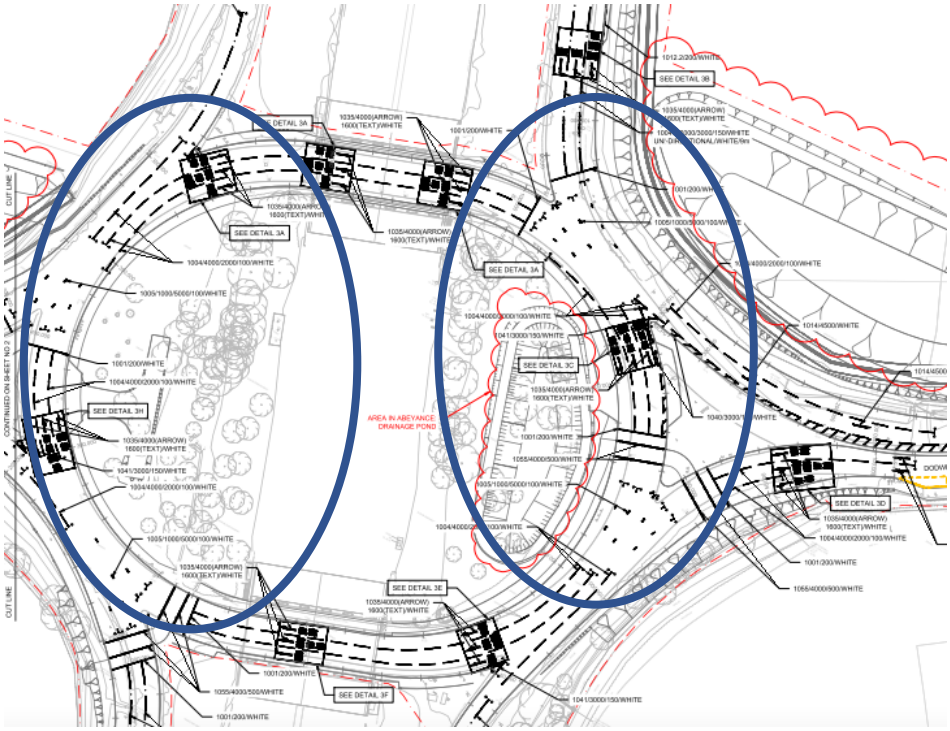
Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-50003

Summary: Unclear carriageway markings may lead to increased likelihood of side swipe type crashes.

Description:

The M27 Junction 8 roundabout circulatory proposes to utilise 1005 road markings to help guide road users to the appropriate lane and onward destination. Due to the variable number of entry and exit lanes from the roundabout arms compared to the number of circulatory lanes, there is a danger that the proposed road markings may not offer sufficient guidance to road users to enable them to naturally enter their desired receiving lane. This may result in driver hesitation and lead to an increased likelihood of side swipe type crashes.

Figure 4.3: Roundabout circulatory markings at Junction 8 M27



Recommendation:

It is recommended that full/improved spiral road markings are introduced on the roundabout circulatory and entering and receiving lanes to provide clear guidance to road users.

PROBLEM 4.2.3

Location: Windhover roundabout circulatory

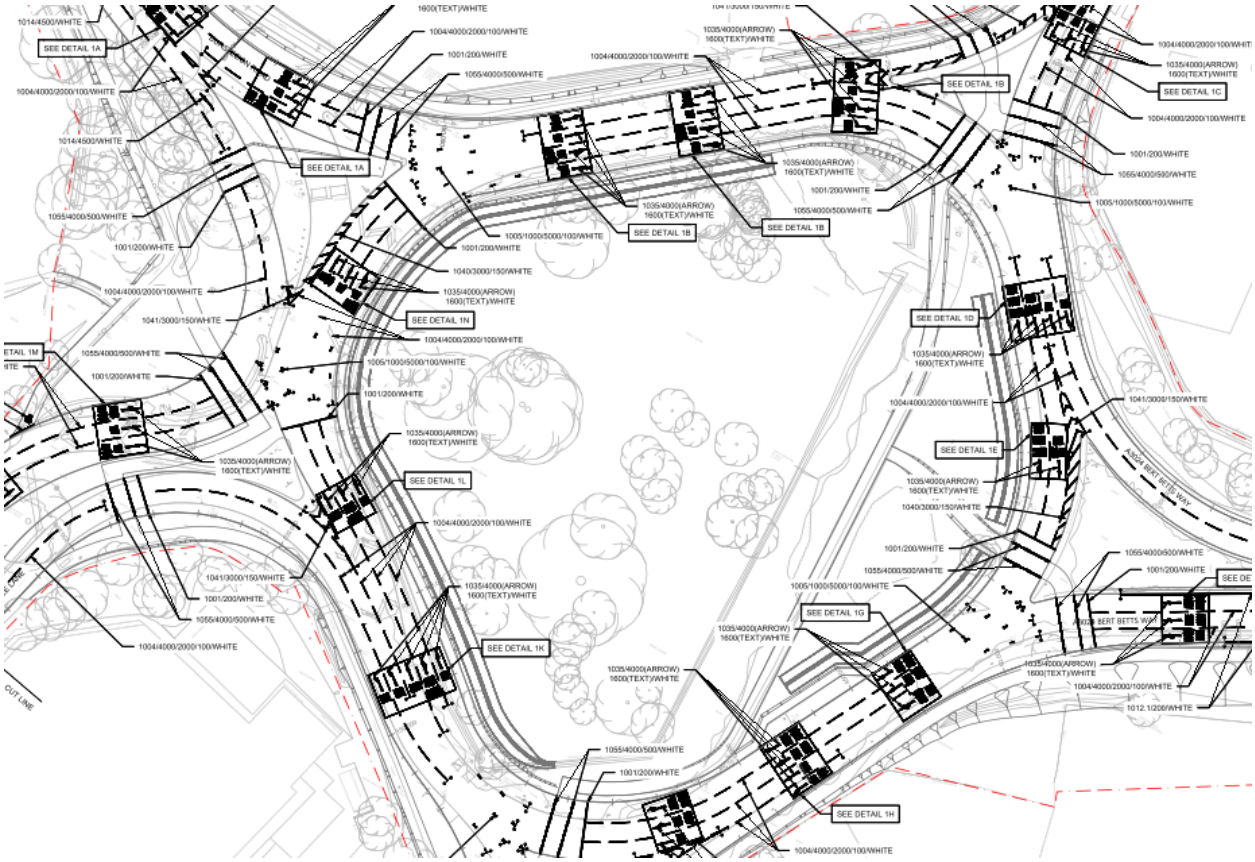
Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-50001

Summary: Unclear carriageway markings may lead to increased likelihood of side swipe type crashes.

Description:

Windover roundabout includes 5 arms (Figure 4.4). Each arm includes between 1 and 3 carriageway lanes in each direction to reflect traffic flow requirements. The roundabout circulatory also includes a variable lane balance to reflect the entry and exit traffic flows for each arm. Windhover roundabout therefore has a changing lane balance throughout the circulatory between 2 and 5 lanes. This changing lane balance, particularly for unfamiliar drivers, may result in difficulties in way-finding. This is most likely to pronounced when attempting to negotiate the area past the signal stop line on the roundabout circulatory where proposed guidance markings for circulating and turning vehicles provide limited information for road users. The absence of clear and concise information to drivers in terms of lane selection may result in driver hesitancy and potentially an increased likelihood of side swipe type crashes.

Figure 4:4 Road markings proposed on Windhover roundabout



Recommendation:

It is recommended that full / improved spiral road markings are introduced throughout the roundabout to aid way-finding.

PROBLEM 4.2.4

Location: Windhover roundabout circulatory entry/exit to Bursledon Road

Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-5001

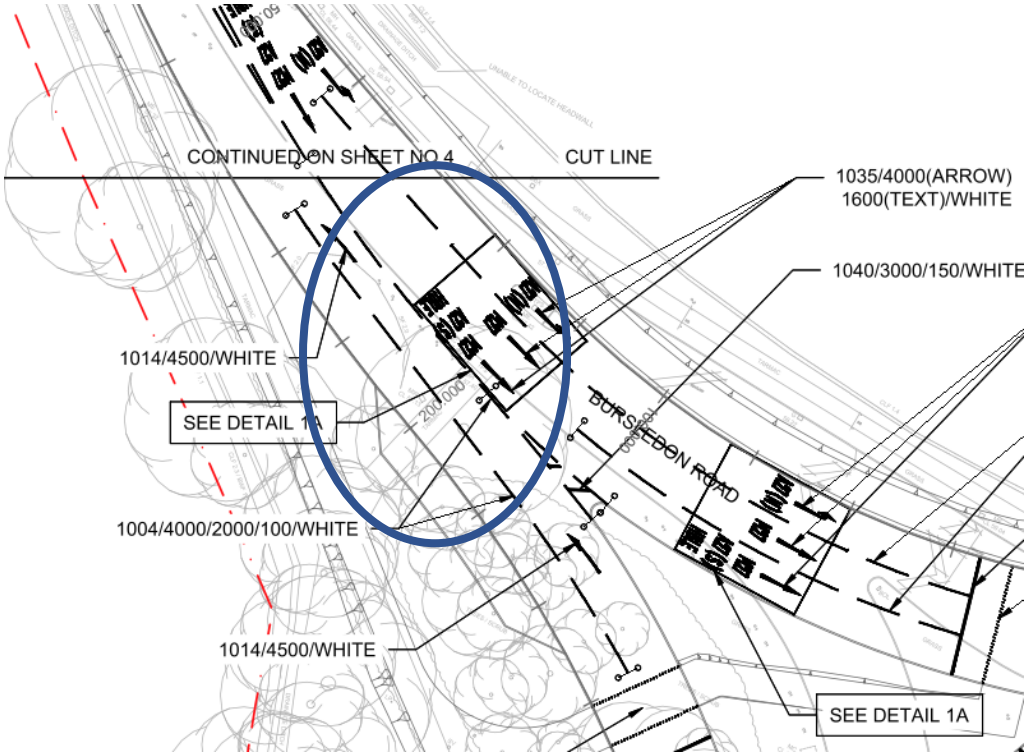
Summary: Two northbound and three southbound lanes are divided by a centre line road marking only at a location where lane re-positioning may take place therefore potentially resulting in an increased likelihood of head-on type crashes.

Description:

Bursledon Road entry and exit to Windhover roundabout includes two northbound and three southbound lanes as shown in Figure 4.5. North of the splitter island there is a limited length of hatched road marking and then a central line road marking separating north and southbound traffic movements. As northbound vehicles are attempting to merge into the left side lane at this location, and southbound vehicles are also repositioning themselves to select the appropriate lane there is an increased likelihood that north and

southbound vehicles may overrun the centre line at this location therefore potentially resulting in an increased likelihood of head-on type crashes.

Figure 4:5 Road marking showing the division of north and southbound movements.



Recommendation:

It is recommended that the central hatching is extended from the splitter island to provide additional separation between north and southbound carriageways.

PROBLEM 4.2.5

Location: Windhover roundabout circulatory and southbound entry to Providence Hill

Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-5001

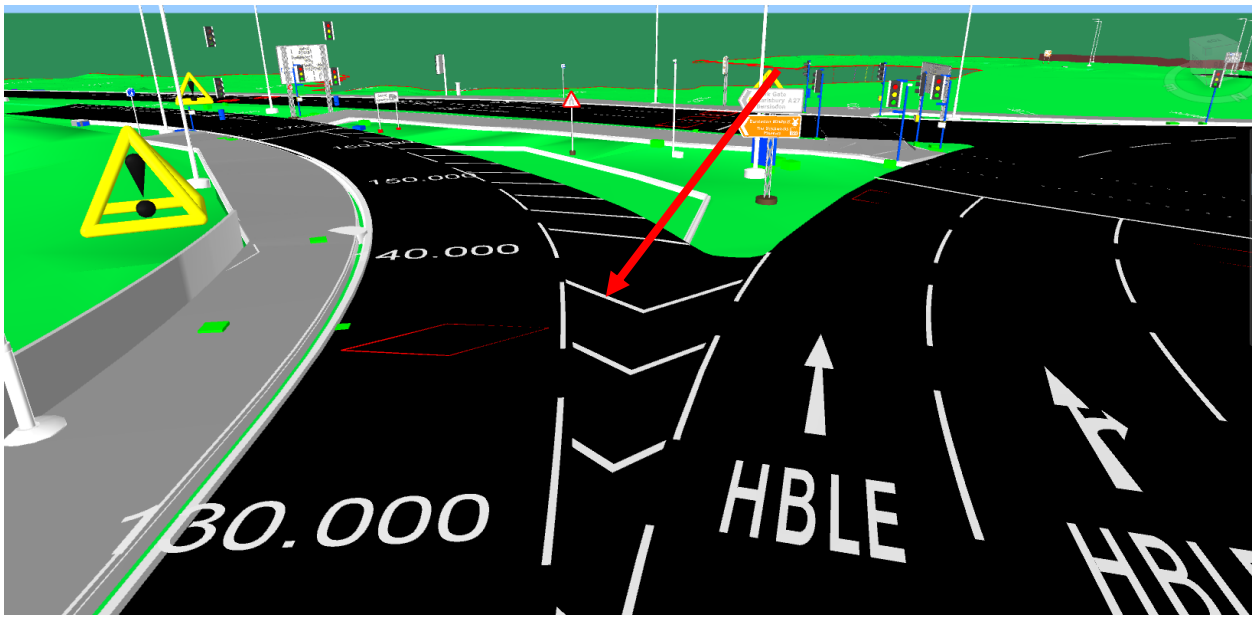
Summary: Excessive hatched area of carriageway may be utilised by both crossing vulnerable road users and vehicles entering Providence Hill therefore introducing a potential conflict area and collision involving vulnerable road users.

Description:

Southbound entry into Providence Hill from Windhover roundabout includes one lane entry. On the offside of the entry lane there is an extended length of hatched road markings as identified with the red arrow in Figure 4.6 below. The hatching extends either side of the proposed signalised Toucan crossing.

The presence of the proposed hatching raises a number of road safety concerns. Firstly, the hatching will introduce an excessive amount of 'dead' carriageway space that in the absence of vehicle runover is likely to collect debris and rubbish that may create a hazard for any vehicle that enters the hatched area, due to reduced skid resistance. Secondly, users of the Toucan crossing may feel confident waiting in the carriageway in the area shielded by the hatching. This may potentially expose users of the Toucan of an increased risk of vehicle strikes and injury if approaching vehicles overrun or utilise the hatched area.

Figure 4:6 Hatched area of carriageway on the approach to Providence Hill



Recommendation:

It is recommended that the hatched area is reduced and replaced with an extension to the physical island, (whilst retaining sufficient space to enable the passing of any broken down vehicle at this location). This will provide a shorter crossing distance for vulnerable road users, remove the lack of clarity of the use of the road space, and reduce the necessity for highway sweeping.

PROBLEM 4.2.6

Location: Windhover roundabout circulatory between Providence Hill and Hamble Lane arms

Drawing No: HE551514-SWE-HSN-ZZ-DR-CH-50001

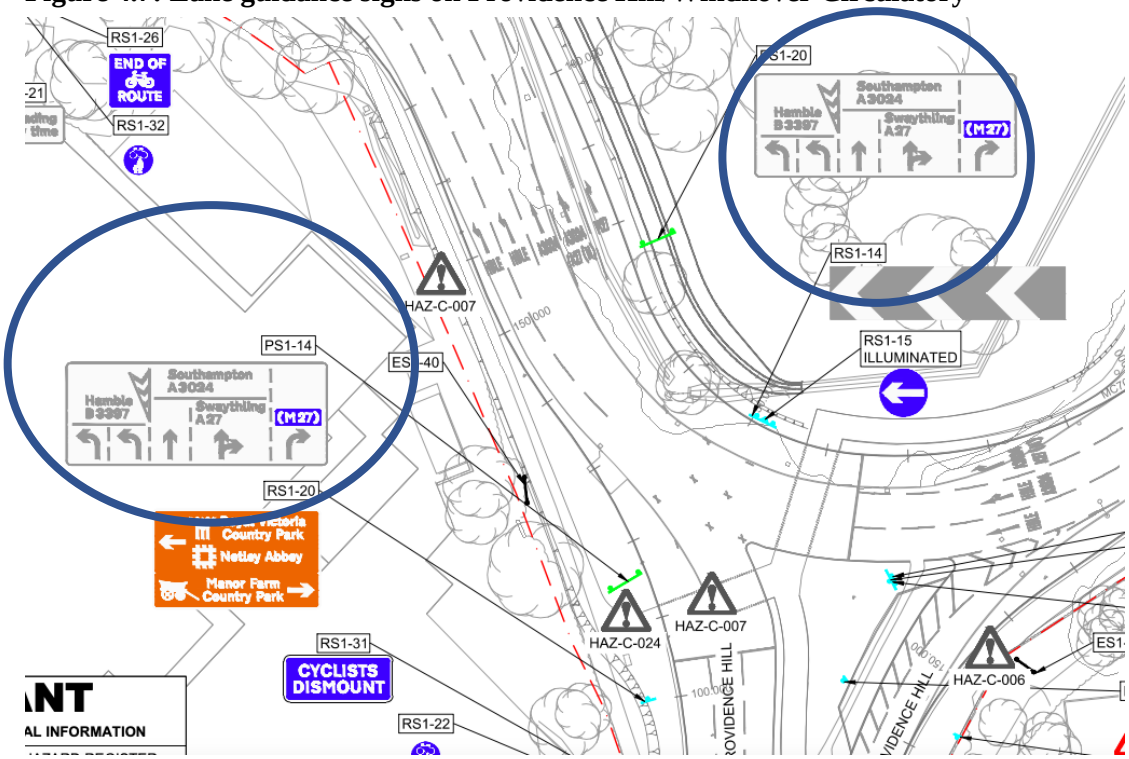
Summary: Position of lane destination signs may not provide clear guidance to road users.

Description:

On the Windhover roundabout circulatory between the arms serving Providence Hill and Hamble Lane five circulating lanes are proposed. To provide guidance to road users text is provided on the carriageway to show lane destination. The text markings are supported by sign reference PS1-20 which is proposed to be located on the offside of the carriageway and shown in Figure 4.7. Due to the proposed location on the

right side of the carriageway where 5 lanes are present there is a concern that vehicles circulating on the left side of the roundabout may fail to see the directional sign, particularly if a high sided vehicle is masking the sign. Unfamiliar drivers may therefore be unclear of the appropriate lane to select for their onward route leading to possible hesitancy and side swipe crashes from late lane changes.

Figure 4.7: Lane guidance signs on Providence Hill/Windhover Circulatory



Recommendation:

It is recommended that sign reference PS1-14, which provides lane guidance information, is relocated forward of its current position in a north-westerly direction so it is placed alongside the roundabout circulatory where it may be visible to northbound traffic from Providence Hill as well as circulatory traffic.

PROBLEM 4.2.7

Location: Windhover roundabout circulatory between Hamble Lane and Bursledon Road arms

Drawing No: HE551514-SWE-HSN-ZZ-DR-CH-5001

Summary: Position of lane destination signs may not provide clear guidance to road users.

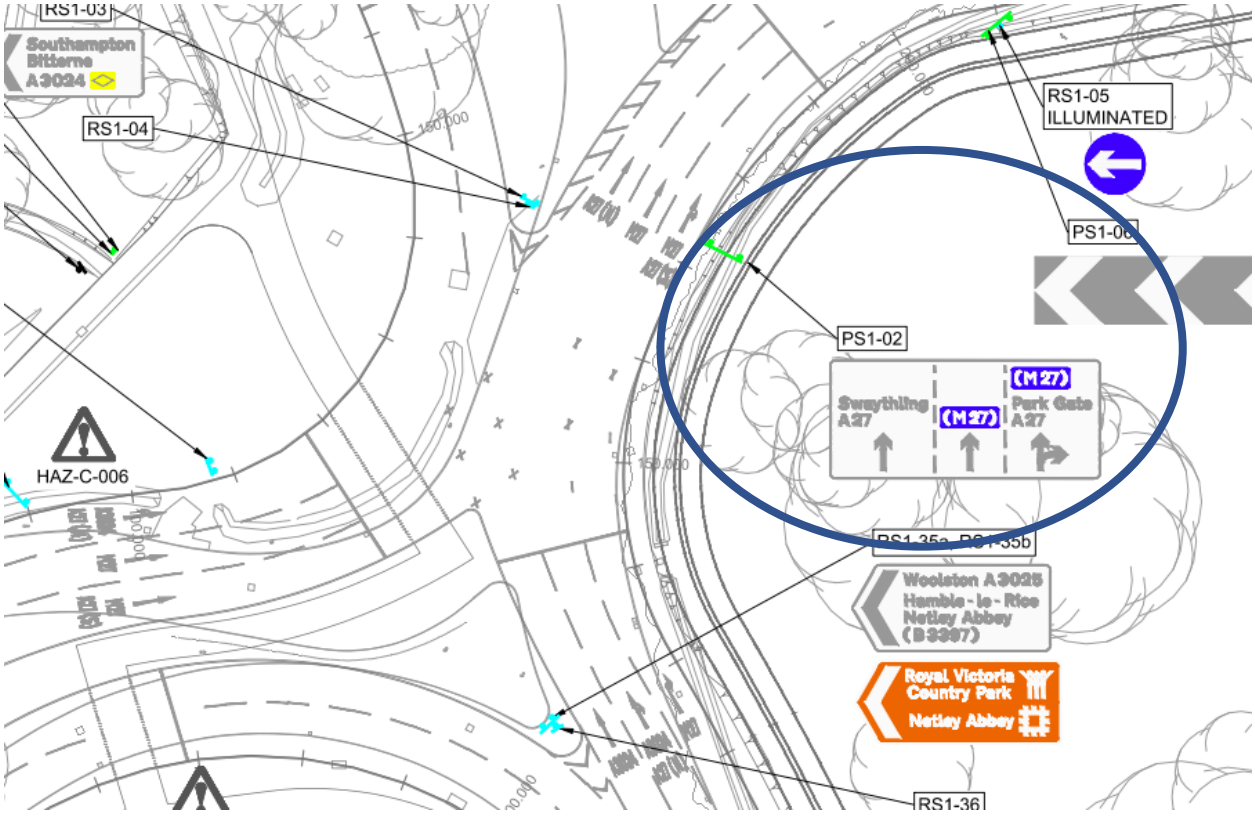
Description:

Road sign PS1-02 as shown in Figure 4.8 provides lane destination information for road users on Windhover roundabout and is located on the northern side of the roundabout between Hamble Lane and Bursledon Road arms. The proposed position of the sign provides limited visibility to circulating vehicles

on the roundabout until the sign position is reached due to approach radius on the circulatory. Similarly, for vehicles travelling east on Hamble Road towards Windhover roundabout, the proposed position of sign reference PS1-02 also appears to provide limited advance guidance to road users until the roundabout circulatory is entered. Poor way-finding information may result in driver hesitancy and late, last minute lane changes.

It is further noted that at this location, and throughout the circulatory, the vertical road sign provides place name directional finding, i.e A27 Swaythling & A27 Park Gate. In contrast, the carriageway markings indicate A27 (N) and A27 (S). This reflects existing provision, but may not fully inform unfamiliar drivers, adding to potential hesitancy in drivers and subsequent increased likelihood of conflicts.

Figure 4.8: Lane guidance sign proposed position provides limited forward visibility



Recommendation:

It is recommended that signage is positioned so that it provides clear advance information to road users. The application of an addition N (north) and S (south) symbol on vertical signage may also aid route finding.

In addition, the application of full spiral road markings as raised in PROBLEM 4.2.3 above, will provide further clarity on lane selection, thereby reducing the likelihood of possible late lane change movements and potential resultant side swipe type crashes.

PROBLEM 4.2.8

Location: M27 junction 8 roundabout circulatory

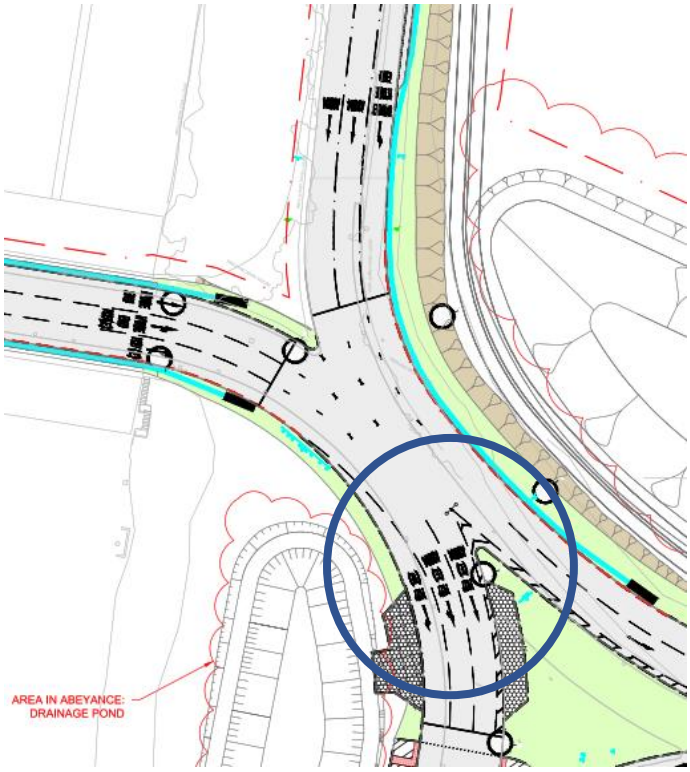
Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-50003

Summary: Confusing lane allocation markings may lead to lane change side swipe type collisions.

Description:

On the southbound circulatory carriageway the lane allocation markings appear to show both M27 (E) and A3204 traffic using lanes 1 and 2 of the circulatory carriageway. It is acknowledged that these traffic streams are separated within the signal phasing / staging however, in peak traffic periods excessive queuing may mean that these traffic streams are mixed and this may lead to A3024 traffic in lane 1 crossing M27 (E) traffic in lane 2 at the gyratory exit. This may lead to side swipe type collisions.

Figure 4.9: Circulatory carriageway markings



Recommendation:

It is recommended that the circulatory traffic lane allocations are amended to remove the potential conflict. It would appear that the 3rd lane allocation for M27 (W) appears to be unnecessary and could be replaced with A3204, which would mean that lane 1 of the circulatory could be marked for M27 (E) only; this would require minor amendments to spiral markings.

4.3 Vehicle Restraint Systems

PROBLEM 4.3.1

Location: M27 junction 8 roundabout, M27 westbound entry slip

Drawing No: HE551514-SWE-HRR-ZZ-DR-CH-50003

Summary: Proposed sections of VRS do not appear to fully protect roadside hazards therefore presenting a hazard to an errant vehicle

Description:

Proposed VRS detail on the entry slip to the M27 westbound at the junction 8 roundabout indicates two sections of VRS, one section running alongside the offside of the westbound entry slip, and a further section of VRS continuing on the outside of the junction 8 circulatory as shown in the sign drawing and 3D model screenshot images in Figures 4.10 & 4.11.

The proposed arrangement for VRS provides a gap between the two sections of VRS which an errant vehicle may enter. The road safety concern is exacerbated as the current situation appears to show that two existing directional signs and a motorway dot matrix sign is provided at this location and will appear to be unprotected by the new arrangement. Note: the sign drawing indicates sign reference ES3-07 only at this location, and this sign is not listed in the provided schedule, so sign information and post detail is not known.

Figure 4.10: Gap between sections of VRS

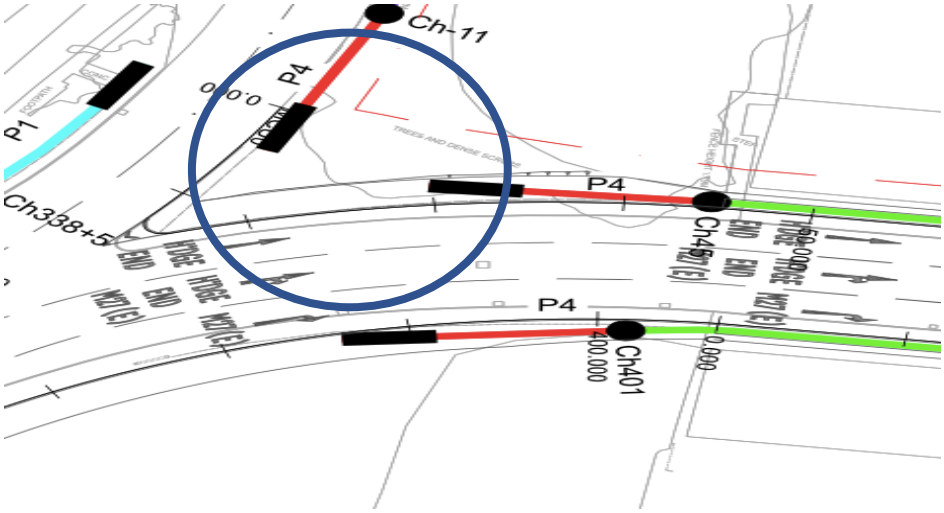
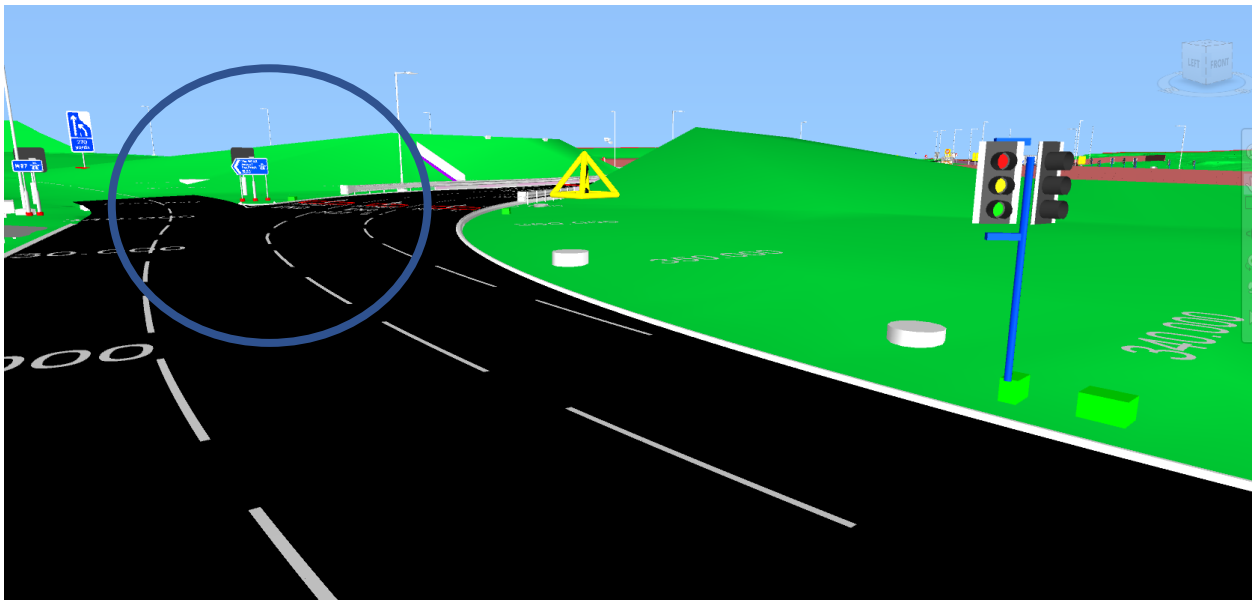


Figure 4.11: Road sign and dot matrix sign on the M27 westbound entry slip



Recommendation:

It is recommended that roadside furniture is adequately protected by VRS, alternatively passively safe posts are introduced.

PROBLEM 4.3.2

Location: M27 junction 8 roundabout, M27 eastbound entry slip

Drawing No: HE551514-SWE-HRR-ZZ-DR-CH-50003

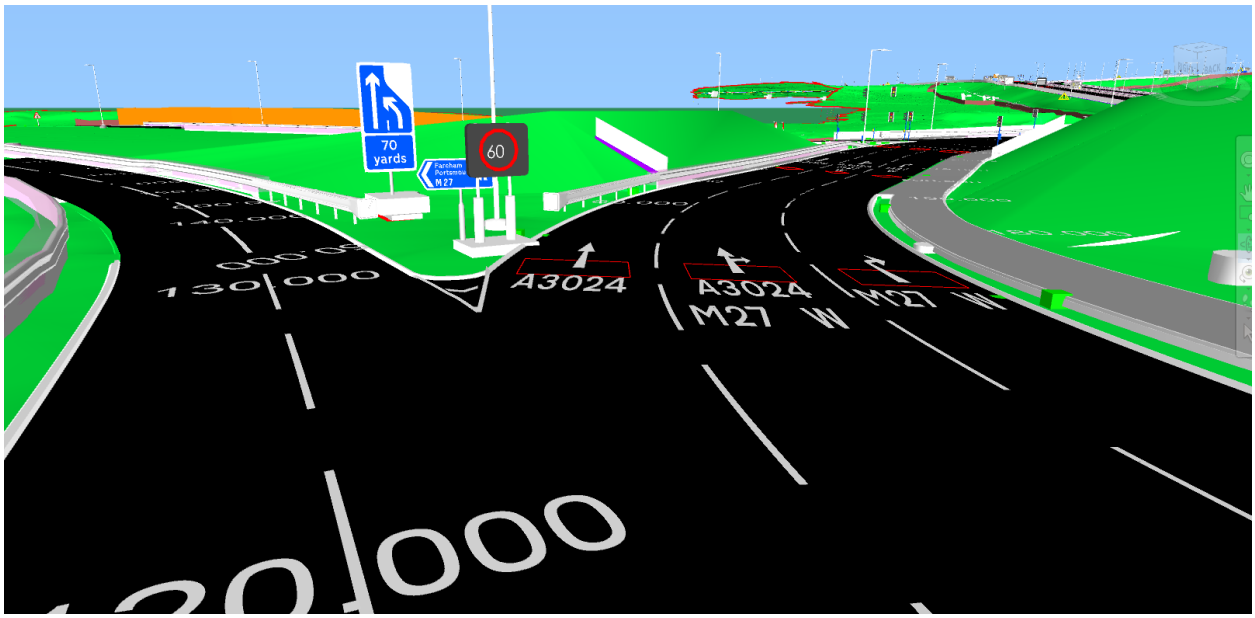
Summary: Proposed sections of VRS do not appear to fully protect roadside hazards therefore presenting a hazard to an errant vehicle

Description:

Proposed VRS detail on the entry slip to the M27 eastbound at the junction 8 roundabout indicates two sections of VRS, one section running alongside the offside of the eastbound entry slip, and a further section of VRS continuing on the outside of the junction 8 circulatory as shown in Figure 4.12.

The proposed arrangement for VRS provides a gap between the two sections of VRS which an errant vehicle may enter. The road safety concern is exacerbated as the current situation shows numerous signs located within the nosing area (including some new posts currently under placement as part of the on-going M27 smart motorway project). Note: the sign drawing indicates sign reference PS3-12 introduced at this location as part of the works, which is positioned on a small diameter post. Details of other signs is not known.

Figure 4.12: Unprotected roadside furniture on the nosing of the M27 Eastbound entry slip Junction 8



Recommendation:

It is recommended that roadside furniture is adequately protected by VRS; alternatively passively safe posts are introduced.

PROBLEM 4.3.3

Location: Southern side of the M27 junction 8 roundabout circulatory

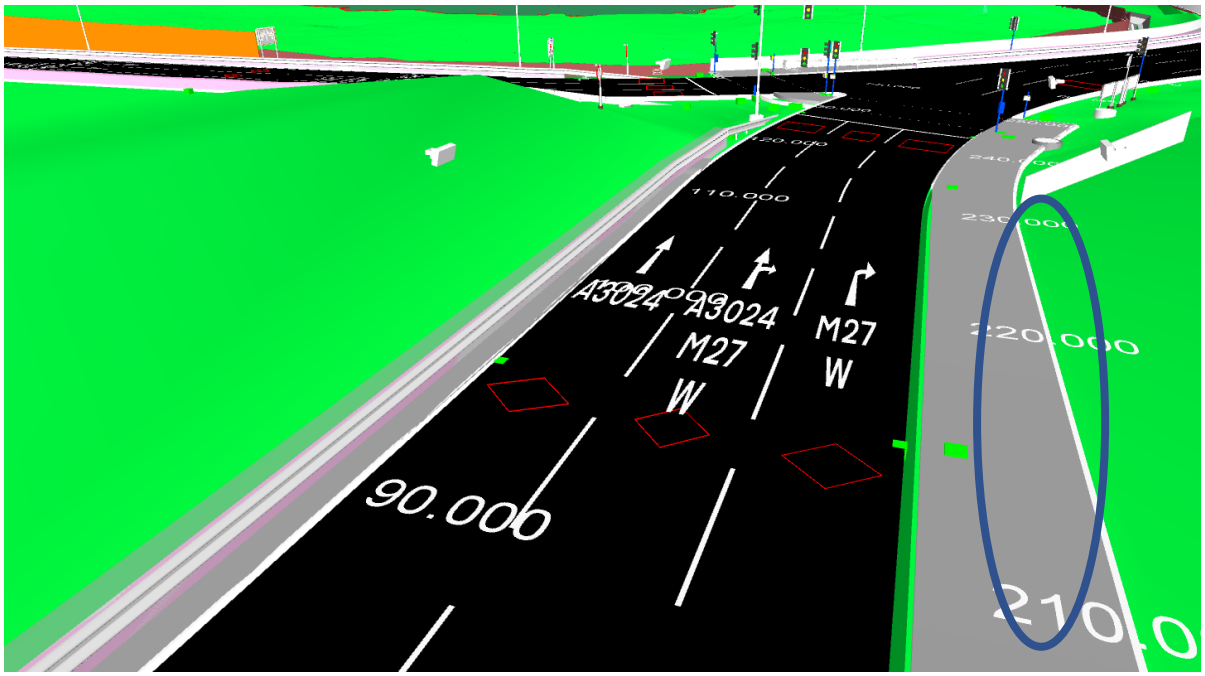
Drawing No: HE551514-SWE-HRR-ZZ-DR-CH-50003

Summary: Removal of VRS on the roundabout circulatory increases the risk of strikes to vulnerable road users and the bridge piers.

Description:

On the southern side of the roundabout circulatory of the M27 junction 8 roundabout, the existing vehicle restraint system is being removed from the inner side of the circulatory area, as highlighted in Figure 4.13. The existing restraint system currently offers protection to the bridge piers which support the M27 over the roundabout. The restraint system proposed to be removed from this location will be replaced with a High Containment Safety Kerb which is designed to allow the introduction of a shared cycle/pedestrian route. There is a concern that an errant vehicle at this location which strikes the High Containment Safety Kerb (which is proposed to replace the VRS at this location) may be launched and this is turn may result in the vehicle striking a pedestrian/cyclist utilising the shared route, or/and a direct strike on the bridge piers which may result in potential bridge collapse.

Figure 4.13: Highlighted section where VRS is removed on the M27 J8 circulatory.



Recommendation:

It is recommended that a vehicle restraint system is retained at this location to support the bridge piers.

PROBLEM 4.3.4

Location: M27 junction 8 roundabout circulatory

Drawing No: HE551514-SWE-HDG-ZZ-DR-CH-50003

Summary: Abeyance flood storage area and abeyance attenuation pond within the vicinity of Junction 8 may represent a hazard to an errant vehicle.

Description:

Within the roundabout circulatory area of Junction 8 an abeyance attenuation pond is identified. There is also an abeyance flood storage area shown on the north-eastern side of the roundabout circulatory. Both of these facilities have not yet been finalised in terms of their future use. There is a concern therefore that the final design taken forward may result in a facility which provides a hazardous location for an errant vehicle resulting in potential vehicle occupant injury. There is also a risk that users of the nearby proposed shared pedestrian/cycle route may also be at risk of entering the attenuation pond.

Recommendation:

It is recommended that the introduction of VRS and/or pedestrian guardrail is introduced at this location depending on how the facility is decided to be taken forward in design.

4.4 Traffic Signals

PROBLEM 4.4.1

Location: M27 junction 8 roundabout circulatory

Drawing No: HE551514-SWE-HSL-ZZ-DR-TS-51001

Summary: Elliptical shape of roundabout introduces short stacking length for queuing vehicles on the Junction 8 roundabout circulatory and lead to lane change side-swipe type collisions.

Description:

The M27 J8 roundabout circulatory includes an elliptical shape. This results in a shorter circulatory distance between the north-south and south-north sides of the roundabout arms. With the introduction of traffic signals on the roundabout circulatory the east and west sides of the roundabout serving north-south and south-north movements provide only a short queuing length on the roundabout circulatory and therefore queue detectors may quickly be exceeded, particularly if the stacking area is filled by long HGVs. There is a danger therefore that traffic queuing at a red light at these locations may queue across the entry/exit to the nearby arm thereby blocking the roundabout circulatory and resulting in the mis-operation of the signal control to the detriment of road safety and this may lead to lane change type collisions where powered two wheeled users may be particularly vulnerable when filtering.

Recommendation:

It is recommended that yellow box junctions are provided on the approach to the traffic signal control areas on the east and west side of the roundabout circulatory, noting that the conspicuity of recommended spiral markings at this location may be compromised if excessive amounts of road marking are introduced.

PROBLEM 4.4.2

Location: Windhover roundabout circulatory near West End Road

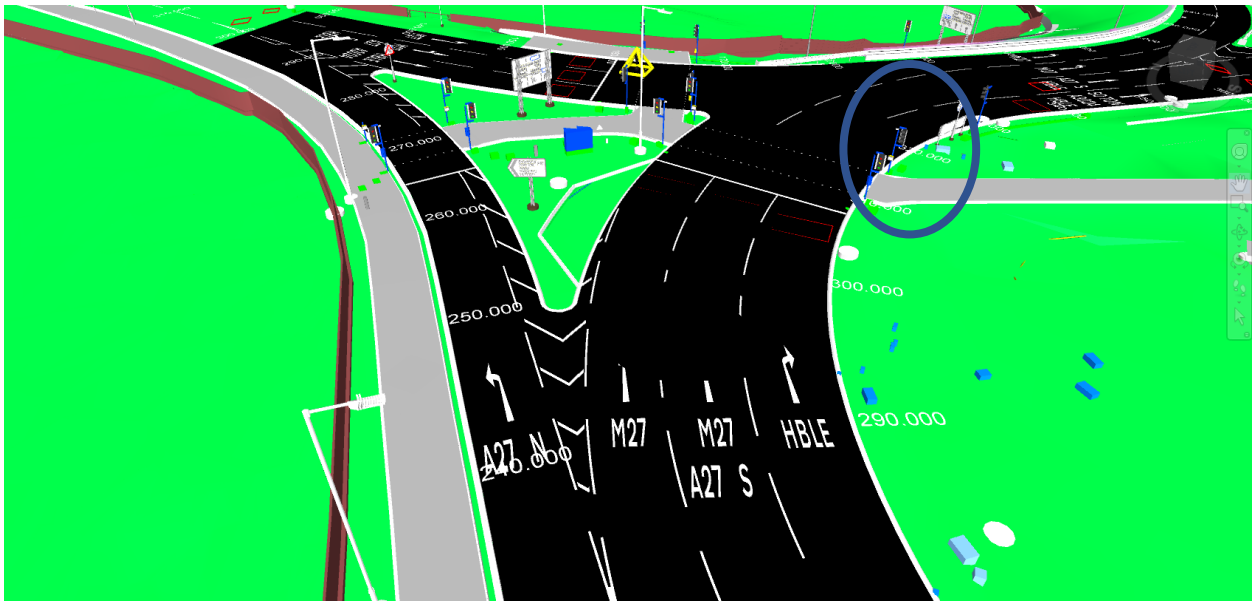
Drawing No: HE551514-SWE-HSL-ZZ-DR-TS-53001

Summary: The circulatory radius of Windhover roundabout may result in late identification of traffic signals ahead therefore increasing the likelihood of rear shunt type crashes.

Description:

The Windhover roundabout circulatory includes a section of carriageway where the proposed traffic signal heads controlling the West End Road arm are located on the roundabout circulatory radius as shown in Figure 4.14. There is a danger therefore that the traffic signal heads are not clearly visible to circulating vehicles, particularly if the visibility to the traffic signal head on the nearside of the carriageway is masked by a stationary high sided vehicle. This may result in a circulating vehicle in lane 2 or lane 3 failing to note the traffic signals sufficiently enough in advance, therefore resulting in potential overshoot type crashes and conflicts with crossing vulnerable road users, or potential rear shunt type crashes with queuing vehicles.

Figure 4:14: Traffic signal heads on the Windhover roundabout circulatory near West End Road.



Recommendation:

It is recommended that a high signal head is provided at this location to help provide advanced information to approaching vehicles of the traffic light status ahead.

PROBLEM 4.4.3

Location: Windhover roundabout circulatory near Hamble Lane and Bursledon Road

Drawing No: HE551514-SWE-HSL-ZZ-DR-TS-54001

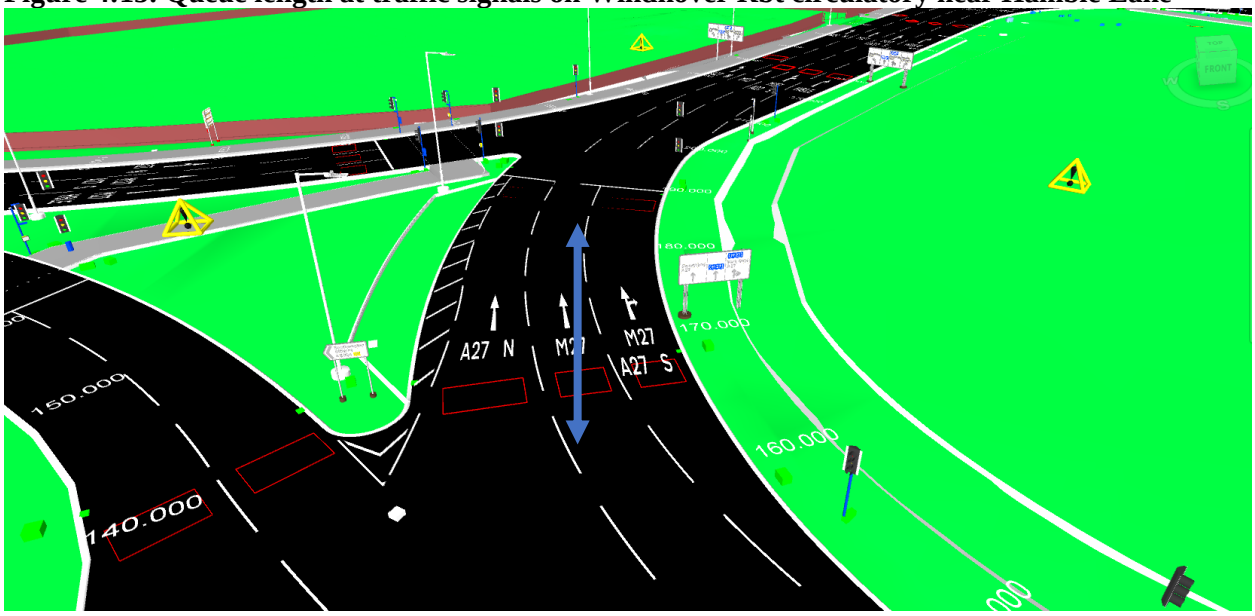
Summary: Limited stacking capacity at approach to traffic signals may result in queuing across Hamble Lane junction

Description:

Windhover roundabout circulatory where traffic signals are proposed between Hamble Lane and Bursledon Road provides an area of limited stacking capacity when a red light is displayed on the traffic signals on the Windhover roundabout Circulatory as shown in Figure 4.15.

The presence of a limited stacking capacity may result in an increased likelihood of queueing vehicles exceeding the available queuing space and therefore potentially blocking the entry to the roundabout circulatory from Hamble Lane. This may result in driver frustration and an increased likelihood of conflicts.

Figure 4:15: Queue length at traffic signals on Windhover Rbt circulatory near Hamble Lane



Recommendation:

It is recommended that a yellow box junction is provided at this location noting that the application of the recommended spiral road markings raised earlier within this Road Safety Audit report at this location may result in excessive carriageway markings which may compromise conspicuity.

PROBLEM 4.4.4

Location: Bursledon Road north of the Windhover roundabout project works

Drawing No: N/A

Summary: Traffic signals serving the new housing development north of Windhover roundabout on Bursledon Road may have a detrimental impact on the proposed signals serving Windhover roundabout.

Description:

Traffic signals are in place serving a new housing development on Bursledon Road, just north of Windhover roundabout. The signalisation of Windhover roundabout may have a detrimental impact on the signal timings for the traffic lights serving the existing housing development, particularly during the peak periods. This may result in queues occurring across the nearby signalised junctions, resulting in mis-operation of the signals to the detriment of safety.

Recommendation:

It is recommended that the traffic signals serving the housing estate on Bursledon Road are coordinated to operate with the nearby traffic signals on Windhover roundabout.

4.5 Vulnerable Road Users

PROBLEM 4.5.1

Location: Hamble Lane Toucan Crossing

Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-50001

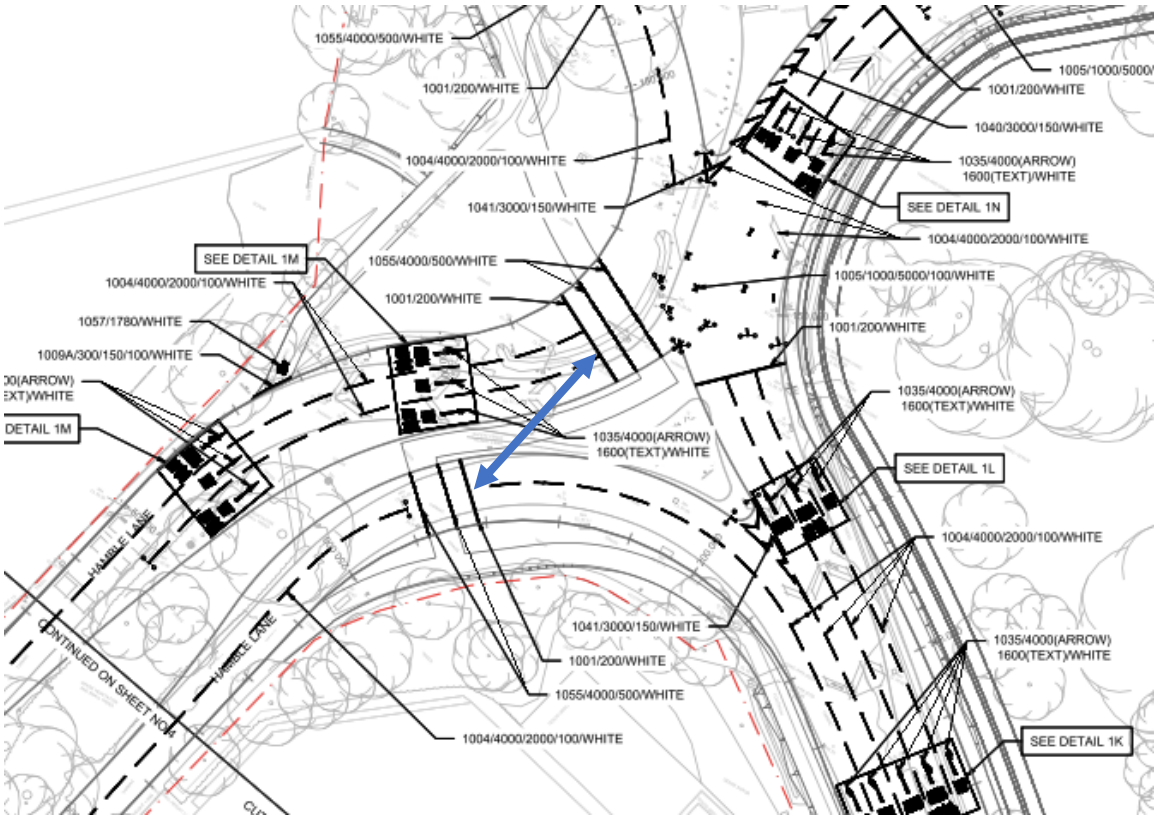
Summary: Staggered Toucan crossing does not reflect the natural desire line of users.

Description:

The proposed Toucan crossing over Hamble Lane east and westbound carriageways include a stagger within the central island between the two carriageway directions. This results in users heading between the north and south directions having to divert from the natural 'straight ahead' desire line to utilise the Toucan for each carriageway approach. This may result in some users avoiding the use of both of the Toucan crossings at this location, and instead crossing without signal control, thereby avoiding the need to divert from their assumed natural desire line. Crossing without the aid of signal control may increase the likelihood of vehicle strikes.

It is also noted at this location that there is a height difference between the east and westbound carriageway. The amendments to the infrastructure for vulnerable road users at this location may result in the introduction of a shared footway with a gradient which may result in an increased likelihood of slips for users, particularly when the surface is wet/icy, therefore increasing the likelihood of falls.

Figure 4.16: Toucan crossings over Hamble Lane



Recommendation:

The Toucan crossing on Hamble Lane westbound carriageway is relocated further to the east on Hamble Lane. This also provides improved visibility for vehicles turning into Hamble Lane towards any users of the Toucan crossing. The shared footway shall include an appropriate grade to ensure the facility is comfortable to users with the likelihood of slips minimised.

PROBLEM 4.5.2

Location: Providence Hill Toucan Crossing

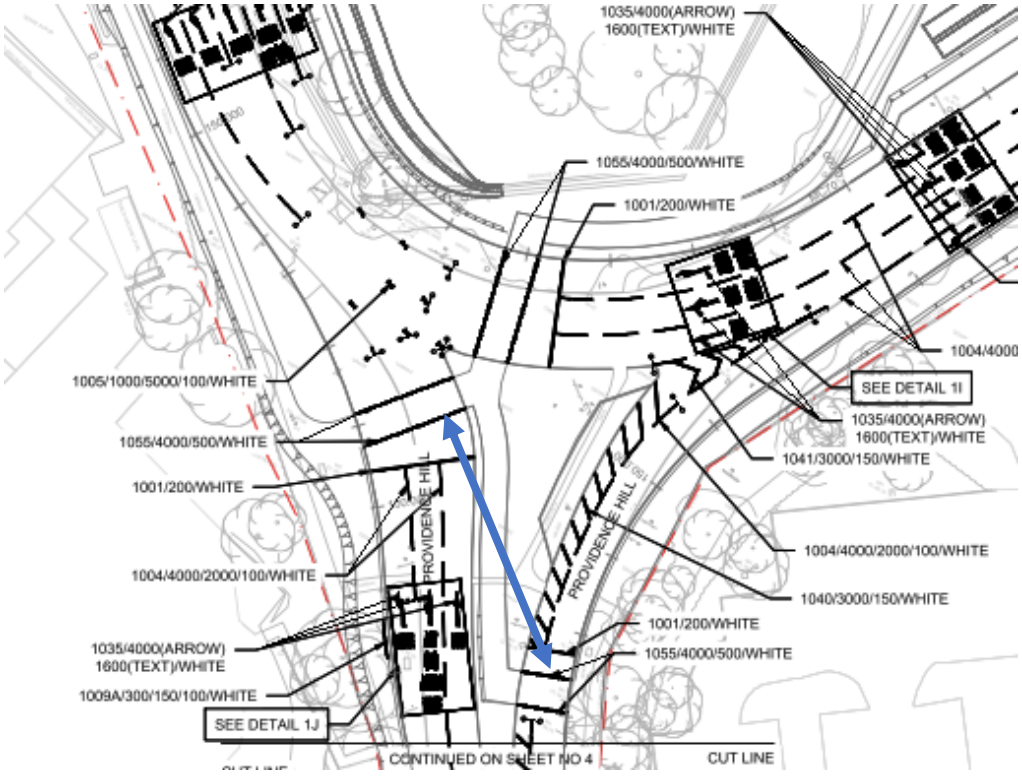
Drawing No: HE551514-SWE-HMK-ZZ-DR-CH-50001

Summary: Staggered Toucan crossing does not reflect the natural desire line of users.

Description:

The proposed Toucan crossing over Providence Hill between north and southbound carriageways include a stagger within the central island between the two carriageway directions. This results in users heading between the east and west directions having to divert from the natural 'straight ahead' desire line to utilise the Toucan for each carriageway approach. This may result in some users avoiding the use of both of the Toucan crossings at this location, and instead crossing without signal control, thereby avoiding the need to divert from their assumed natural desire line. Crossing without the aid of signal control may increase the likelihood of vehicle strikes.

Figure 4.17: Toucan crossings over Providence Hill



Recommendation:

The Toucan crossing on Providence Hill is repositioned to reduce the proposed stagger distance. The repositioning of the southbound carriageway Toucan further to the north towards the roundabout circulatory may result in improved forward visibility towards the traffic signals which in turn may be beneficial in terms of road safety.

PROBLEM 4.5.3

Location: Bert Betts Way shared use path for WCH

Drawing No: HE551514-SWE-HRR-ZZ-DR-CH-50002

Summary: Shared use footway for vulnerable road users may conflict with Z posts of the proposed VRS at this location.

Description:

On the southside of Bert Betts Way a new shared use footway is proposed for vulnerable road users. Adjacent to the shared use facility a VRS will be in place along the length of the shared use facility separating the carriageway from the footway. In the absence of a supporting drawing provided to the Road Safety Audit Team outlining the detailed design arrangements, there is a concern that the positioning of the VRS may present a hazard to vulnerable road users with the Z posts encroaching into the footway area presenting a potential trip hazard with potential to fall on top of Z post with subsequent potential injury to a vulnerable road user.

Recommendation:

Ensure there is a buffer zone between the shared use footway and VRS. In addition, introduce caps on top of Z posts to protect vulnerable road users against falls.

PROBLEM 4.5.4

Location: West End Road northbound shared cycle/footway

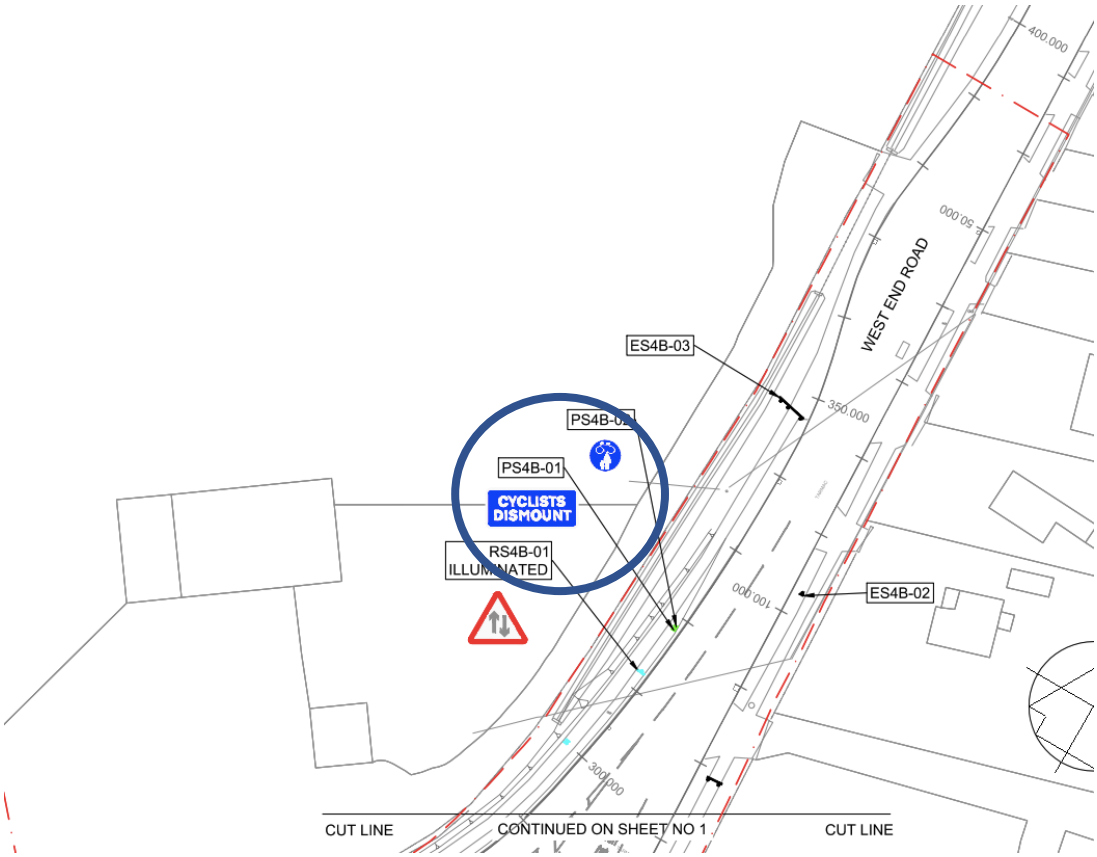
Drawing No: HE551514-SWE-HSN-ZZ-DR-CH-50004

Summary: Shared use facility for vulnerable road users does not provide information on how cyclists may re-join the carriageway at the end of the off-road cycle route.

Description:

Cyclists heading northbound on the shared used footway on the westside of West End Road reach the end of the shared use facility and are confronted with a sign requesting cyclists to dismount. This does not provide clear information on how cyclists may continue their journey northbound in a safe manner thereby reducing the likelihood of conflict with other road users.

Figure 4.18: Signage to cyclists at the end of the shared use footway.



Recommendation:

It is recommended that the proposed 'Cyclists Dismount' signage is removed and instead information is provided to direct cyclists safely back to the carriageway; a dropped kerb return to the carriageway may be appropriate for cyclists.

PROBLEM 4.5.5

Location: Providence Hill southbound shared cycle/footway

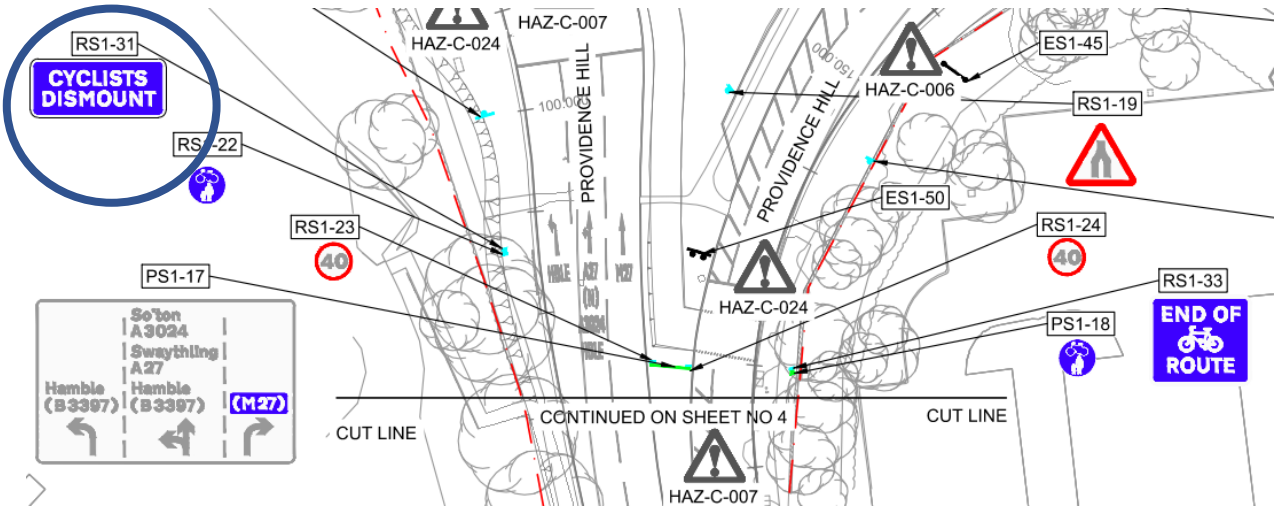
Drawing No: HE551514-SWE-HSN-ZZ-DR-CH-50001

Summary: Southbound cyclists on the westside of Providence Hill shared cycleway facility faced with inappropriate signage with no confirmation of onward route.

Description:

For cyclists heading southbound on the shared cycle facility on the westside of Providence Hill, there is no onward wayfinding information provided to users. Instead, a proposed sign instructing cyclists to dismount is included. This may result in confusion for cyclists unfamiliar with the location and may result in a lack of clarity on which onward route to select. Uncertainty on the correct onward route may result in confusion and the increased potential for conflicts.

Figure 4.19: Signage for cyclists on the southbound shared footway.



Recommendation:

It is recommended that continuous and coherent cycle facilities are provided and the proposed 'Cyclists Dismount' and 'End of Route' signage are removed and appropriate information is provided to direct cyclists safely back to the carriageway.

5. Audit Team Statement

We certify that this road safety audit has been carried out in accordance with DMRB GG 119.

Road Safety Audit Team Leader

Kevin Seymour B Sc, PG Dip TS, MCIHT, MSoRSA
Highways England Certificate of Competence (Road Safety Audit)

Signed:  Date: 23rd July 2021

Road Safety Audit Team Member

John Aldridge BA (Hons). MSc, MCIHT

Signed: Date: 23rd July 2021

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Hampshire
GU31 4NX
United Kingdom

Others Involved

(Such as an observer, Police/Network Management representative or specialist advisor)

None

APPENDIX A: Information Provided

The following drawings and documentation were provided and examined as part of this Road Safety Audit.

A.1 List of Drawings Examined:

Drawings	
Drawing no. and revision	**Title**
HE551514-SWE-HGN-ZZ-DR-CH-50000	Location Plan
HE551514-SWE-VAS-ZZ-DR-ZS-50001	M27 Junction 8 area plot (amended)
HE551514-SWE-VAS-ZZ-DR-ZS-50002	Windhover roundabout Bursledon plot (amended
HE551514-SWE-HGN-ZZ-DR-CH-50001	General Arrangement Sheet 1 of 5
HE551514-SWE-HGN-ZZ-DR-CH-50002	General Arrangement Sheet 2 of 5
HE551514-SWE-HGN-ZZ-DR-CH-50003	General Arrangement Sheet 3 of 5
HE551514-SWE-HGN-ZZ-DR-CH-50004	General Arrangement Sheet 4 of 5
HE551514-SWE-HGN-ZZ-DR-CH-50005 5	General Arrangement Sheet 5 of 5
HE551514-SWE-MAN-ZZ-SK-ZK-50001	Maintenance Boundary Drawing Sheet 1 of 2
HE551514-SWE-MAN-ZZ-SK-ZK-50002	Maintenance Boundary Drawing Sheet 2 of 2
HE551514-SWE-HAC-ZZ-DR-CH-50003	Departures & Relaxations Location Plan Sheet 1 of 2
HE551514-SWE-HAC-ZZ-DR-CH-50004	Departures & Relaxations Location Plan Sheet 2 of 2
HE551514-SWE-HFE-ZZ-DR-CH-50001	Fencing Sheet 1 of 5
HE551514-SWE-HFE-ZZ-DR-CH-50002	Fencing Sheet 2 of 5
HE551514-SWE-HFE-ZZ-DR-CH-50003	Fencing Sheet 3 of 5
HE551514-SWE-HFE-ZZ-DR-CH-50004	Fencing Sheet 4 of 5
HE551514-SWE-HFE-ZZ-DR-CH-50005	Fencing Sheet 5 of 5
HE551514-SWE-HRR-ZZ-DR-CH-50001	Road Restraint System Sheet 1 of 5
HE551514-SWE-HRR-ZZ-DR-CH-50002	Road Restraint System Sheet 2 of 5
HE551514-SWE-HRR-ZZ-DR-CH-50003	Road Restraint System Sheet 3 of 5
HE551514-SWE-HRR-ZZ-DR-CH-50004	Road Restraint System Sheet 4 of 5
HE551514-SWE-HRR-ZZ-DR-CH-50005	Road Restraint System Sheet 5 of 5
HE551514-SWE-HDG-ZZ-DR-CD-50001	Drainage Layout Sheet 1 of 5
HE551514-SWE-HDG-ZZ-DR-CD-50002	Drainage Layout Sheet 2 of 5
HE551514-SWE-HDG-ZZ-DR-CD-50003	Drainage Layout Sheet 3 of 5
HE551514-SWE-HDG-ZZ-DR-CD-50004 5	Drainage Layout Sheet 4 of 5
HE551514-SWE-HDG-ZZ-DR-CD-50005	Drainage Layout Sheet 5 of 5
HE551514-SWE-HDG-ZZ-DR-CD-50006	Drainage Standard Details Sheet 1 of 2
HE551514-SWE-HDG-ZZ-DR-CD-50007	Drainage Standard Details Sheet 2 of 2
HE551514-SWE-HKF-ZZ-DR-CH-50001	Kerbs, Footways & Paved Areas Sheet 1 of 5
HE551514-SWE-HKF-ZZ-DR-CH-50002	Kerbs, Footways & Paved Areas Sheet 2 of 5
HE551514-SWE-HKF-ZZ-DR-CH-50003	Kerbs, Footways & Paved Areas Sheet 3 of 5
HE551514-SWE-HKF-ZZ-DR-CH-50004	Kerbs, Footways & Paved Areas Sheet 4 of 5
HE551514-SWE-HKF-ZZ-DR-CH-50005	Kerbs, Footways & Paved Areas Sheet 5 of 5
HE551514-SWE-HMK-ZZ-DR-CH-50001	Road Markings Sheet 1 of 5
HE551514-SWE-HMK-ZZ-DR-CH-50002	Road Markings Sheet 2 of 5
HE551514-SWE-HMK-ZZ-DR-CH-50003	Road Markings Sheet 3 of 5
HE551514-SWE-HMK-ZZ-DR-CH-50004	Road Markings Sheet 4 of 5
HE551514-SWE-HMK-ZZ-DR-CH-50005	Road Markings Sheet 5 of 5
HE551514-SWE-HSN-ZZ-DR-CH-50001	Traffic Signs Sheet 1 of 5
HE551514-SWE-HSN-ZZ-DR-CH-50002	Traffic Signs Sheet 2 of 5
HE551514-SWE-HSN-ZZ-DR-CH-50003	Traffic Signs Sheet 3 of 5
HE551514-SWE-HSN-ZZ-DR-CH-50004	Traffic Signs Sheet 4 of 5

HE551514-SWE-HSN-ZZ-DR-CH-50005	Traffic Signs Sheet 5 of 5
HE551514-SWE-HSN-ZZ-DE-CH-50010	Traffic Sign Detail Sheet 1 of 2
HE551514-SWE-HSN-ZZ-DE-CH-50011	Traffic Sign Detail Sheet 2 of 2
Drawings	
Drawing no. and revision	**Title**
HE551514-SWE-HGT-ZZ-DE-CE-50001	Standard Earthworks Details - (SED) Sheet 1 of 4
HE551514-SWE-HGT-ZZ-DE-CE-50002	Standard Earthworks Details - (SED) Sheet 2 of 4
HE551514-SWE-HGT-ZZ-DE-CE-50003	Standard Earthworks Details - (SED) Sheet 3 of 4
HE551514-SWE-HGT-ZZ-DE-CE-50004	Standard Earthworks Details - (SED) Sheet 4 of 4
HE551514-SWE-HGT-ZZ-DR-CE-50001	Earthworks Details Sheet 1 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50002	Earthworks Details Sheet 2 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50003	Earthworks Details Sheet 3 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50004	Earthworks Details Sheet 4 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50005	Earthworks Details Sheet 5 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50101	Pavement Formation Plan Sheet 1 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50102	Pavement Formation Plan Sheet 2 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50103	Pavement Formation Plan Sheet 3 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50104	Pavement Formation Plan Sheet 4 of 5
HE551514-SWE-HGT-ZZ-DR-CE-50105	Pavement Formation Plan Sheet 5 of 5
HE551514-SWE-HLG-ZZ-DR-EO-50000	Road Lighting and Electrical Detailed Design Lighting Key Notes and Legend
HE551514-SWE-HLG-ZZ-DR-EO-50001	Lighting Layout Sheet 1 of 5
HE551514-SWE-HLG-ZZ-DR-EO-50002	Lighting Layout Sheet 2 of 5
HE551514-SWE-HLG-ZZ-DR-EO-50003	Lighting Layout Sheet 3 of 5
HE551514-SWE-HLG-ZZ-DR-EO-50004	Lighting Layout Sheet 4 of 5
HE551514-SWE-HLG-ZZ-DR-EO-50005	Lighting Layout Sheet 5 of 5
HE551514-SWE-SRW-ZZ-DR-CB-50001	Bert Betts Way Retaining Wall
HE551514-SWE-HPV-ZZ-DR-CH-50001	Pavement Treatments 1 of 5
HE551514-SWE-HPV-ZZ-DR-CH-50002	Pavement Treatments 2 of 5
HE551514-SWE-HPV-ZZ-DR-CH-50003	Pavement Treatments 3 of 5
HE551514-SWE-HPV-ZZ-DR-CH-50004	Pavement Treatments 4 of 5
HE551514-SWE-HPV-ZZ-DR-CH-50005	Pavement Treatments 5 of 5
HE551514-SWE-HPV-ZZ-DR-CH-50010	Pavement Typical Details 1 of 4
HE551514-SWE-HPV-ZZ-DR-CH-50011	Pavement Typical Details 2 of 4
HE551514-SWE-HPV-ZZ-DR-CH-50012	Pavement Typical Details 3 of 4
HE551514-SWE-HPV-ZZ-DR-CH-50013	Pavement Typical Details 4 of 4
HE551514-SWE-HPV-ZZ-DR-CH-50014	Pavement typical detail notes
HE551514-SWE-HPV-ZZ-DR-CH-50015	Pavement treatment notes
HE551514-SWE-HPV-ZZ-SP-CH-50001	Appendix 7.1
HE551514-SWE-HPV-ZZ-SP-CH-50002	Appendix 7.2
HE551514-SWE-HPV-ZZ-SP-CH-50003	Appendix 7.4
HE551514-SWE-HPV-ZZ-SP-CH-50004	Appendix 7.6
HE551514-SWE-HPV-ZZ-SP-CH-50005	Appendix 7.9
HE551514-SWE-HRR-ZZ-SP-CH-50003	VRS Schedule
HE551514-SWE-HSL-ZZ-DR-TS-51001	Controller 1 1-1500
HE551514-SWE-HSL-ZZ-DR-TS-51002	Controller 1 1- 200
HE551514-SWE-HSL-ZZ-DR-TS-51001	Controller 2 1-500
HE551514-SWE-HSL-ZZ-DR-TS-52002	Controller 2 1-200
HE551514-SWE-HSL-ZZ-DR-TS-52003	Controller 2 1-500 Ducting
HE551514-SWE-HSL-ZZ-DR-TS-53001	Controller 3 1-500
HE551514-SWE-HSL-ZZ-DR-TS-53002	Controller 3 1-300 streem
HE551514-SWE-HSL-ZZ-DR-TS-53003	Controller 3 1-200 street
HE551514-SWE-HSL-ZZ-DR-TS-53004	Controller 3 Detector info
HE551514-SWE-HSL-ZZ-DR-TS-54001	Controller 4 1-500

HE551514-SWE-HSL-ZZ-DR-TS-54002	Controller 4 1-200
HE551514-SWE-HSL-ZZ-DR-TS-54003	Controller 4 1-200 Streams 1-4
HE551514-SWE-HSL-ZZ-DR-TS-54004	Controller 4 1-200 Streams 2_3
HE551514-SWE-HSL-ZZ-DR-TS-54005	Controller 4 Detecor info
Drawings	
Drawing no. and revision	**Title**
HE551514-SWE-HSL-ZZ-DR-TS-55001	HCC Example traffic signal drawing detail design
HE551514-SWE-HSL-ZZ-SP-EC-50001	Appendix 12_5
HE551514-SWE-HSL-ZZ-SP-EC-50002	Appendix 12_70
HE551514-SWE-HSL-ZZ-SP-EC-50003	Appendix 5_2
HE551514-SWE-HSL-ZZ-TN-EC-51001	Traffic Signal Design Notes J8
HE551514-SWE-HSL-ZZ-TN-EC-53001	Traffic Signal Design Notes Windhover
HE551514-SWE-ELS-ZZ-DR-LX-50201-P01	Landscape & Ecology GA Drawing 1 of 5
HE551514-SWE-ELS-ZZ-DR-LX-50202-P01	Landscape & Ecology GA Drawing 2 of 5
HE551514-SWE-ELS-ZZ-DR-LX-50203-P01	Landscape & Ecology GA Drawing 3 of 5
HE551514-SWE-ELS-ZZ-DR-LX-50204-P01	Landscape & Ecology GA Drawing 4 of 5
HE551514-SWE-HSC-ZZ-DR-LX-50205-P01	Landscape & Ecology GA Drawing 5 of 5
HE551514-SWE-ELS-ZZ-DR-CH-50000-P01	Site Clearance Notes and Key
HE551514-SWE-ELS-ZZ-DR-CH-50001-P01	Site Clearance Sheet 1 of 5
HE551514-SWE-ELS-ZZ-DR-CH-50002-P01	Site Clearance Sheet 2 of 5
HE551514-SWE-ELS-ZZ-DR-CH-50003-P01	Site Clearance Sheet 3 of 5
HE551514-SWE-ELS-ZZ-DR-CH-50004-P01	Site Clearance Sheet 4 of 5
HE551514-SWE-ELS-ZZ-DR-CH-50005-P01	Site Clearance Sheet 5 of 5

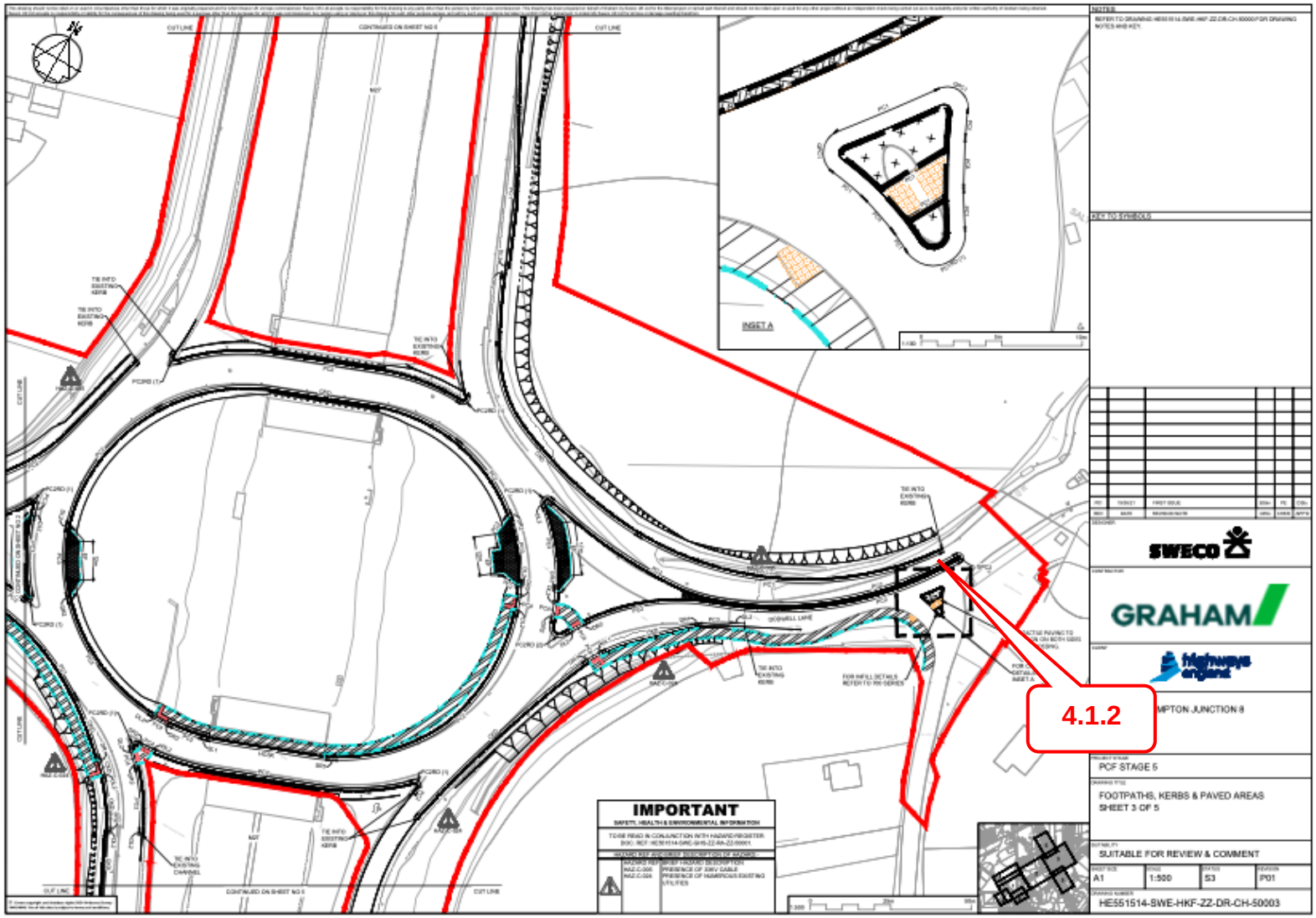
A.2 List of Documents Examined:

Reference and Revision	Title	Date
HE551514-JAC-HGN- PCF3_SS1-RP-ZS-0001 [0.1].docx	Road Safety Audit (RSA) ST1 Brief	April 2019
HE551514-JAC-HGN- PCF3_SS1-RP-CH-0004 [0.1].docx	Road Safety Audit Stage 1 Covering Letter Southampton Junctions – J8	April 2019
HE551514-JAC-HGN- PCF3_SS1-RP-CH-0003 [0.1].docx	Stage 1 Road Safety Audit	April 2019

HE551514-JAC-GEN-PCF3_SS1- HS-ZS-0003 [0.1].docx	Road Safety Audit Stage 1 Designer's Response	September 2019
HE551514-SWE-HAC-ZZ-SH- CH-50001	Departures from Standard checklist	May 2021
HE551514-SWE-HGN-ZZ-RP- CH-50001	Walking, Cycling and Horse- Riding PCF Stage 5 Strategy	March 2021
HE551514-SWE-VAS-ZZ-RP-ZS- 50001	M27 Junction 8 area Contributory Factors Report Summary	April 2021
HE551514-SWE-VAS-ZZ-RP-ZS- 50002	Windhover roundabout Bursledon Contributory Factors Report Summary.	April 2021
HE551514-SWE-TEC-ZZ-RP-TR- 50002	Stage 5 Transport Model Package Report	May 2021
HE551514-SWE-TEC-ZZ-RP-TR- 50003	Stage 5 Traffic Flow forecasting report	May 2021
HE551514-SWE-HSN-ZZ-SH- CH-50001	Traffic Signs Schedule	May 2021
HE551514-SWE_HGN-ZZ-RP-ZZ-50001	RSA Brief	June 2021
HE551514-SWE_HLG-ZZ-RA-ZS-50001-GG104	GG104 Lighting Risk Assessment	July 2021

APPENDIX B: Problem Location Plan

B.1 Key plan –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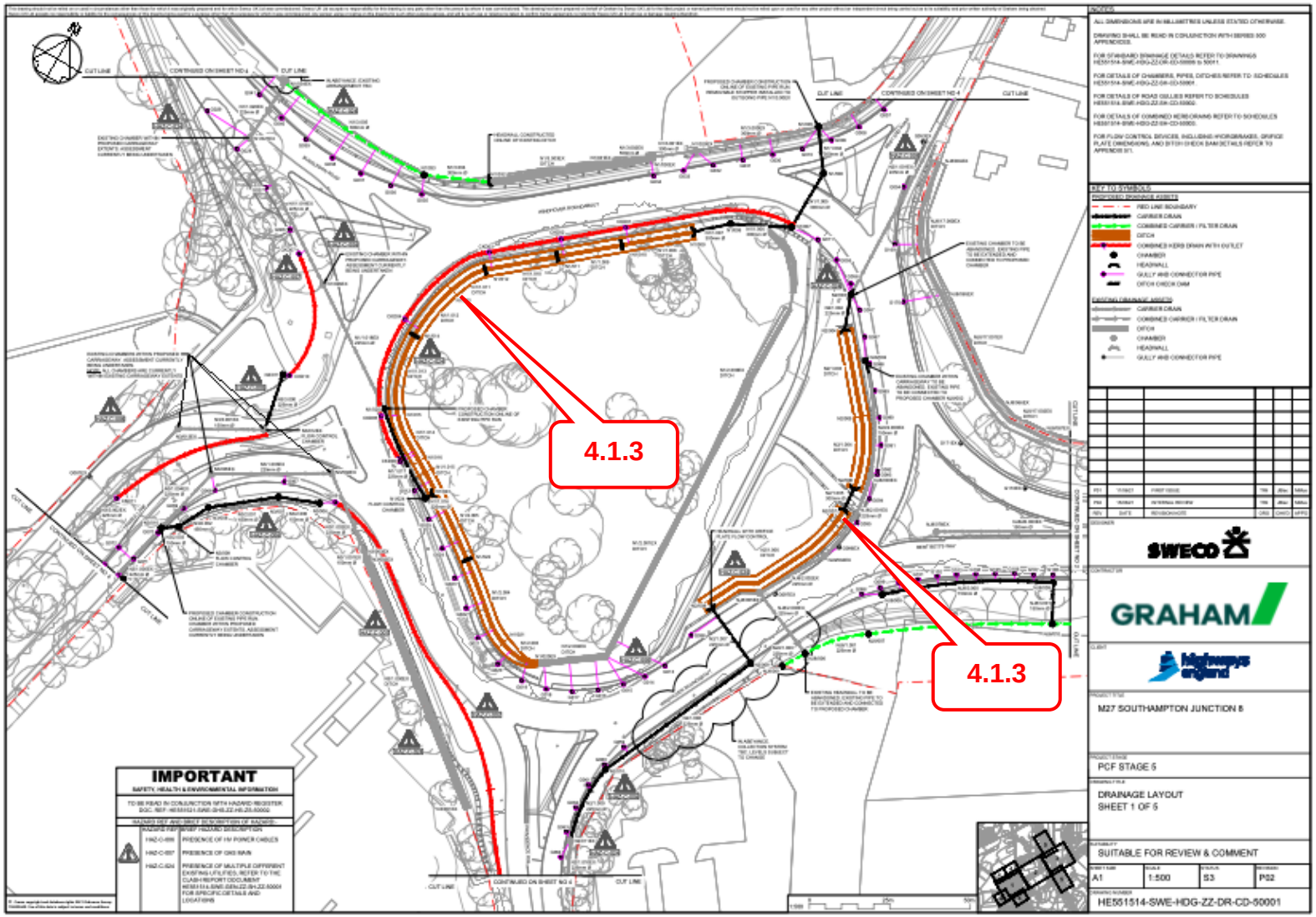
GRAHAM
PCF STAGE 5
FOOTPATHS, KERBS & PAVED AREAS
SHEET 3 OF 5
SUITABLE FOR REVIEW & COMMENT
HE551514-SWE-HKF-ZZ-DR-CH-50003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Highways England
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PCF STAGE 5
DRAINAGE LAYOUT
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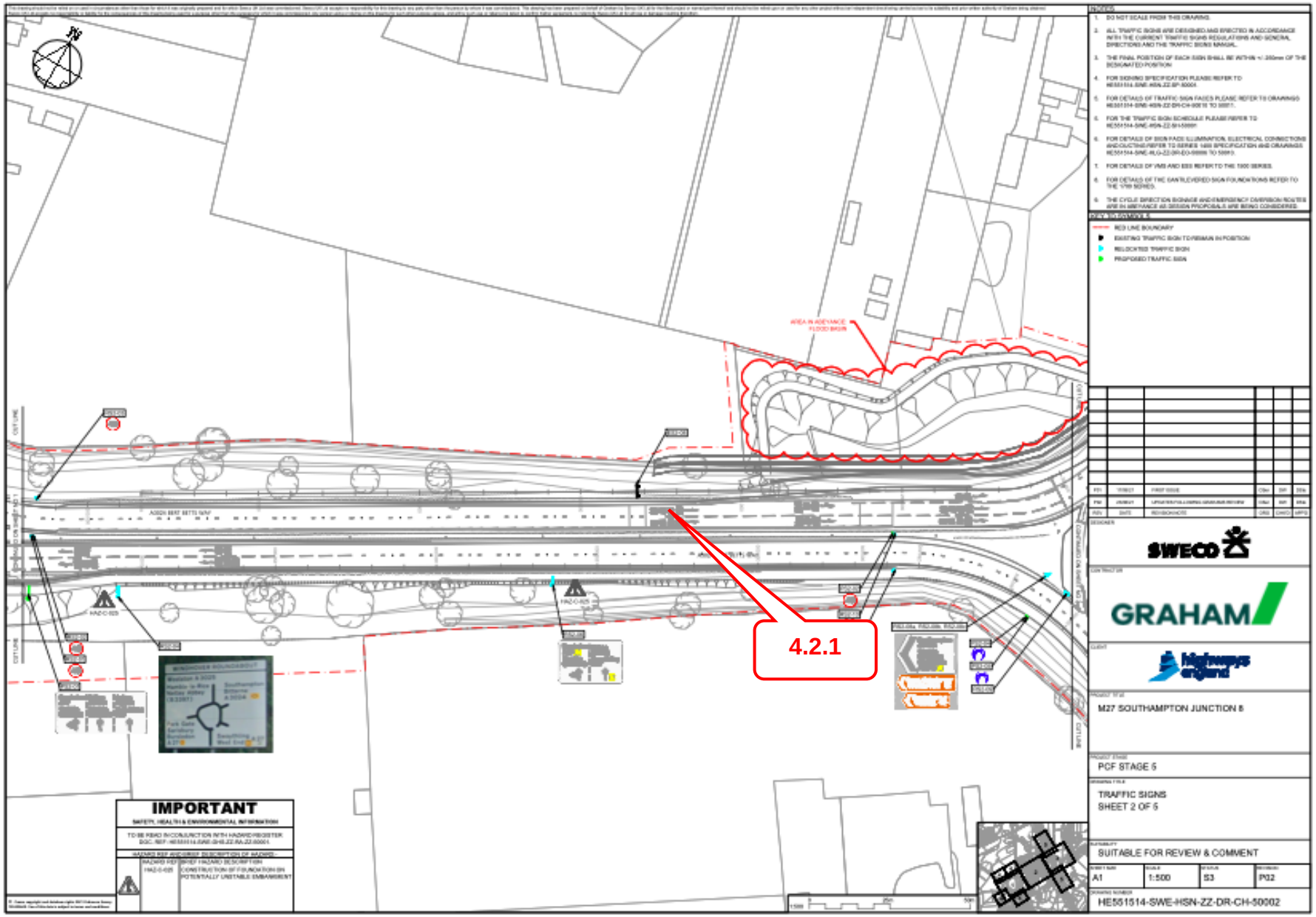
S3
P02
HE551514-SWE-HDG-ZZ-DR-CD-50001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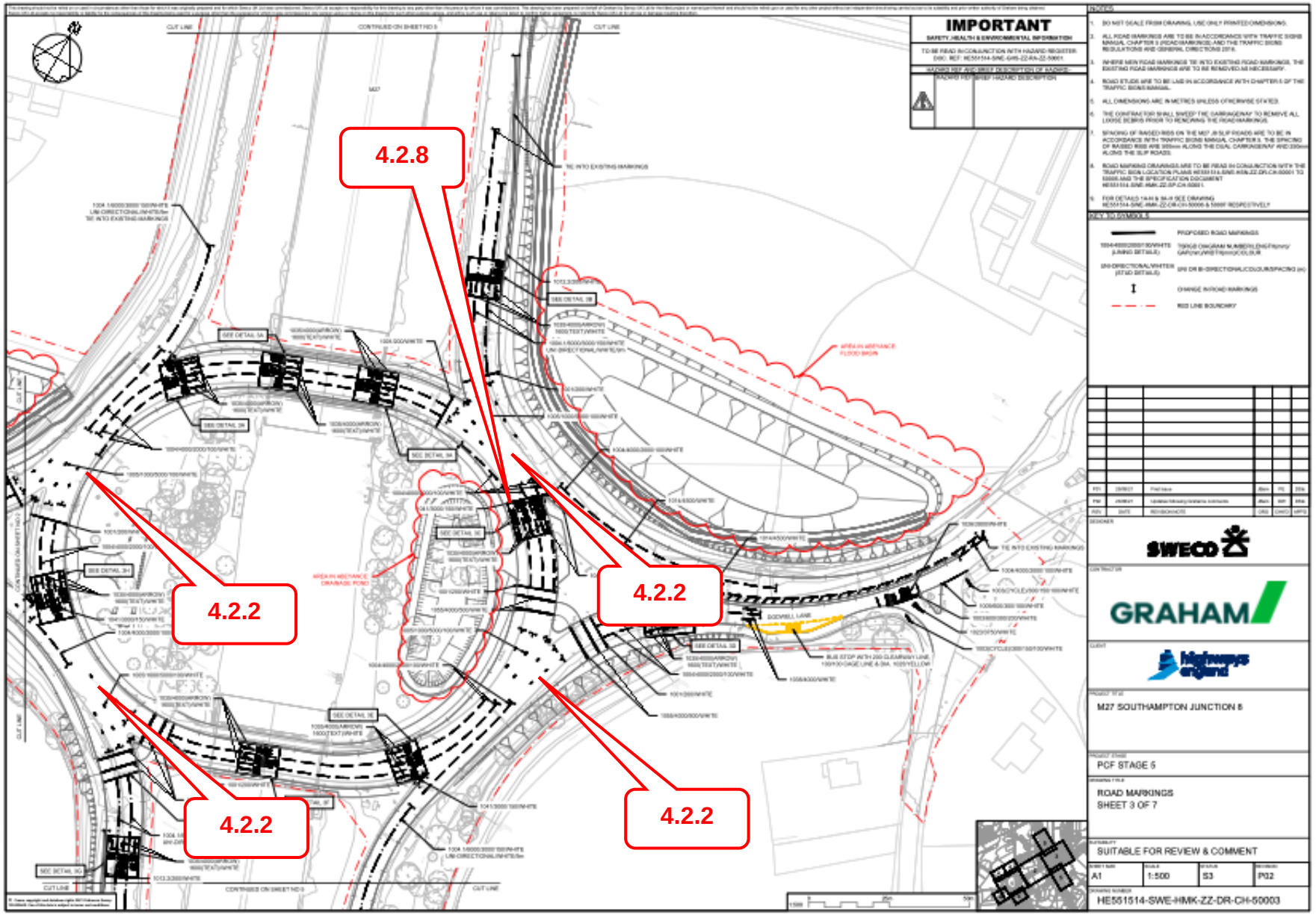
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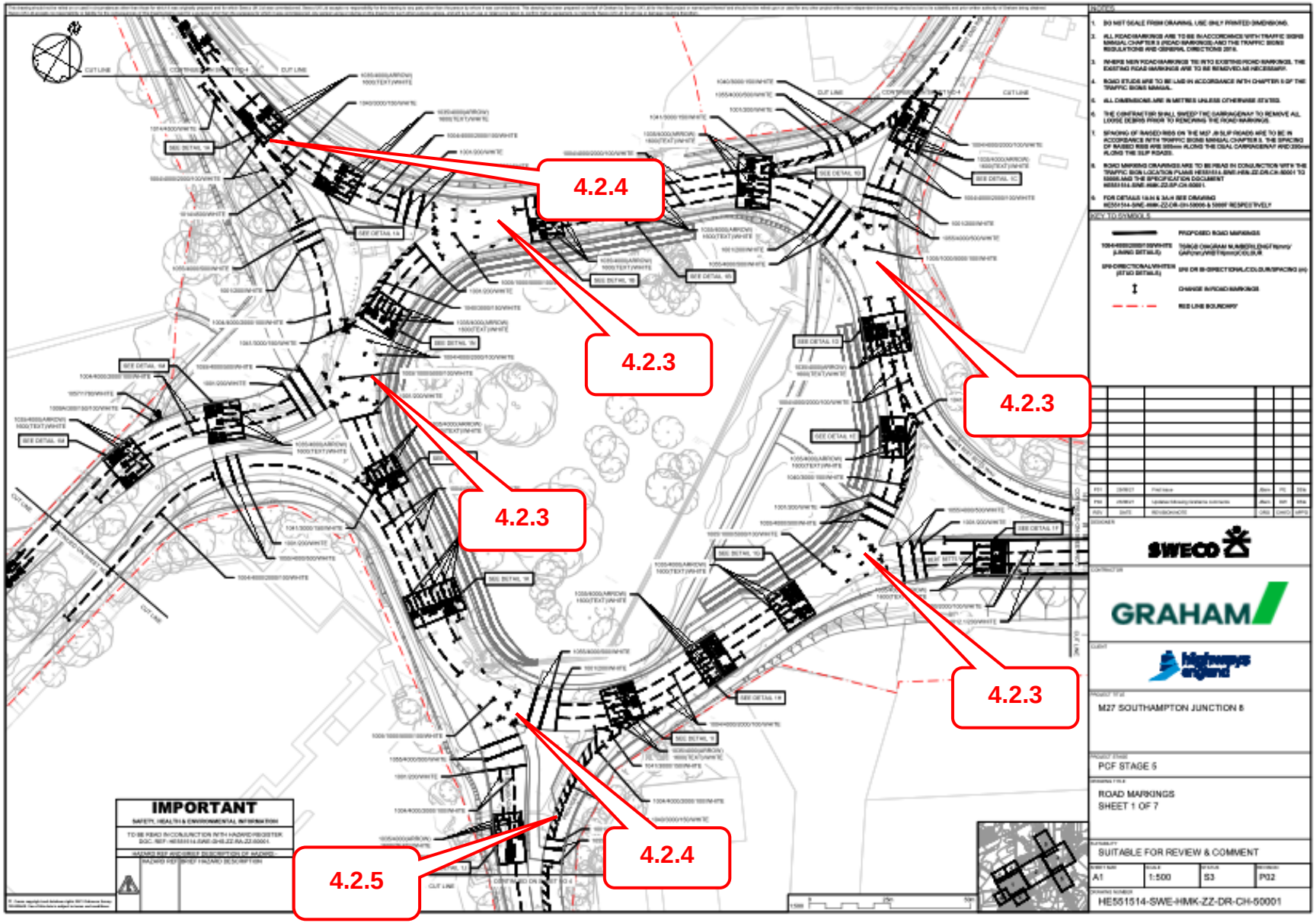
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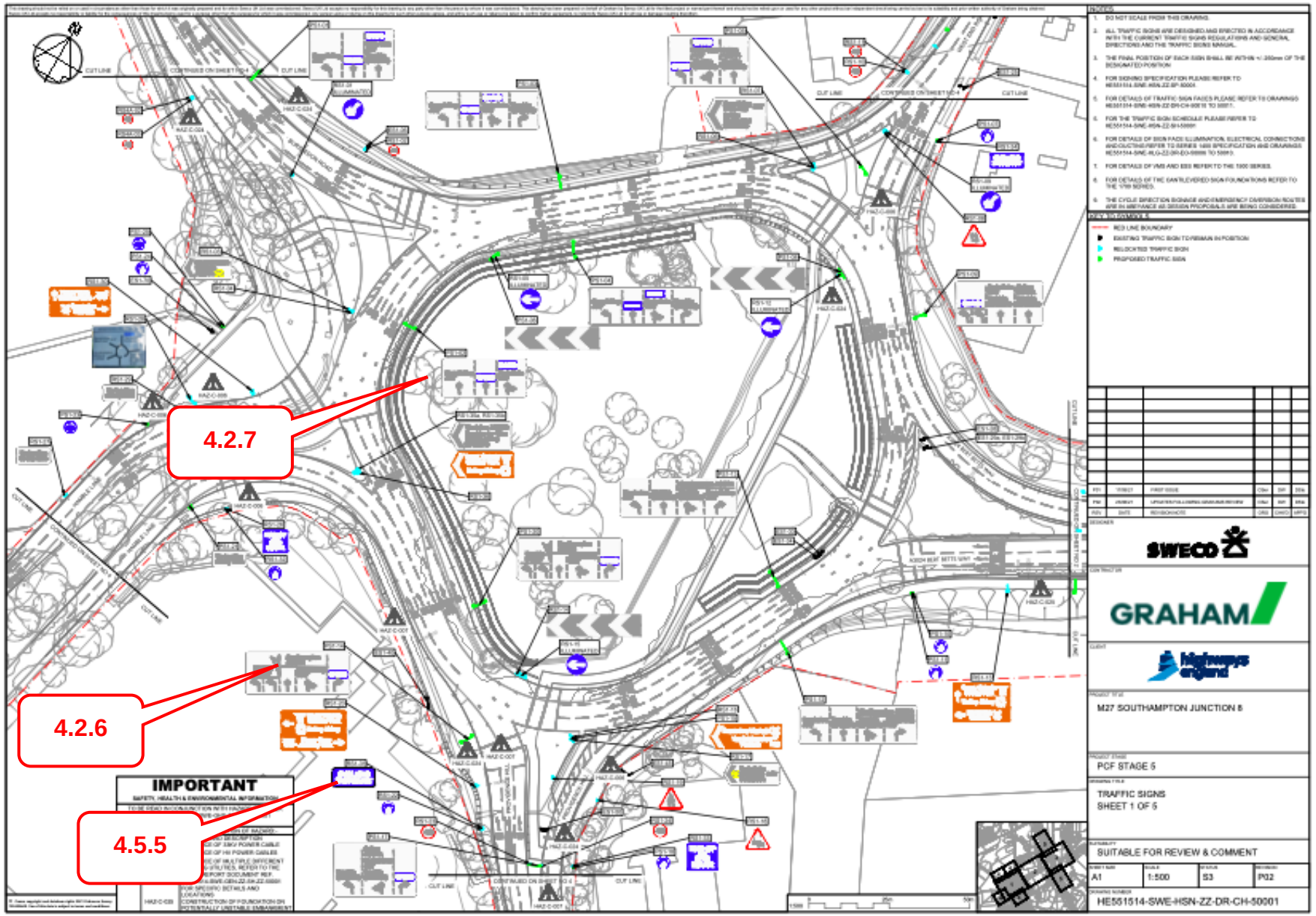
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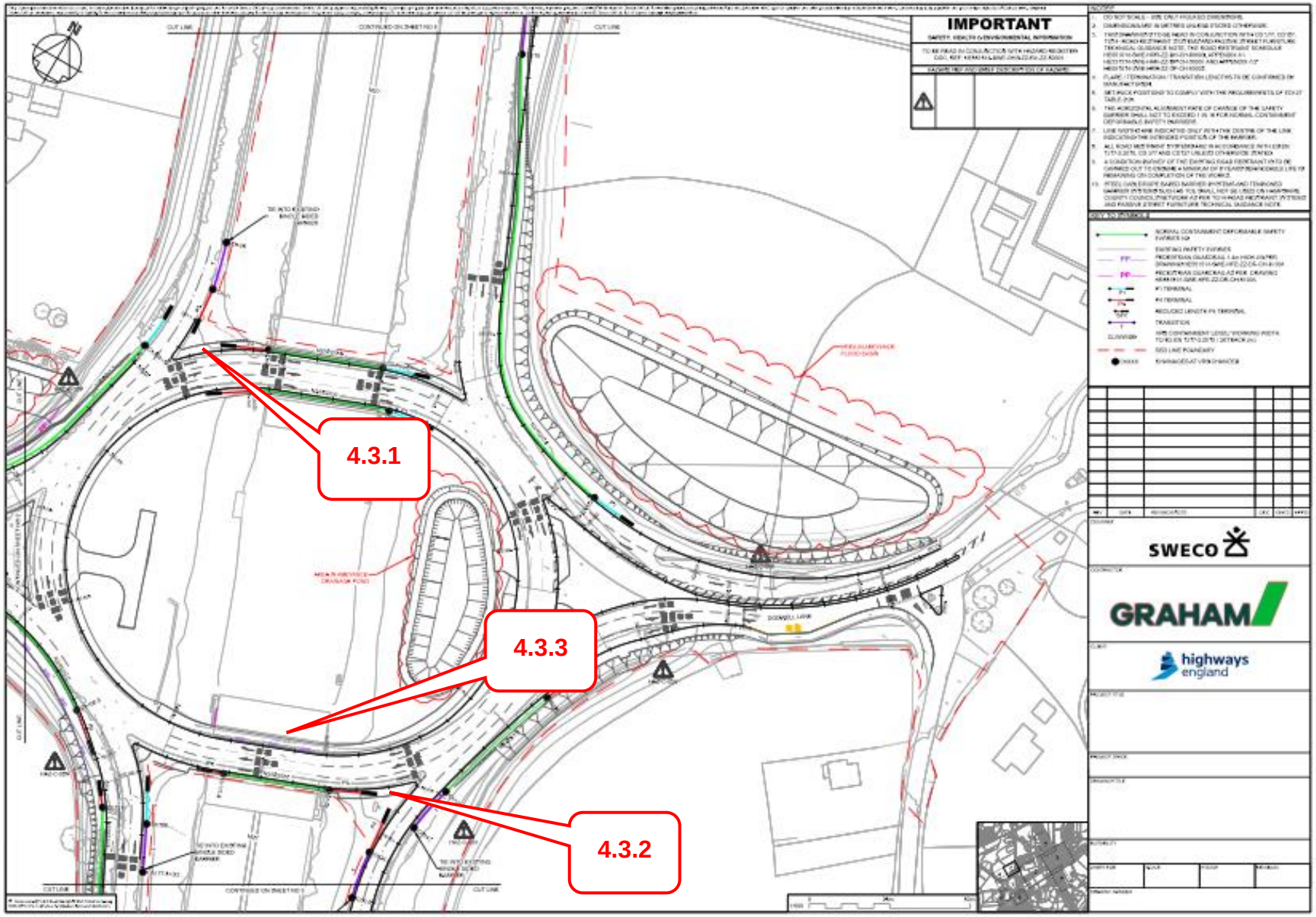
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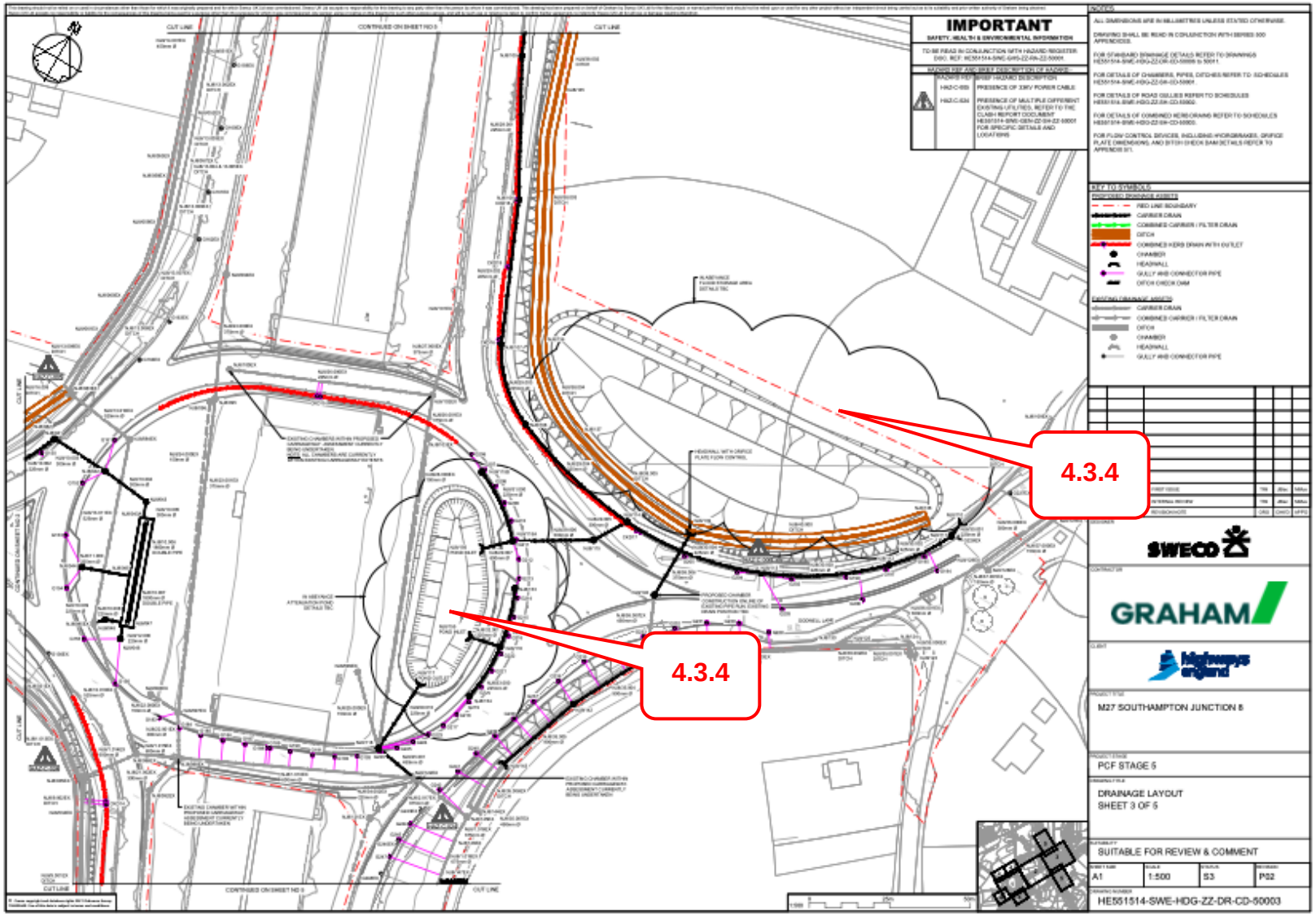
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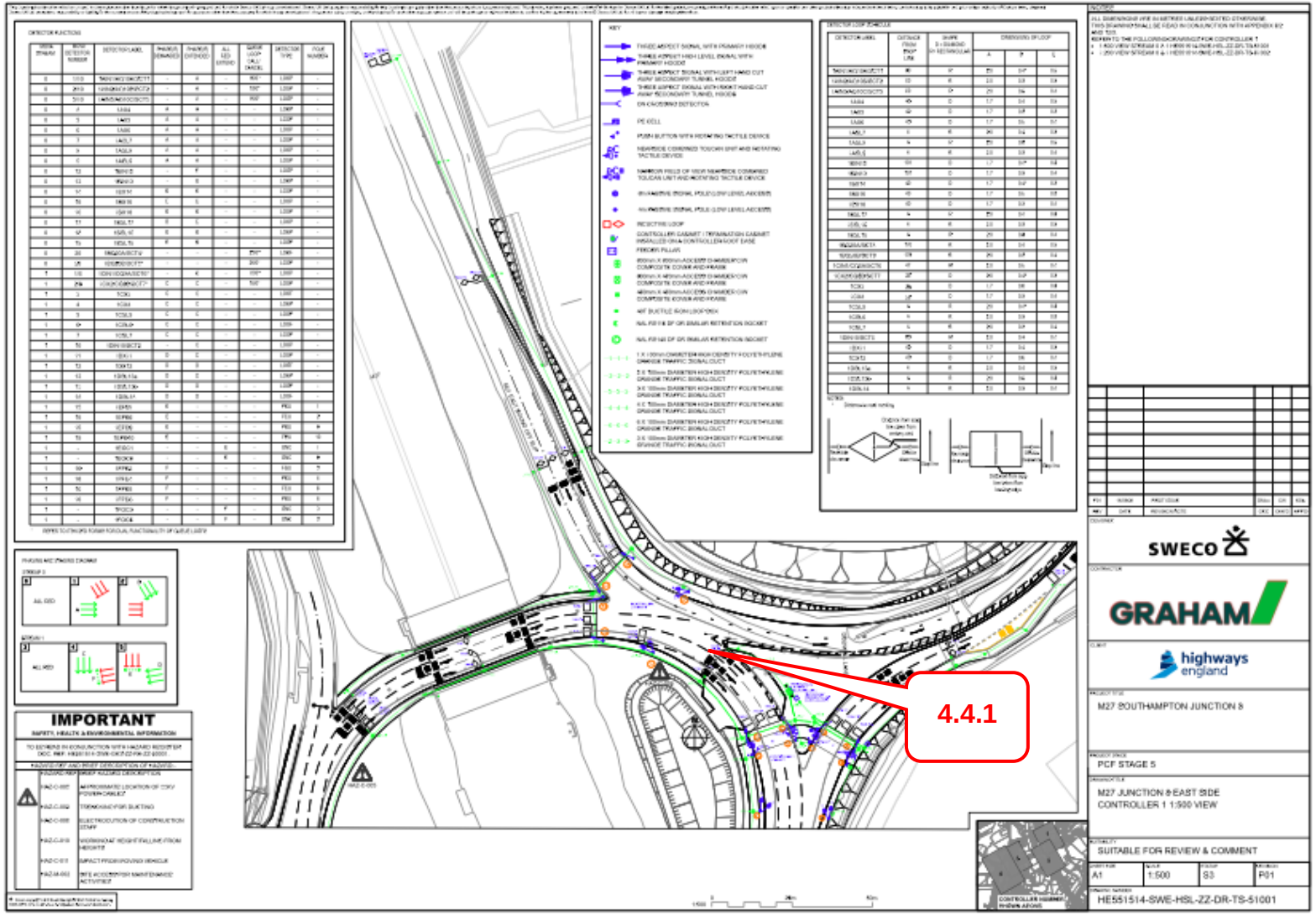
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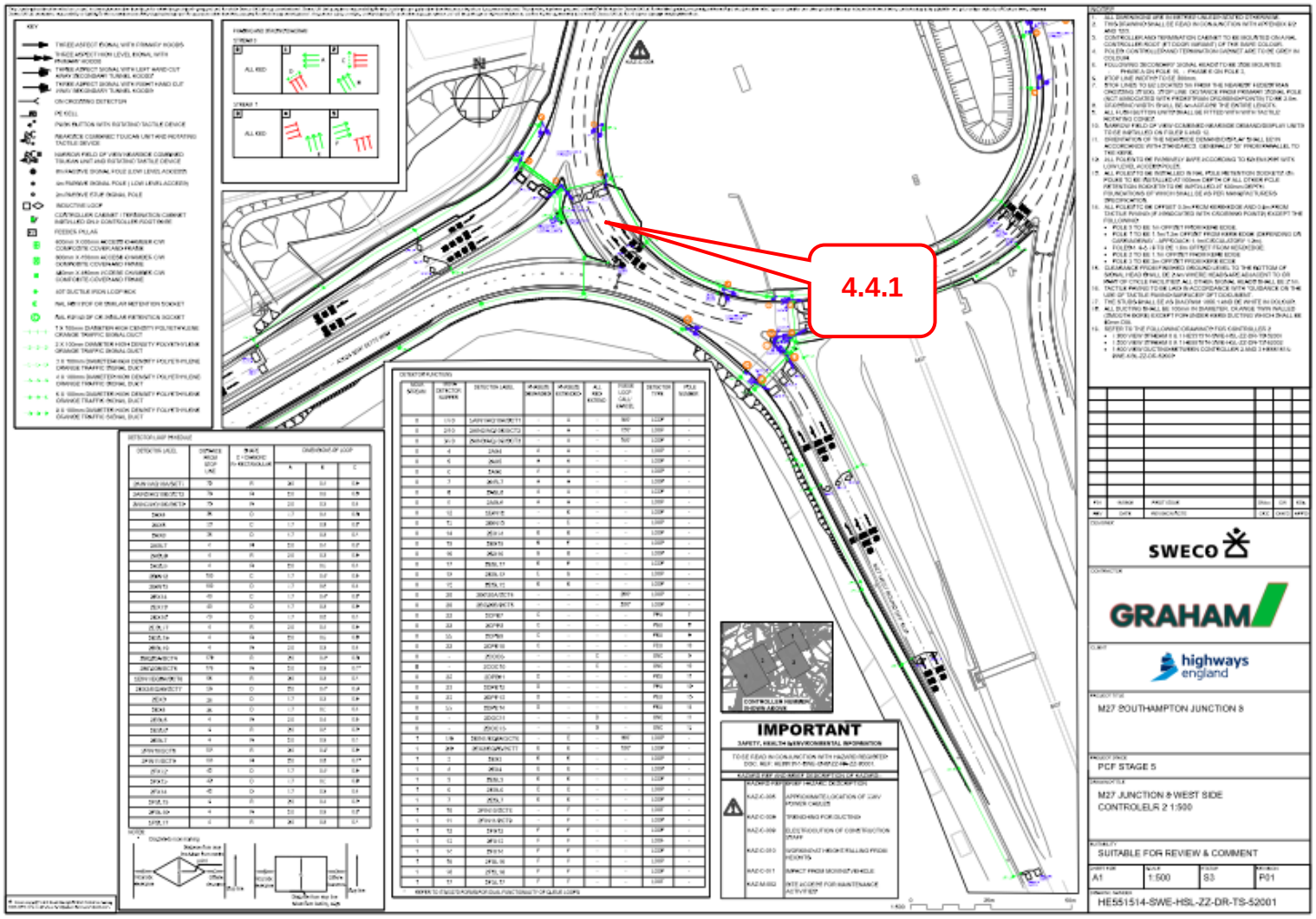
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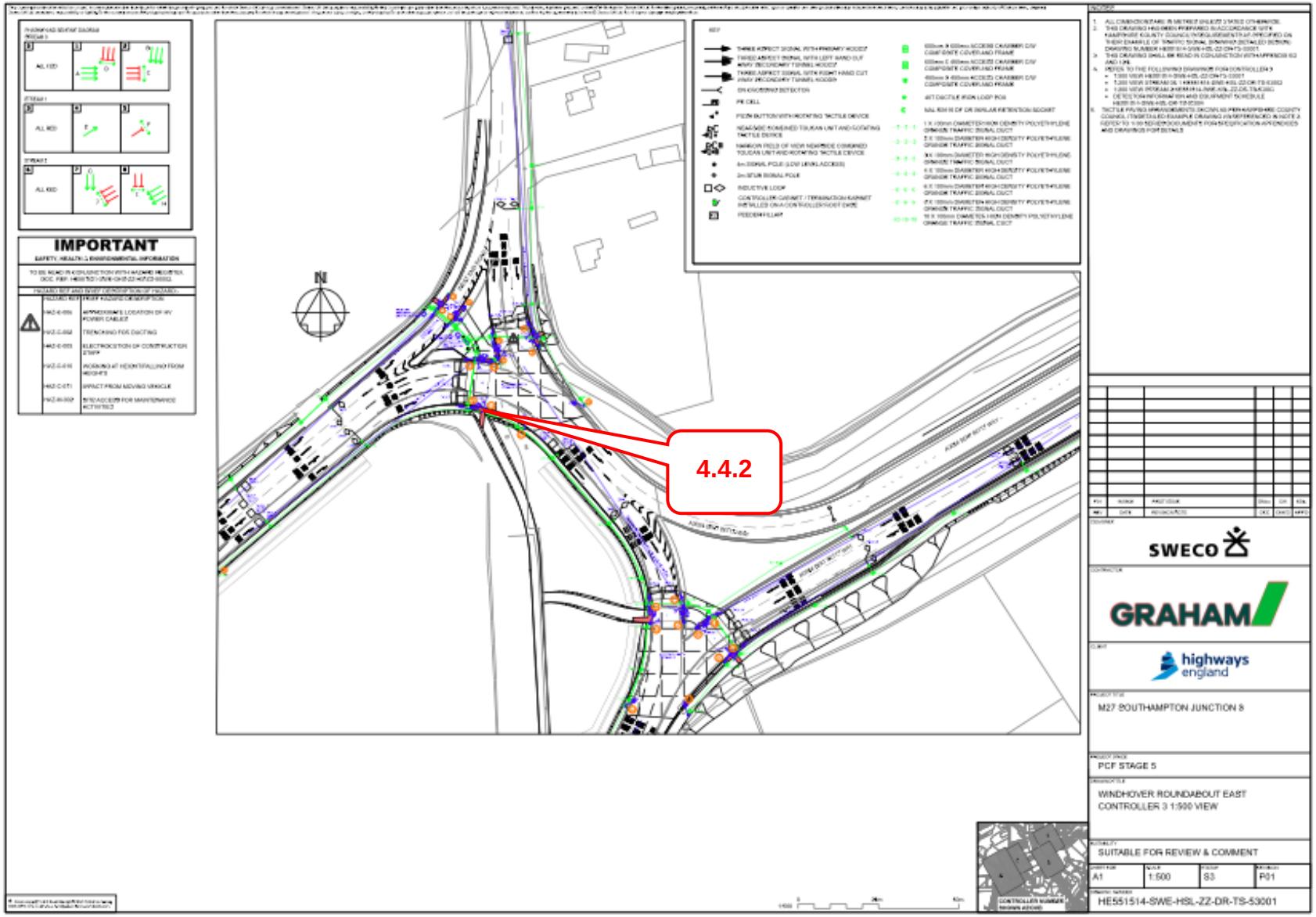
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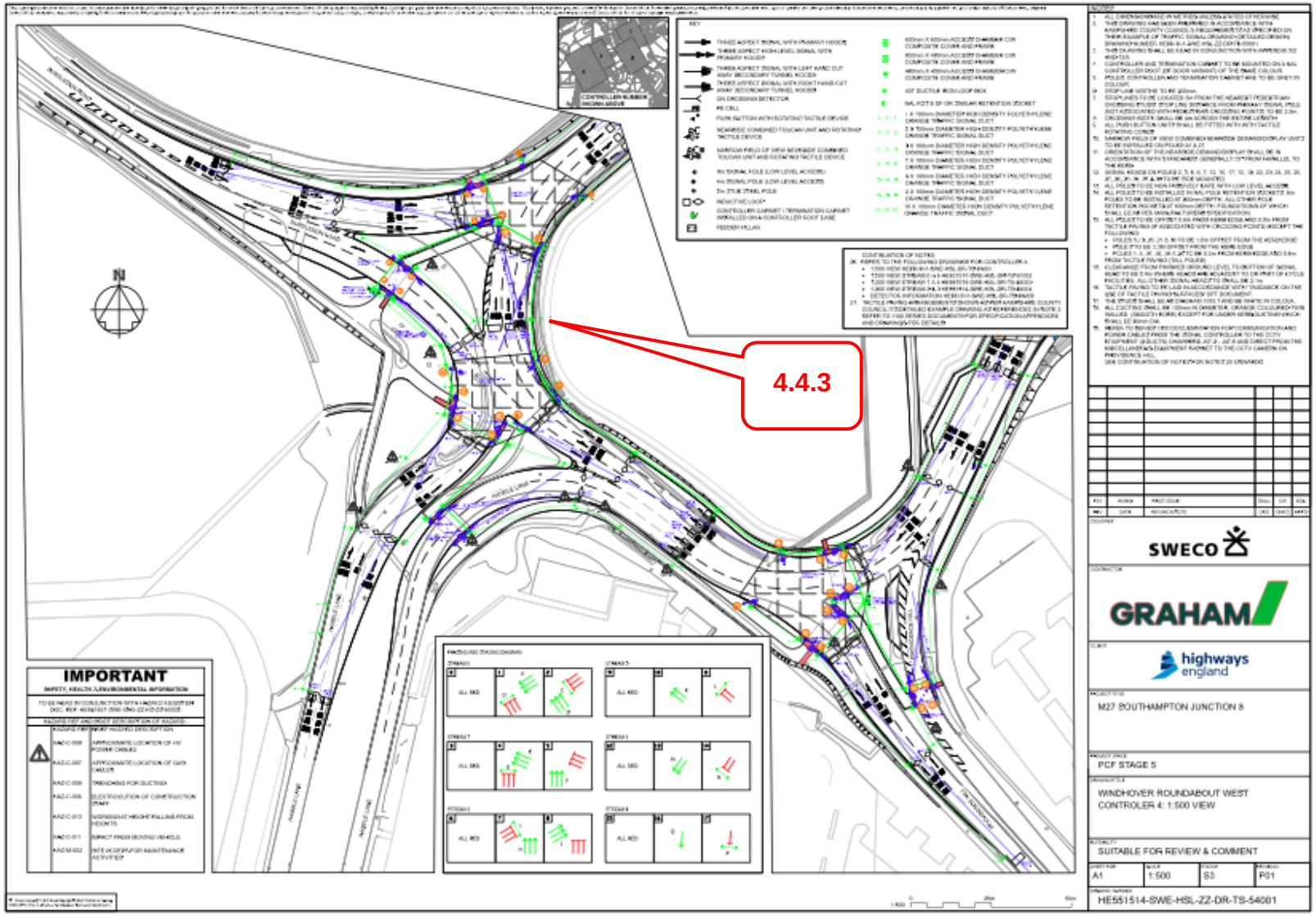
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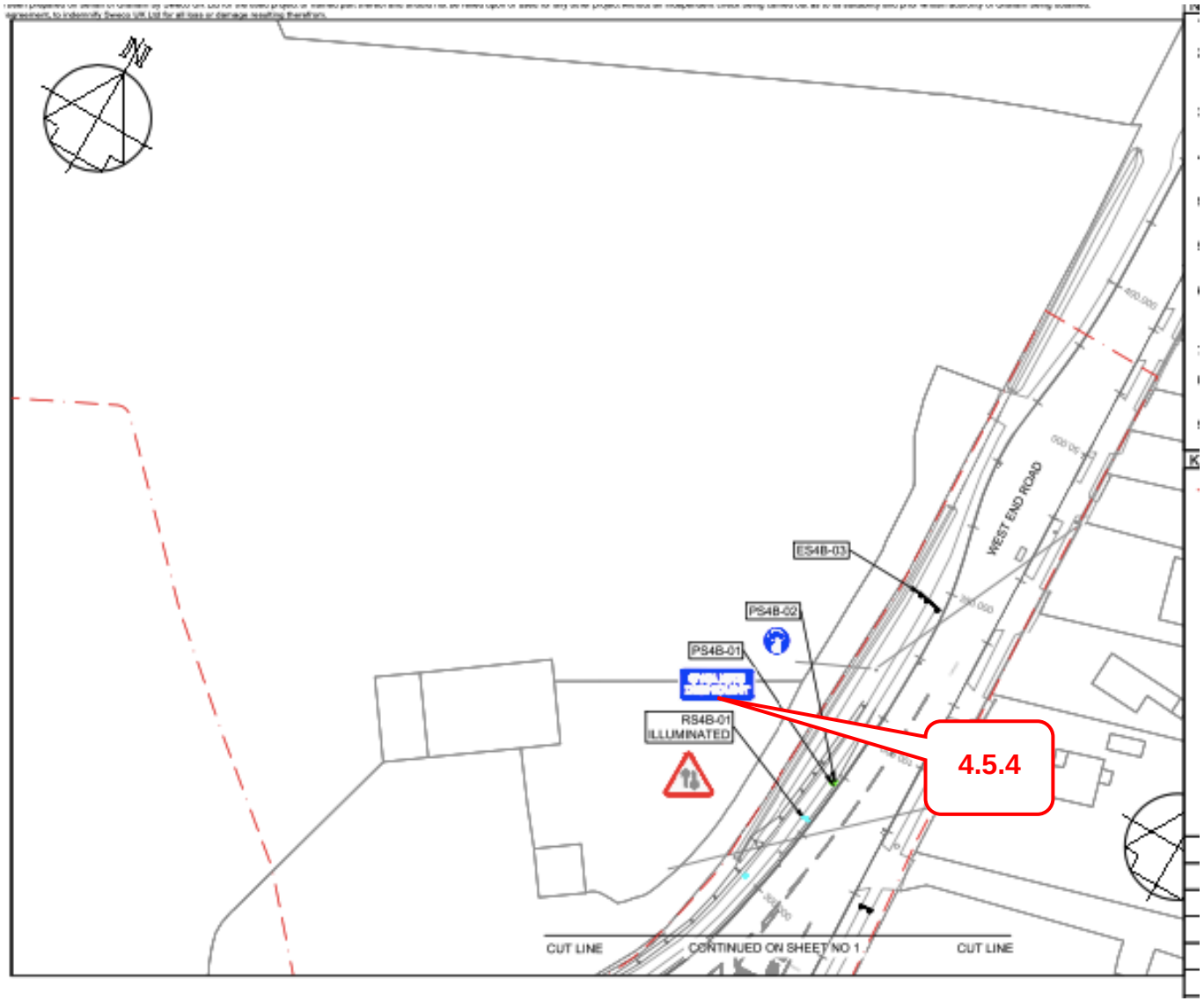
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PS4B-01
RS4B-01
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CUT LINE
CONTINUED ON SHEET NO 1
CUT LINE

Report End