WEST MIDLANDS INTERCHANGE

Transport Technical Note 46 – A449 / A5 Link Road Signalised Crossing

Job Title	West Midlands Interchange	**Project Number**	70001979
Client	Four Ashes Limited		
TTN No.	46	**Date of Issue**	6 February 2020
Subject	A449 / A5 Link Road Signalised Crossing (Final)		
Author	Ian Fielding	**Authorised**	Ian Fielding
Distribution			

1 INTRODUCTION

1.1 Following the issue of correspondence from the Secretary of State (SoS) dated 24 January 2020, this TN46 has been prepared in order to demonstrate that a satisfactory signal controlled crossing can be provided of the A449 / A5 link road.

1.2 At the time of the closure of the West Midlands Interchange Examination, the precise location of the crossing of the A449 / A5 link road had not been fully resolved with Highways England (HE). Details of an amended location for the crossing had been submitted to the Examining Authority at Deadline 8 as shown on drawing 70001979-GA-103 Rev I **(REP08-030)** and provided at Annex 1, however the further submission had not been fully responded to by HE at the conclusion of the Examination.

1.3 Given the above, the Applicant had proposed wording for a draft "Requirement", which is provided below in order to allow this point to be addressed at the detailed implementations stage.

"the location of the pedestrian crossing on the A5/A449 link road notwithstanding the detail shown in that respect on the Highway plans (in consultation with the local highway authority and Highways England)"

1.4 Within the correspondence of 24 January 2020, the SoS has specifically sought comment from Highways England on the proposed draft requirement.

1.5 Discussions between the Applicant and HE since receipt of the SoS correspondence have revealed that the further Stage 1 Road Safety Audit (RSA1) that had been prepared after the Examination had closed (dated 29 August 2019 Revision G) considering the revised crossing location must be responded to. In the view of HE, the further RSA1 needs to be responded to by the Applicant as they have not seen any further detail on how the crossing could be satisfactorily provided in order to respond to the further RSA1 comments. This RSA1 Rev G is provided at Annex 2.

1.6 The further RSA1 had considered the proposal of the Applicant to relocate the signal controlled crossing so that it sits 20m to the east of the exit from the A449 roundabout. The reason for this was to provide the crossing on the desire line for Non Motorised Users (NMUs), but not trigger a departure from design standard which would have been the case if it were located further to the west. Previous proposals for the crossing were considered to be provided in a location that did not reflect anticipated desire lines and would give rise to NMU's attempting to cross the link road in locations where crossings were not present. This issue had been raised by a previous Safety Audit, dated June 2019 (Rev F) and had been responded to by the Applicant by way of drawing 70001979-GA-103 Rev I.

1.7 The Safety Audit Rev G has confirmed on page 19 that the location of the crossing is now shown in a location that will not give rise to NMU's choosing to cross at locations where there is no crossing facility. Therefore the risk of an NMU being struck by a vehicle whilst attempting to cross in an unsuitable location has been satisfactorily removed.

1.8 Notwithstanding the above, the RSA Rev G identified the following further issues with regard to the relocated crossing, as shown below: -

> **5.1.1 Problem**
>
> **Location:** Gravelly Way to the east of its junction with the A449 (see Appendix B)
>
> **Drawing Number:** 70001979-SK-108-A Demonstrative representation of signalised pedestrian crossing located 20m East of A449/Gravelly Way Roundabout
>
> **Summary:** Risk of rear end shunt collisions or Vehicle/Pedestrian collisions in Gravelly Way at the new stop line of the proposed signalised crossing if the signals are not visible or adequately signed.
>
> **Detail:** Due to the location of the proposed signalised crossing in Gravelly Way being relocated closer to the roundabout, drivers turning left into Gravelly Way would have less time to view the signals and subsequently brake should they be on a red phase. This is compounded if the forward visibility from the roundabout to the proposed signalised crossing is restricted by mature vegetation and trees. Therefore, there is a risk of rear end shunts or vehicle/pedestrian collisions at the stop line due to drivers not realising that there is a controlled crossing in Gravelly Way off the roundabout.
>
> **RECOMMENDATION**
>
> It is recommended that the proposed signalised crossing on Gravelly Way has adequate visibility from the A449 and/or the proposed crossing is adequately signed from all approaches to minimise the risk of conflict.

1.9 RSA Rev G was not received by the Applicant until after the West Midland Interchange Development Consent Order Examination had closed. However, following the correspondence from the SoS, the Appellant has held further discussions with Highways England and their Consultants to ensure that this matter could be resolved.

1.10 Therefore this Note sets out how the further issues identified by RSA Rev G can be dealt with so that Highways England can be confident that an appropriate design can be provided that has addressed the matters identified by the RSA.

1.11 Having considered the further issues raised by the further Audit, it can be seen that the following issues need to be considered: -

- Traffic Queuing;
- Provision of adequate visibility; and
- Signage.

1.12 Given the above, a further sketch layout of the A449 Roundabout showing the crossing of the A449 / A5 link road has been prepared; this is shown on drawing 70001979-SK-115 Rev B, provided at Annex 3.

1.13 Dealing with each point in turn.

2 TRAFFIC QUEUING

2.1 Detailed LINSIG assessments were undertaken in order to identify the influence of the crossing on the safe operation of the crossing, in relation to the free flow of traffic using the A449. These assessments were provided in TN39 Rev A “A449 & Gravelly Way Pedestrian / Cycle Crossings” (dated 25 June

2019). The results of the modelled scenario's for the A449 / A5 link road crossing are presented in Tables 5 – 8 of TN 39 and are provided at Annex 4.

2.2 Given the proximity of the A449 roundabout to the west and the RSA1 Rev G comment, the key approach to the signal crossing is the east bound A449 / A5 link road. Tables 5 – 8 of TN 39 show a mean maximum queue for eastbound traffic on the A449 / A5 link road of six PCU's during the PM peak hour, with the full quantum of development in place. The maximum queue of six vehicles is only shown to occur during the PM peak hour and as shown in TN 39, queues are less at other times of the day, including shift change over times (please refer to Tables 5 – 8 of TN 39). The modelled queue for the AM peak is shown as five PCU's. It should be noted that these queue values are mean maximum queue values and which will be formed by traffic waiting at the stop line as well as further traffic arriving at the stop line from downstream links. This point is considered later within this Note.

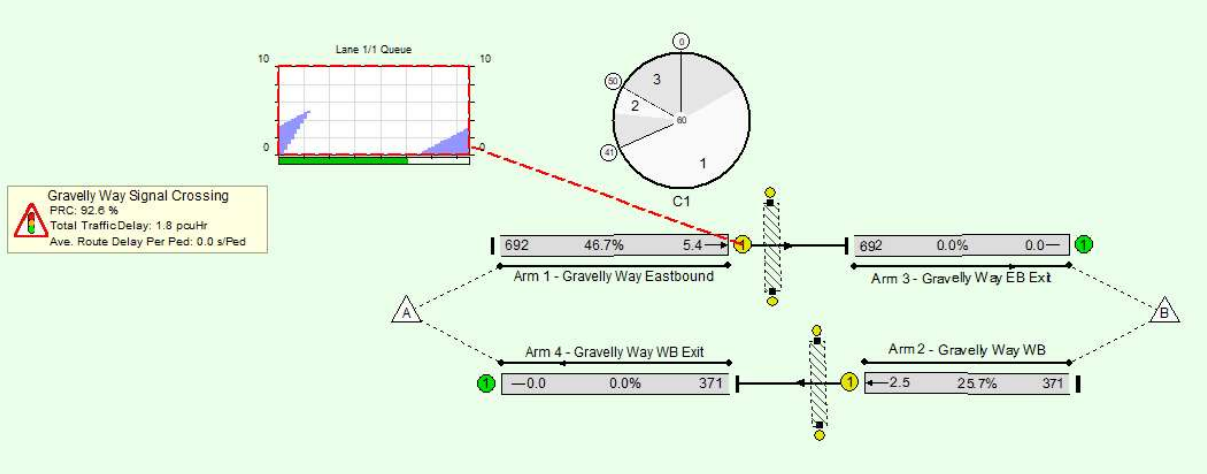
2.3 The separation from the A449 roundabout to the crossing extends to 20m. Assuming the typical PCU value of 6m, three queuing PCU's could be accommodated in the section of the link road immediately to the east of the roundabout on the approach to the crossing. This would leave three potential residual queuing PCU's which would not be accommodated within the section of the link road on the approach to the crossing. The implications of this residual queuing traffic are now considered.

2.4 "Keep Clear" markings can be introduced on the north eastern corner of the A449 roundabout in order to maintain free flow of the mainline and the circulatory carriageway, as shown on drawing 70001979-SK-115 Rev B. This would force traffic arriving from the south and which may need to wait when the crossing is called to be accommodated in the area to the to the south of the roundabout central island, as shown on drawing 70001979-SK-115 Rev B. As shown, this could accommodate two PCU's

2.5 As the traffic flow approaching the crossing consists of streams of traffic approaching from both the north and the south. By reference to Figure T7, provided within Appendix Q of the scheme Transport Assessment (**APP-146**), provided at Annex 5), 15% of traffic using the link road during the PM peak would have an origin from the north. On the basis of the maximum PM queue of six PCU's and that a proportion of 15% of the vehicular demand will originate from the north it is reasonable to assume that at least one PCU of this queue will also be from the north. With the provision of the keep clear markings, any residual queueing traffic from the north would be accommodated on the A449 south bound approach to the junction.

2.6 During the AM peak and at other times of the day, the proportion of traffic arriving from the north is lower, however the residual queuing is also lower.

2.7 To consider further the matter of the potential for residual queuing traffic during the PM peak, a queue graph for the east bound approach to the junction has been obtained from the LINSIG model and a screenshot provided below.



2.8 As can be seen from the queue graph, the queue shown extends to a value of three PCU's, therefore this confirms that the mean maximum queue is formed by traffic adding to the values shown at the end of the red phase. Therefore, the mean maximum queue value obtained is formed by traffic adding to the queue length whilst traffic discharges at the end of the red phase. The three residual queuing PCU's are effectively moving traffic approaching the signal crossing.

2.9 A further function has been added to LINSIG, which provides details of the queue values at the end of each red phase. This output has been added to the LINSIG results analysis for the PM peak hour and is provided at Annex 6. This confirms the queue value at the end of the red phase is three PCU's. This confirms that the three residual queuing PCU's are vehicles adding to the queue value at the end of the red phase.

2.10 Importantly, the LINSIG analysis previously provided confirms that the traffic arms of the crossing operate below 90% saturation, therefore any traffic queues that would form would clear during the relevant green phase.

2.11 As shown on drawing 70001979-SK-115 Rev B, three PCU's can be accommodated within the link length approaching the stop line of the proposed crossing.

2.12 In view of the above, it is considered that there would be no adverse queuing arising from the signal controlled crossing being located as shown on drawing 70001979-SK-115 Rev B.

3 VISIBILITY

3.1 Specific comment has been made within the RSA1 Rev G that adequate visibility must be provided from the A449 to the crossing.

3.2 As shown on drawing 70001979-SK-115 Rev B, in accordance with paragraph 3.53 of CD116, visibility from the approach from the south bound A449 is available for the whole of the crossing area. This visibility is accommodated within either designated verge or highway land and which would be dedicated highway to be adopted by HE so would be kept clear of vertical obstruction.

3.3 In terms of visibility from the south, as shown on drawing 70001979-SK-115 Rev B, 40m circulatory visibility can be provided, in accordance with CD116 Figure 3.48. This will allow road users from the south to identify any residual queuing which may occur.

3.4 In addition, the vertical profile of the roundabout central island can be provided in a way that visibility towards the crossing can be adequately provided for. It is considered that this can be dealt with at the detailed design stage.

3.5 It is therefore considered that adequate visibility can be provided to the crossing from the A449 as required by the RSA1 Rev G.

4 SIGNAGE

4.1 Specific comment has been made that the signal controlled crossing must be adequately signed from all approaches. In our judgement, the signage strategy concerning this matter would be dealt with at the detailed design stage, as is the case for other elements of the highway works to the HE network.

5 CONCLUSION

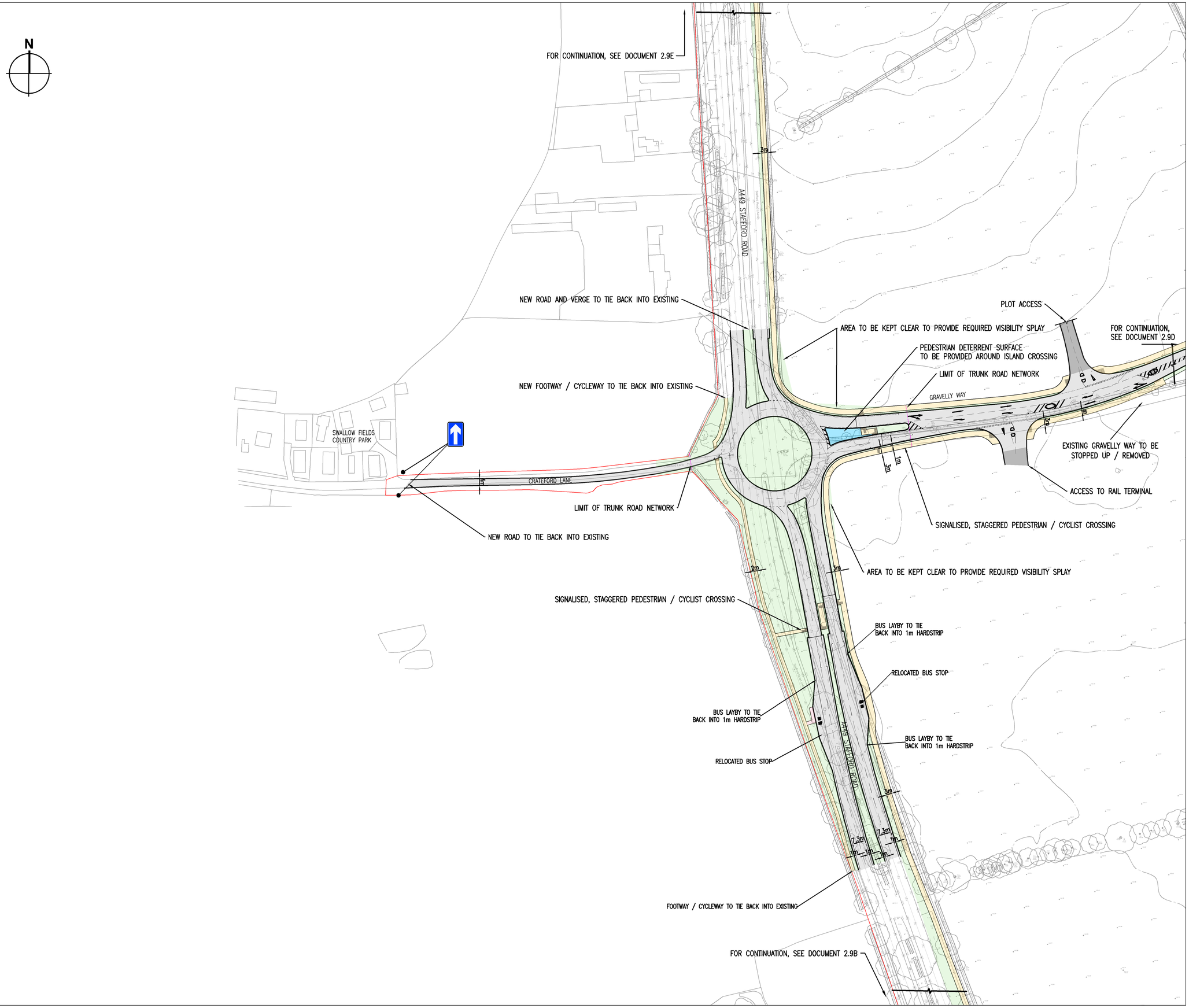
5.1 In conclusion, it can be seen that: -

- The signal controlled crossing can be provided in a location that does not require departures from design standard;

- Queue values at the end of each red phase of the eastbound traffic signals would not exceed the available link length to the A449 roundabout. Any residual queues arising from the signal controlled crossing consist of moving traffic adding to the queue, whilst traffic discharges;
- Adequate and sufficient visibility to the pedestrian crossing can be provided from the A449, in accordance with relevant design standards; and
- Matters relating to signage of the crossing will be dealt with at the detailed stage.

5.2 Given the above, it is the view of the Applicant that the crossing of the A449 / A5 link road can be satisfactorily provided.

Annex 1



KEY

- ORDER LIMITS
- FOOTWAY
- FOOTWAY / CYCLEWAY
- ROAD
- VERGE / GRASS
- PEDESTRIAN DETERRENT SURFACE
- UNADOPTED HIGHWAY
- TACTILE PAVING
- LIMIT OF TRUNK ROAD NETWORK

NOTE: LIMITS OF DEVIATION SHOWN ON THE WORKS PLANS (DOCUMENT SERIES 2.2) AND SET OUT IN ARTICLE 4 OF THE DEVELOPMENT CONSENT ORDER.

CHANGES MADE TO DOCUMENT 2.9C SINCE DCO SUBMISSION:

MAY 2019 –

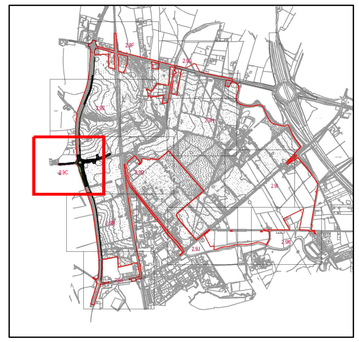
- PEDESTRIAN CROSSING ON THE A449 SIGNALISED AND RELOCATED FURTHER SOUTH OF THE ROUNDABOUT, IN RESPONSE TO COMMENTS FROM HIGHWAYS ENGLAND IN THE RSA.
- PEDESTRIAN CROSSING ON GRAVELLY WAY MOVED EAST, STAGGERED AND SIGNALISED IN RESPONSE TO HIGHWAYS ENGLAND COMMENTS IN THE RSA AND AS A RESULT THE ACCESS TO THE RAIL TERMINAL HAS BEEN MOVED EAST. THE TOTAL WIDTH OF THE GRAVELLY WAY ARM HAS BEEN INCREASED TO PROVIDE SUFFICIENT WIDTH FOR THE CROSSING AND VEHICLE MOVEMENTS.
- THE EXTENT OF THE TRUNK ROAD NETWORK HAS BEEN RELOCATED EAST, TO THE BACK OF THE REDESIGNED SPLITTER ISLAND.
- ADDITIONAL VERGE ON THE EASTERN SIDE OF THE A449 HAS BEEN ALLOCATED TO ENSURE VISIBILITY TO THE PEDESTRIAN CROSSINGS IS PROTECTED.

JULY 2019 –

- AMENDMENT TO CROSSING OF LINK ROAD IN RESPONSE TO COMMENTS FROM HIGHWAYS ENGLAND AND RSA.
- CROSSING AREA AS CENTRAL ISLAND OF GRAVELLY WAY REVISED.
- PEDESTRIAN DETERRENT SURFACING ADDED TO CENTRAL ISLAND ON GRAVELLY WAY.

AUGUST 2019 –

- AMENDMENT TO CROSSING ON LINK ROAD IN RESPONSE TO COMMENTS FROM RSA AND GG104 SAFETY RISK ASSESSMENT.



West Midlands Interchange

Project	THE WEST MIDLANDS RAIL FREIGHT INTERCHANGE ORDER 201X
Drawing Status	SUBMISSION
Drawing Title	GENERAL ARRANGEMENT PLAN 103
Drawing Size	A1
Regulation	5 (2) (o)
Document	2.9C
Drawn	NW
Date	JUNE 2018
Scale	1: 1000
Reviewed	IF
Drawing No.	WSP-70001979-GA-103
Rev.	I

Annex 2

Highways England

WEST MIDLAND INTERCHANGE

Stage 1 Road Safety Audit

ITS/496/2019 REV G
AUGUST 2019

(CONFIDENTIAL)

Highways England

WEST MIDLAND INTERCHANGE

Stage 1 Road Safety Audit

DOCUMENT (CONFIDENTIAL)

PROJECT NO. 70042700-RSA

OUR REF. NO. ITS/496/2019 REV G

DATE: AUGUST 2019

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QUALITY CONTROL

Issue/ revision	Revision A	Revision B	Revision C	Revision D	Revision E	Revision F	Revision G
Remarks	Draft	Draft	Draft	Draft	Draft	N/A	First Issue
Date	20/11/17	24/11/17	21/12/17	02/01/18	06/09/18	19/06/19	29/08/19
Prepared by	Neil Jones	Neil Jones	Neil Jones	Neil Jones	Neil Jones	Neil Jones	Lyn Turner
Signature							
Checked by	Lyn Turner	Lyn Turner	Lyn Turner	Lyn Turner	Lyn Turner	Lyn Turner	Neil Jones
Signature							
Authorised by	Axel Kappeler	Axel Kappeler	Axel Kappeler	Axel Kappeler	Neil Jones	Neil Jones	Neil Jones
Signature							
Project number	70042700-RSA	70042700-RSA	70042700-RSA	70042700-RSA	70042700-RSA	70042700-RSA	70042700-RSA
Report number	ITS/416/2018	ITS/416/2018	ITS/416/2018	ITS/416/2018	ITS/454/2018	ITS/496/2019	ITS/496/2019 Rev G
File reference	As above	As above	As above	As above	As above	As above	As above

CONTENTS

1. PROJECT DETAILS

Report title:	*West Midland Interchange RSA1*
Date:	*29th August 2019*
Document reference and revision:	*ITS/496/2019 – Issue revision G*
Prepared by:	*WSP*
On Behalf of:	*Highways England*

2. INTRODUCTION

2.1.1. This report results from a Stage 1 Road Safety Audit carried out on West Midlands Interchange Scheme (Trunk Roads) at the request of Patrick Thomas, Highways England Project Sponsor. Road Safety Audits associated with this scheme have been carried out during November 2017, August 2018, June 2019 and August 2019.

2.1.2. The Road Safety Audit Team approved by Patrick Thomas, Highways England Project Sponsor was as follows:

Audit Team Leader:	Neil Jones BA(hons), DipTEDM, MSoRSA, MCIHT
Audit Team Member	Lyn Turner FIHE, FSoRSA, RegRSA(IHE)

Both team members hold a Road Safety Certificate of Competence meeting the requirements of the European Directive 2008/96/EC and GG119 paragraph 3.9 and appendix G.

2.1.3. The audit took place in WSP offices in August 2019. The original Road Safety Audits were undertaken in accordance with the Road Safety Audit brief approved and provided by Patrick Thomas, the Highways England Project Sponsor. The audit team accepted the Road Safety Audit Brief with no requirement to request any further information. This Road Safety Audit was undertaken by instruction from Kathryn Simmonite, Asset Manager, Staffordshire, Highways England.

2.1.4. The Road Safety Audit also comprised of an examination of the documents and drawings supplied to the Road Safety Audit Team, referenced in Appendix A of this report.

2.1.5. This supplementary Stage 1 Road Safety Audit Rev G focuses on the new location of the signalised pedestrian crossing layout shown in drawing 70001979-SK-108-*A Demonstrative representation of signalised pedestrian crossing located 20m East of A449/Gravelly Way Roundabout*. The supplementary Stage 1 Road Safety Audit focused on design changes, implemented following the initial Stage 1 RSA, and any associated impacts they may have on the scheme.

The original RSA1 identified a specific problem and recommendation which is set out below.

PROBLEM J

Location : GA 103 – Proposed A449/Gravelly Way roundabout

Summary: Proposed removal of controlled crossing over A449 and Gravelly Way could increase risk of collisions between pedestrians/cyclists and vehicles.

Detail: The existing layout of the A449/Gravelly Way junction includes controlled crossing facilities over the A449 and Gravelly Way (see Photo 5). The proposed roundabout layout removes the controlled crossing facilities and provides uncontrolled crossing facilities for cyclists and pedestrians over Gravelly Way and for pedestrians only over the A449. The risk of a pedestrian/cyclist crossing into the path of an approaching vehicle is therefore increased. Also, once the West Midlands Rail Freight Interchange is completed, traffic flows are likely to increase therefore reducing the potential gaps in traffic to allow pedestrians and cyclists to safely cross A449/Gravelly way. Should a collision occur between a cyclist or pedestrian and a vehicle, the severity of any injuries suffered is likely to be high.

Photo 5 – Existing controlled pedestrian/cycle facility over Gravelly Way

RECOMMENDATION

Ensure adequate pedestrian and cyclist crossing facilities are provided on the A449 and Gravelly Way taking into account the likely increases to traffic flows once the West Midlands Rail Freight Interchange is completed.

In order to respond to this recommendation, further changes have been proposed to the Highways England network. In addition to the proposed A449 roundabout, it is now proposed to introduce a traffic signal controlled TOUCAN crossing on the A449 to the south. In addition, it is proposed to introduce a further traffic signal controlled TOUCAN crossing on the proposed A449 / A5 link road (to the east of the proposed roundabout).

The purpose of these measures is to respond to the specific comment raised by the Stage 1 RSA at Problem J of the original RSA1 and comments received from HE, which requires that the continuity of traffic signal controlled crossings be maintained with the scheme, following the removal of the current traffic signal junction at A449 / Gravelly Way.

Having discussed with HE and their Consultants, these changes to the HE network are considered material. In accordance with GG119, paragraph 4.2.1, given that these changes showing the provision of the traffic signal controlled crossings are considered to reflect material changes to the highway works that were the subject of the original RSA1, it is necessary that they be considered by a new RSA1.

Therefore, this new RSA1 (Rev G) will only consider the new location of the signalised pedestrian crossing in Gravelly Way.

2.1.6. The Audit Team initially visited together the site of the West Midlands Interchange on the 14th November 2017 between 11am and 2pm. During the site visit the weather was fine and overcast and the existing road surface was dry. Traffic conditions were free flowing although traffic management was in operation along the A449 due to ongoing improvement works at the A449/Gravelly Way junction.

2.1.7. An additional site visit was carried out on the 16th August 2018 between 10:30am and 12 noon. During the site visit the weather was fine and the existing road surface was dry. Traffic conditions were free flowing although traffic management was in operation along the A449 due to grass cutting along the A449 verge. The additional site visit was requested for the road safety audit

team to review the proposed improvement works to the signalised cross roads at the A449/Gravelly Way junction which will be replaced with a roundabout. The audit team were also specifically requested to consider the amended access arrangements serving the Avenue Cottages and the exit visibility of the proposed A5 roundabout to Harrisons Lane.

2.1.8. A previous site visit for this road safety audit was carried out on the 6th June 2019 between 11am and 1pm. During the site visit the weather was fine and the carriageway surface was dry. Traffic conditions were free flowing. One pedestrian was observed at the bus stop, but no cyclists were noted

2.1.9. A further site visit for this Road Safety Audit (Rev G) was undertaken on 28th August 2019 between 11am and 12:30pm. During the site visit the weather was fine turning to torrential rain, which the road surface going from dry to wet in minutes. Traffic conditions were free flowing, no pedestrians and cyclists were observed at this time.

2.1.10. All comments and recommendations are referenced to the supplementary preliminary design drawings and the locations have been indicated on the plan supplied with the Supplementary Road Safety Audit Brief and are located in Appendix B.

2.1.11. The terms of reference of the Road Safety Audit are as described in the Design Manual for Roads and Bridges (DMRB) Standard GG 119 Road Safety Audit.

2.1.12. 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.

2.1.12 Nine departures from Standards have been identified. These relate to

- Stopping site distance to Marina access.
- Stopping site distance to a single residential access on the A5
- Visibility to the right from Marina access
- Visibility to the right from the residential access on the A5
- Distance from adjacent junction of proposed lay-bys
- Distance from adjacent junction of proposed bus lay-bys

Applications for Departures from Design Standard have been submitted, however these have been rejected by Highways England Safety and Engineering Services pending the receipt of further information which is currently being prepared by the Design organization, prior to it being submitted in draft to the Project Sponsor.

A further potential departure has been identified at the proposed A5 roundabout and may be a potential hazard that requires consideration. This is in relation to exit visibility from the roundabout to Harrisons Lane that is located to the east of the proposed A5 roundabout.

No update was given with regards to the Departures from Design Standards

Audit administration

This Audit Report has been submitted to the Overseeing Organisation for consideration. A copy of this RSA report should then be passed onto the design organisation to allow a RSA response report to be produced. This should be completed within 1 month of the issue of the RSA report and the Overseeing Organisation should then provide a copy to the RSA team for information.

The Overseeing Organisation is responsible for identifying any misinterpretations of the highway scheme proposals or if any problem or recommendation is not accepted.

Safety issues identified during the audit and site inspection which the Terms of Reference exclude from this report, but which the audit team wishes to draw to the attention of the Overseeing Organisation, will be set out in a separate letter. Maintenance issues should be reported directly to the maintaining agent.

2.1 PURPOSE OF THE SCHEME

West Midlands Interchange is a Strategic Rail Freight Interchange being developed at land located at Four Ashes. The Site is located south west of the M6 Junction 12 and is bordered by the A5 to the north of the Site and the A449 to the west of the Site. The road safety audit will assess infrastructure proposed on the strategic road network which will enable access to the site and provide mitigation to the SRN through the introduction of a new link road connecting the A5 and A449 bypassing the Gailey Roundabout, which will be adopted by Staffordshire County Council. This includes:

- a new roundabout on the A5, providing access to the Site (GA-107 Rev B);
- Modification to the existing traffic signal control junction of A449 / Gravelly Way to provide a replacement roundabout providing access to the Site, including relocation of bus laybys (GA-103 Rev G).
- Replace the laybys on the A5 with new laybys on the A449 (GA-105 Rev A).
- Banning of a right turn on the A449 into Station Drive (GA-101 Rev A).
- A449 Cycleway/Footway (GA-106 Rev B, 105 Rev A,103 Rev G,102 Rev A and 101 Rev A).
- Proposed footway works on the A5 (GA-106 Rev B and 107 Rev B).

The A5 bordering the north of the Site has a number of residential dwellings and other properties with direct frontage access distributed on both the northern and southern sides of the carriage. The location of the proposed roundabout on the A5 has been chosen to be as far as possible from M6 J12 but avoid the canal which runs underneath the A5 which is a conservation area. The proposed roundabout on the A449 will replace the signalised junction which has recently been constructed.

A separate road safety audit has been completed assessing the complementary infrastructure within Staffordshire County Council control.

During the Road Safety audit carried out in September 2018, the project sponsor specifically asked the road safety audit team to consider certain aspect of the proposals. These are outlined below:

The RSA Team have been requested by the Project Sponsor to take account of the proposal to convert the Crateford Lane arm of the proposed A449 roundabout to one way in a west to east direction. The purpose of this proposed alteration is to prevent A449 traffic travelling north bound from using Crateford Lane to avoid A5/A449 roundabout (The Gailey Roundabout) during

times of congestion. The unbalanced traffic flows at the new roundabout would potentially reduce gaps for vehicles waiting at the Crateford Lane Arm which does raises Highway safety concern.

In response – The road safety audit team have considered the conversion of Crateford Lane to one-way and have raised road safety issues within this report.

The junction of A449/Gravelly Way has recently been reconfigured in order to convert the junction from priority to control to traffic signal control. The new arrangement provides signal controlled pedestrian and cycle crossing facilities on the northern arm of the junction. The proposed A449 roundabout would see the signal controlled crossings removed and which would be replaced with uncontrolled crossing facilities, connecting to the central reservation. These pedestrian crossing facilities are proposed to be provided on the southern arm of the junction and would connect to the proposed replacement bus stops that form part of the highway works that are the basis of this Safety Audit brief. The Auditors are specifically requested to consider the highway safety implications of the removal of the signal controlled crossing provided by the existing junction arrangement to be replaced by uncontrolled crossing facilities. This will require a second site visit to be undertaken by the Auditors due to the works being undertaken during the initial site visit.

In response – The road safety audit team have carefully considered the junction improvement works and issues have been identified within this report.

The RSA team should be aware that the introduction of the proposed A449 roundabout junction will require changes to the earthworks that have been constructed in order to deliver the A449 / Gravelly Way traffic signal junction. At this stage, the design work in relation to this area of the proposed A449 roundabout has yet to be undertaken and would be expected to be carried out at the detailed design stage.

In response – This will be reviewed during the stage 2 road safety audit

In addition, the Auditors are specifically requested to consider the amended access arrangements serving the Avenue Cottages left in / left out junction to the east of the A5 roundabout, as shown on WSP-70001979-GA-107 Rev B - General Arrangement Plan. A west bound running lane width of 3.5m together with hard strips has been provided, which is sufficient to accommodate the largest vehicle that will use the junction arrangement, in accordance with TD41/95.

In response - The road safety auditors have considered the amended access arrangements and have no road safety comments at the preliminary design stage.

A potential departure from standard has been identified at the proposed A5 roundabout and may be a potential hazard that requires consideration. This is in relation to exit visibility from the roundabout to Harrisons Lane that is located to the east of the proposed A5 roundabout.

In response - The audit team have considered the exit visibility from the A5 roundabout to Harrisons Lane and currently have no road safety concerns at this time, as presented. There appears to be adequate forward visibility from the roundabout to Harrisons Lane considering a number of factors including the verge between Harrisons Lane and the A5 roundabout, and the A5 roundabout itself, if these are to be planted with grass only there shouldn't be an adverse effect of driver's visibility. Therefore, drivers wishing to turn left out of Harrisons Lane will have

adequate visibility of vehicles approach westbound along the A5. The roundabout should also act as a traffic calming feature therefore potentially slowing vehicles down within the 50mph speed limit. The collision data supplied to the audit team show only 1 collision at the junction of the A5 and Harrisons Lane. This involved a vehicle attempting a right turn manoeuvre out of Harrisons Lane into the path a vehicle travelling westbound along the A5. This resulted in a collision where the occupants suffered slight injuries. With the provision of the kerbed central island on the A5 across Harrisons Lane, the right turn out (and right turn in) manoeuvres would no longer be possible.

Also considered is that Harrisons Lane is a cul-de-sac and only appears to serve a handful of properties. Therefore, traffic flows in and out are likely to be very low. The preliminary drawing shows a westbound single lane exit from the new A5 roundabout. If, at the detailed design, this becomes a two lane exit then this may increase the risk of a collision between a vehicle exiting the roundabout and with a vehicle entering or exiting Harrisons Lane.

Although the road safety audit team don't consider there be a road safety issue with the A5 roundabout/Harrisons Lane at the preliminary design stage (as presented), the Harrisons Lane junction should be reviewed once again during the stage 2 road safety audit, once the detailed design has been completed, especially the planting and road marking drawings.

This new RSA1 (Rev G) will only consider the new location of the signalised pedestrian crossing in Gravelly Way.

3 PROBLEMS IDENTIFIED IN PREVIOUS ROAD SAFETY AUDITS

3.1.1 A Stage 1 Road Safety Audit was completed in October 2014 at the A449 Bericote, Four Ashes junction.

3.1.2 A Stage 2 Road Safety Audit was completed in September 2016 at the A449 Bericote, Four Ashes junction.

3.1.3 The Stage 3 Road Safety Audit was completed in February 2018 at the A449 Bericote, Four Ashes junction (signalised crossroad layout). The issues raised are detailed below along with the designers' response:

General

3.1.4 Problem

Location: Gravelly Way

Summary: Risk for various types of collisions for vehicles entering the junction from Gravelly Way

It was observed during the site visit that the signals on the Gravelly Way did not operate accordingly whereby the red aspect was running for a very long time. This resulted in motorists having to ignore the red aspect of the signals in order to enter the junction and could result in potential collisions with vehicles travelling on the A449 or from Crateford Lane as the motorists are not aware of the other signals aspects. This is of particular concern for vehicles turning right as they would have the most potential conflicts. It was also observed that the pedestrian phase over the A449 Northbound appeared to be permanently demanding, resulting in driver frustration for other approaches. This issue was already raised with the traffic signals team and is pending to be resolved.

Recommendation

The signal staging should be amended as per the traffic signal controller work specification and configuration form issued to the audit team.

Designer's Response: This issue was identified during the audit and the traffic signal designers (Julian Smith's team at Kier) were notified of it immediately. It is understood they have since attended site and rectified this issue.

3.1.5 Problem

Location: Gravelly Way

Summary: Orientation of signal poll could be misleading to motorists who may attempt to enter the junction on a red aspect leading to various collisions. One of the secondary signal pols for the A449 southbound right turn was incorrectly orientated and was facing traffic coming out from Gravelly Lane. If motorists waiting at Gravely Lane stop line would believe that it is the secondary signal for this junction, then they could enter the junction on a red aspect without being aware of it and could lead to various types of collisions such as side swipe or side impact collisions. It

was determined on site that the signal pole was loose and was rotated to face the correct direction. This issue was already raised and is pending to be resolved.

Recommendation

The signal pole to be adequately tightened facing the correct direction as soon as possible.

Designer's Response: This issue was identified during the audit and the pole was rotated to the correct aspect there and then. However, this is only a temporary fix, the NAL socket in which the pole is mounted requires a restraining bolt to be fitted. We understand this issue has been raised with the signals sub-contractor and is being addressed.

3.1.6 Problem

Location: A449 Southbound crossing

Summary: Push button mounted to low could discourage pedestrians to use it which would have an increased risk in vehicle/pedestrian conflicts. The push button on the right-hand pole of the A449 northbound crossing was mounted too low, as it can be seen in Photo 3.

The location of the push button could discourage NMU's to use it as it is uncomfortable to be operated. Moreover, visual impaired pedestrians would find it even more difficult as they would have to wait for the tactile rotator in an uncomfortable position. As a result, there could be an increased risk in vehicle/pedestrian conflicts.

Recommendation

The push button unit should be relocated at the adequate height.

Designer's Response: Agreed - We understand this issue has been raised with the signals sub-contractor and is being addressed.

3.1.7 Problem

Location: Maintenance bay

Summary: Risk of trip and fall with inherited injuries for operatives using the maintenance bay.

The kerbing drawing issued to the Audit Team shows that the edging kerb is to be flushed with the footway surface. During the site visit it was observed that the edging kerb along the maintenance bay has a raised upstand. Operatives using the maintenance bay could trip on the kerb raised upstand which

could lead to potential injuries especially if they carry tools. This event is exacerbated during the hours of darkness where the upstand would be more difficult to be observed.

Recommendation

The kerbing along the maintenance bay should be flushed with the footway and the grass crated area.

Designer's Response: We acknowledge this point; however, we consider it even more important to protect pedestrians from (and alert them to) the trip hazard of the uneven (grass-crete) surface to the bay by means of the raised edging. Maintenance operatives will be aware

of the raised edging having driven over it, will be trained to be aware of and assess their surroundings, and will typically be wearing PPE including safety boots.

By contrast pedestrians, in particular those with visual impairments walking along this length of footway will not have such benefits. As such we consider the raised edging to be a useful feature, to ensure that pedestrians do not “stray” into the maintenance bay as they might if the delineation were flush between the two surfaces. A raised edging at the back of a footway is a commonly used feature and as such we do not consider it to

be a particularly hazardous feature for the maintenance operatives to encounter in their day to day activities.

Road Signs, Carriageway Markings and Lighting

3.1.8 Problem

Location: A449 Northbound ADS

Summary: Risk of nose to tail and side swipe collisions due to obstructed ADS.

The ADS sign on the northbound approach to the junction is hidden behind the trees as it can be seen in photo 4 below. There is the risk for motorists to not observe the sign until they are very close to it which could lead to sudden breaking and potential nose to tail collisions with traffic behind. Furthermore, if the motorists would not see the sign at all, they would not be aware of the junction ahead, and there is the risk for the vehicles with the intention to turn right to be positioned in the first lane which would require crossing over two lanes in a short distance with the risk of side swipe collisions.

Recommendation

The ADS sign should be relocated and adequately positioned such that adequate sight lines and clearances are achieved. If not possible then the trees obscuring the sign should be removed.

Designer’s Response: Agreed – The sign is currently positioned at its minimum distance from the stop line of 150m so cannot be positioned further north. The guidance within LTN 1/94 Appendix A allows this distance to be increased to 225m, but we believe that other trees would then obscure visibility to the sign. Therefore, we propose that the situation is monitored through the current bird nesting season, after which the trees in question should be removed either by the Contractor, or by agreement with the Highways England maintaining agent for this length of the A449.

3.1.9 Problem

Location: A449 Northbound ADS and A449 Southbound ADS

Summary: ADS signs do not match with the road layout ahead and could lead to junction related collisions.

The two ADS signs installed on the A449 approach to the junction do not match with the road layout ahead. Motorists could believe that they are approaching a 'T junction' when in fact is a 'crossroad junction'.

Motorists travelling along the A449 northbound, unfamiliar with the road layout, would not be aware of a junction arm to the left. In the event of a traffic signals failure there is an increased risk of collision between vehicles travelling on the A449 northbound and vehicles exiting from Crateford Lane as vehicles traveling on the mainline would not expect vehicles from the left. Furthermore, vehicles travelling along the A449 southbound, unfamiliar with the road layout, would not be aware of a junction arm to the right until when they are potentially to close to the junction. There is the risk for the vehicles with the intention to turn right to be positioned in the first lane which would require crossing over two lanes in a short distance with the risk of side swipe collisions.

Recommendation

The ADS signs should be amended to reflect that the junction ahead is actually a crossroads.

Designer's Response: Agreed – However the arm of the junction in question (Crateford Lane) is a very minor road with minimal traffic flows. As such we propose to amend the sign by means of applying a small white rectangular patch of retro-reflective material to each one, to denote a small "stub" opposite the arm indicated for Four Ashes Park. The gap between the white vertical stem, and the white border is 150mm (4 stroke widths), so it is considered that a 75mm wide x 50mm deep rectangle would be sufficiently visible to correctly convey the form of the actual junction layout.

3.1.10 Problem

Location: Crateford Lane

Summary: Risk of junction overshoot collisions due to obstructed signs/signal heads

The nearside 60mph speed limit/ no stopping on the carriageway signs together with the nearside signal head are obscured by vegetation as it can be seen in Photo 8. Together with the fact that the offside signage is also part hidden due to the lamp column there is the risk for motorists to overshoot the junction resulting in collisions with traffic on the mainline.

Recommendation

The vegetation obscuring the signage/signal head should be cleared.

Designer's Response: Agreed - Staffordshire County Council (SCC) are responsible for maintaining Crateford Lane, including trimming/pruning of trees and vegetation as required to maintain visibility. This item will be dealt with as part of the routine SCC maintenance regime for the area. In the meantime, it is noted that whilst the sign may be obscured, both the primary and secondary signal heads are clearly visible, so it is considered that the risk of motorists overshooting the junction at this location is minimal.

3.1.11 Problem

Location: A449 Southbound

Summary: Risk of junction overshoot or nose to tail collisions if traffic signals warning sign not observed.

The traffic signals ahead warning sign must be illuminated. The southbound traffic signals ahead sign had the illumination lamp but it was not functioning during the night time sight visit as it can be seen from Photo 9 bellow. If the warning sign is not observed by motorists there is the risk to not expect the traffic signals ahead which could result in junction overshoot or hard braking and potential nose to tail collision

Recommendation

The traffic signals warning sign should be illuminated.

Designer's Response: Agreed - We understand this issue has been raised with the traffic signs sub-contractor and is being addressed.

3.1.12 An additional Stage 1 Road Safety Audit was completed in August 2018 at the A449 Bericote, Four Ashes junction in relation to the design alterations where the signalised crossroads is altered to a roundabout layout. The issues raised are detailed below:

GENERAL

3.1.13 PROBLEM A

Location: GA 101, GA105, GA106 - Northbound approach to Station Drive and approaches to proposed closures of central reserve gaps (both directions)

Summary: Restricted manoeuvres may cause driver confusion and hesitation resulting in shunt type collisions.

Detail: As part of this scheme, the northbound right turn manoeuvre from the A449 into Station Drive is to be prevented (see Photo1). Also, several central reserve gaps are to be closed. Without adequate advance signing and subsequent directional signing, drivers may become confused, resulting in hesitation and subsequent collisions.

Also, once the central reserve gaps are closed and agricultural vehicles can no longer turn right into and out of their fields, there is likely to be a number of slow agricultural vehicles looking for alternative opportunities to U-turn.

RECOMMENDATION

Ensure the restricted turning movements and the alternative diversions are adequately signed. Safe alternatives should be relayed to the users of the fields adjacent to the A449 once the gaps are closed.

Designer's Response (DRAFT): Agreed. Signage will be dealt with at detailed design. Turning opportunities for agricultural vehicles are available at Gailey Roundabout and the A449 / Gravelly Way roundabout but it is not anticipated to affect a large number of vehicles. Safety will be improved due to the removal of U-turn opportunities on the high-speed road by the closure of the three existing gaps in the central reservation.

3.1.14 PROBLEM B

Location: GA 106, GA 107 – A5 including Gailey Roundabout and proposed new roundabout.

Summary: Proposed development of the WMI site has the potential to increase the risk of collisions on the A5, especially at Gailey Roundabout.

Detail: Collisions data provided to the audit team as part of the RSA1 showed high numbers of collisions, including serious injury collisions, on the A5 at Gailey roundabout (see Photo 2) and along the A5 between Gaily Roundabout and its junction with Vicarage Road. The proposed development of the WMI is likely to increase traffic flows, especially HGVs, on the surrounding road network. The A5 is a major feeder road for traffic into and out of the WMI development and is likely to encounter increases in flows. However, improvement works are not proposed to the Gaily Roundabout to help mitigate the potential risk attributed to higher traffic flows and there is a risk that the already poor collision record, will get worse.

RECOMMENDATION

Collision investigation be carried out on this section of the A5 (including Gaily Roundabout) and remedial measures proposed to help reduce the possibility of an increase in collisions once the WMI development is completed.

Designer's Response (DRAFT): The A449 / A5 link road to be adopted by Staffordshire County Council will redirect traffic travelling between the A449 south of the development and the A5 route to the M6 via Junction 12, thereby reducing the risk of collisions. In addition, vegetation in the centre and around Gailey roundabout should be regularly maintained to ensure sufficient visibility is available at the junction. Appendix B (AADT Values) shows that the projected annual average daily traffic flows on the A5 and A449 approaching Gailey roundabout would be similar with and without the introduction of the development and A449 / A5 link road. Therefore, mitigation in respect of this Problem has already been provided by the proposed Development.

3.1.15 PROBLEM C

Location: GA103 – Proposed roundabout at the Crateford Lane junction with the A449

Summary: Proposed one-way of Crateford Lane is likely to increase traffic flows on Four Ashes Road and Claygates Road

Detail: As part of this scheme, Crateford Lane is to be made a one-way carriageway, with vehicles only being able to travel eastbound. Therefore, any traffic wanting to access Crateford, would have to use Four Ashes Road or Claygates Road. The drawings provided didn't show any improvement works on the surrounding road network, resulting from the introduction of the one-way system at Crateford Lane. These roads are very rural and narrow in nature and an increase in traffic flows could increase the risk of collisions on these roads.

RECOMMENDATION

Ensure the local road network is capable of safely absorbing any additional traffic flows resulting from the introduction of the one-way system.

Designer's Response (DRAFT): Crateford Lane is a minor single-track road which serves a small number of properties. By making Crateford Lane one-way, the possibility of using

Crateford Lane as a 'rat run' is reduced. Amending Crateford Lane to one way only is reflected in the strategic modelling that has been carried out. Appendix C (Traffic Turning Flows) shows the projected flows at the junction under different scenarios and which have been extracted from the Transport Assessment that has been prepared to support the DCO. Figures L1 and L2 show that the number of vehicles wishing to turn into Crateford Lane in the AM and PM peaks is 12 and 13 respectively. The impact of the development increases vehicles turning into Four Ashes Lane by 8 in the AM peak and 16 in the PM peak, which can be seen on Figures L5 and L6. It is deemed that the number of vehicles that will be displaced from Crateford Lane and the additional demand for vehicles to use Four Ashes Road will therefore be negligible. Figures L7 and L8 show that the development will create no additional demand for vehicles to use Crateford Lane or Four Ashes Road, in either direction.

PEDESTRIANS, CYCLISTS AND HORSE RIDERS

3.1.16 PROBLEM D

Location: GA 101, GA102 - A449 northward from its junction with Station Drive.

Summary: Users of the pedestrian and cycle facility may be at risk of collisions with errant vehicles on the adjacent carriageway.

Detail: On the southbound carriageway of the A449 there is a pedestrian and cyclist facility which runs adjacent to the carriageway (see Photo 3). A majority of this facility is set away from the edge of the carriageway with a strip of verge between the facility and the edge of carriageway. However, there is a section of the facility on the A449 southbound carriageway, to the north of its junction with Station Drive, where a 'buffer' zone between the facility and the edge of carriageway does not appear to exist.

The construction of the new West Midlands Interchange is likely to increase pedestrian and cyclist usage of the facilities. The A449 is subject to 60mph speed limit along this section of carriageway. The lack of a 'buffer' zone may increase the risk of a vehicle colliding with a cyclist or pedestrian using the facility and/or deterring cyclists or pedestrians from using the facilities.

RECOMMENDATION

Provide a safety zone between the pedestrian/cyclist facility and the edge of the carriageway.

Designer's Response (DRAFT): A 1m buffer between the carriageway was provided in the original submission of 70001979-GA-101 and 70001979-GA-102. Clarification was sought from Highways England on this point and the buffer has now been recognised by the Audit Team. See Appendix D (70001979-GA-101-E) and Appendix E (70001979-GA-102-E).

3.1.17 PROBLEM E

Location: GA 103 - Proposed roundabout at the A449/Gravelly Way junction

Summary: Reverse stagger in the pedestrian/cyclist crossing may increase the risk of a collision between pedestrians/cyclists and vehicles

Detail: On the southern arm of the proposed roundabout, there is a pedestrian/cyclist crossing facility within the central reserve (between the north and southbound carriageways of the A449). The facility has a 'right-left' stagger which results in pedestrians and/or cyclists attempting to cross the A449 with their backs to approaching vehicles. This may increase the risk of a pedestrian or cyclist attempting to cross the A449 into the path of an approaching vehicle resulting in a collision.

RECOMMENDATION

Provide a 'positive' stagger in the crossing.

Designer's Response (DRAFT): Agreed. The stagger in the junction has been reversed to become a 'positive' stagger. See Appendix F (70001979-GA-103-G).

3.1.18 PROBLEM F

Location: GA 106 – A5 pedestrian/cycle facility over the rail bridge.

Summary: The width of the pedestrian/cycle facility is reduced over the bridge and a lack of signing to warn them may increase the risk of pedestrians/cyclist colliding with each other or passing vehicles.

Detail: There are to be proposed pedestrian/cycling facility improvements along the eastbound carriageway of the A5. However, the facility over the rail bridge will not be improved and to remain as it currently is. This results in a reduced width facility over the rail bridge. Although a sign is proposed on the western side of the rail bridge to inform pedestrians/cyclists of the need to give way, no such information or warning signing is proposed at the eastern end of the rail bridge. This may increase the risk of a pedestrians/cyclist travelling westbound, failing to take care on the narrow facility, resulting in a collision with another pedestrian/cyclist travelling eastbound or being forced onto the A5 carriageway and then colliding with a vehicle.

RECOMMENDATION

Provide adequate signing on the eastern side of the rail bridge to inform pedestrians/cyclists of the reduced width of facility.

Designer's Response (DRAFT): Agreed. An additional sign will be placed on the eastern side of the rail bridge. The indicative location can be seen on Appendix G (70001979-GA-106-G). The exact positioning will be dealt with at the detailed design stage.

3.1.19 PROBLEM G

Location: GA 107 – A5 pedestrian/cycle facility over the canal bridge.

Summary: The width of the pedestrian/cycle facility is reduced over the bridge and lack of signing to warn them may increase the risk of pedestrian/cyclists colliding with each other or passing vehicles.

Detail: There are to be proposed pedestrian/cycle facility improvements along the eastbound carriageway of the A5. However, the facility over the canal bridge will not be improved and to remain as it currently is. This results in a reduced width facility over the bridge. Although

a sign is proposed on the eastern side of the canal bridge to inform pedestrian/cyclists of the need to give way, no such information or warning signing is proposed at the western end of the canal bridge. This may increase the risk of a pedestrian/cycle travelling eastbound, failing to take care on the narrow facility, resulting in a collision with another pedestrian/cyclist travelling westbound or being forced onto the A5 carriageway and then colliding with a vehicle.

RECOMMENDATION

Provide adequate signing on the western side of the canal bridge to inform pedestrian/cyclists of the reduced width of facility.

Designer's Response (DRAFT): Agreed. An additional sign will be placed on the eastern side of the canal bridge. The indicative location can be seen on Appendix H (70001979-GA-107-G). The exact positioning will be dealt with at the detailed design stage.

3.1.20 PROBLEM H

Location: GA 103 – A449 cycle facilities within the western verge

Summary: Lack of cycle facilities on the western verge of the A449 may increase risk of collisions between cyclists and pedestrians and/or vehicles.

Detail: The proposed pedestrian/cyclist facilities in the vicinity of the new roundabout include a combined cycle and pedestrian facility on the A449 eastern verge and also into Gravelly Way. However, the crossing facility over the A449 to the south the roundabout and the facility on the A449 western verge is intended for pedestrians only. The existing provision includes a combined cycle/pedestrian facility on the A449 western verge (see Photo 4) and the signalised crossings have cycle provision to allow the safe crossing of cyclists. Failing to provide adequate provision for cyclists could increase the risk of a cyclist colliding with a pedestrian when using the pedestrian facilities or with a vehicle due to the cyclist being forced onto the carriageway.

RECOMMENDATION

Provide adequate facilities for cyclists alongside the A449 and provide safe facilities for cyclists to cross over the A449.

Designer's Response (DRAFT): The existing provision for pedestrians and cyclists on the western side of the A449 is 2m wide. See Appendix I (C14877_255_P6 General Arrangement). To be consistent with the existing width of the pedestrian / cyclist provision on the western side of the A449, the design also provides a 2m wide footway / cycleway to the south of Crateford Lane. However, the crossing facility on the southern side of the A449 / Gravelly Road roundabout has now been widened to 3m. See Appendix F (70001979-GA-103-G). There is also a significant buffer between the cycleway / footway on the western side of the A449 and the carriageway itself. The provision of the 3m shared use footway / cycleway to the east of A449 will provide the primary cycle route towards WMI and along the A449 corridor to the north and the south for existing users. Consequently, it is the view of the designer that sufficient provision for cyclists alongside the A449 is provided, together with suitable crossing facilities.

3.1.21 PROBLEM I

Location: GA 103 – Central islands on Gravelly Way and its side roads

Summary: Proposed footway/cycleway central island does not appear wide enough to accommodate cyclists

Detail: There is a proposed combined footway and cycleway along the eastern verge of the A449. Where these facilities cross over Gravelly Way a central island has been provided to allow pedestrians or cyclists to wait in the centre of the junction for a safe gap in traffic. However, the central island does not appear to be of sufficient width to allow a cyclist to safely wait in them without there being a risk of collision with passing vehicles.

RECOMMENDATION

Ensure the central island is sufficient width to allow a cyclist to wait whilst being fully protected by the refuge.

Designer's Response (DRAFT): Agreed. The current crossing within the island has been adjusted to ensure that the current 4m width extends over a length of at least 3m. See Appendix F (70001979-GA-103-G).

3.1.22 PROBLEM J

Location: GA 103 – Proposed A449/Gravelly Way roundabout

Summary: Proposed removal of controlled crossing over A449 and Gravelly Way could increase risk of collisions between pedestrians/cyclists and vehicles.

Detail: The existing layout of the A449/Gravelly Way junction includes controlled crossing facilities over the A449 and Gravelly Way (see Photo 5). The proposed roundabout layout removes the controlled crossing facilities and provides uncontrolled crossing facilities for cyclists and pedestrians over Gravelly Way and for pedestrians only over the A449. The risk of a pedestrian/cyclist crossing into the path of an approaching vehicle is therefore increased. Also, once the West Midlands Rail Freight Interchange is completed, traffic flows are likely to increase therefore reducing the potential gaps in traffic to allow pedestrians and cyclists to safely cross A449/Gravelly way. Should a collision occur between a cyclist or pedestrian and a vehicle, the severity of any injuries suffered is likely to be high.

RECOMMENDATION

Ensure adequate pedestrian and cyclist crossing facilities are provided on the A449 and Gravelly Way taking into account the likely increases to traffic flows once the West Midlands Rail Freight Interchange is completed.

Designer's Response (DRAFT): The existing signalised pedestrian crossing is provided to accommodate the Forecast Daily A449 person movements to and from the Bericote development. Under current conditions, the main need for pedestrians to negotiate the A449 is to reach the bus stops to the west of the junction. The proposals for WMI is to divert the bus service through the site and provide a stop closer to the Bericote development and also the buildings provided by the Development. This means that the demand for the bus stop to the west of the A449 / Gravelly Way junction will be reduced. Therefore, there will be fewer people

crossing the A449 following construction of the West Midlands Interchange. Section 9 of the Transport Assessment details the reduction in pedestrian demand at this location and is provided at Appendix J (Section 9.14 of Document 6.2 ES Transport App 15.1 – Transport Statement). As it relates to cycle movement, the main desire line will be alongside the eastern side of the A449 given the improved facility that will be provided. It is therefore considered that the proposed design provides adequate pedestrian and cycle facilities at the A449 / Gravelly Way junction.

ROAD MARKINGS

3.1.23 PROBLEM K

Location: GA 107 – Proposed new roundabout on the A5.

Summary: Lack of road markings on the entries and/or exit arms may result in side swipe type collisions.

Detail: The proposed new A5 roundabout is to have three arms, each of which is to have two entry arms and one exit arm. None of the entry lanes have directional arrow or destination markings proposed. Therefore, drivers on the A5 wishing to continue straight-on at the roundabout, could do so in either lane 1 or lane 2. With only 1 exit lane this may result in side swipe collisions as both vehicles attempt to utilise the same carriageway space.

RECOMMENDATION

Provide directional arrows on the roundabout entries and 'tuck-in' arrows (where required) at the exits.

Designer's Response (DRAFT): Agreed. Directional arrows are shown on Appendix H (70001979-GA107-G).

SIGNING

3.1.24 PROBLEM L

Location: GA 107 – Proposed new roundabout on the A5.

Summary: Preventing vehicle access to Crateford Lane from the proposed roundabout may lead to driver hesitation and confusion.

Detail: As part of the proposed improvement works involving the roundabout construction, the ability to turn into Crateford Lane from this junction is to be prevented. Crateford Lane is to be made a one-way carriageway for vehicles to enter the roundabout only. Crateford Lane is currently two way. If drivers are not made aware of the change in access to Crateford Lane, it may result in confusion/hesitation on the proposed roundabout resulting in late lane change manoeuvres and side swipe/shunt type collisions.

RECOMMENDATION

Ensure adequate signage is provided to inform drivers that access will not be possible into Crateford Lane from the A449 and that alternative routes are signed.

Designer's Response (DRAFT): Agreed. Additional signage will be assessed during the detailed design stage. However, the risk of driver confusion is not significant due to the low traffic flows on Crateford Lane. Crateford Lane would generally be expected to be used by local traffic who are familiar with the area.

End of list of Problems identified and Recommendations offered in the additional Stage 1 Road Safety Audit

4 PROBLEMS IDENTIFIED IN THE SUPPLEMENTARY STAGE 1 ROAD SAFETY AUDIT

4.1.1 Problem

Location: Gravelly Way to the east of its junction with the A449 (see Appendix B)

Drawing Number: WSP-70001979-GA-103RevG

Summary: Risk of Pedestrians & Cyclist being struck by vehicles whilst crossing.

Detail: The existing pedestrian and cycle crossing over Gravelly Way, is located in close proximity to its junction with A449 and so non-motorised Users (NMUs) do not have to detour far from the desire line (if travelling northbound or southbound along the A449). However, the proposed signalised crossing is located somewhat further to the east along Gravelly Way and away from the north-south desire line (see Photo1). This may result in NMUs choosing to not use the crossing and instead chose to cross at places where there is no crossing facility. This may increase the result of a vehicle colliding with the NMU.

RECOMMENDATION

It is recommended that the proposed signalised crossing on Gravelly Way be located on the desire line for north-south (and vice versa) NMUs. If this is not possible then NMUs should be discouraged from crossing at any likely informal crossing locations.

Photo 1 – View from Gravelly Way at the proposed location of the new NMU crossing.

August 2019 Road Safety Audit review: Given the new location of the controlled crossing, the risk of NMUs choosing to not use the controlled signalised and instead choosing to cross at places where there is no crossing facility has been reduced, along with the risk of an NMU being struck by a vehicle whilst attempting such a crossing.

END OF PROBLEMS IDENTIFIED AND RECOMMENDATIONS FOR THIS SUPPLEMENTARY STAGE 1 AUDIT

5 PROBLEMS IDENTIFIED IN THE SUPPLEMENTARY STAGE 1 ROAD SAFETY AUDIT AUGUST 2019 (REV G)

5.1.1 Problem

Location: Gravelly Way to the east of its junction with the A449 (see Appendix B)

Drawing Number: 70001979-SK-108-A Demonstrative representation of signalised pedestrian crossing located 20m East of A449/Gravelly Way Roundabout

Summary: Risk of rear end shunt collisions or Vehicle/Pedestrian collisions in Gravelly Way at the new stop line of the proposed signalised crossing if the signals are not visible or adequately signed.

Detail: Due to the location of the proposed signalised crossing in Gravelly Way being relocated closer to the roundabout, drivers turning left into Gravelly Way would have less time to view the signals and subsequently brake should they be on a red phase. This is compounded if the forward visibility from the roundabout to the proposed signalised crossing is restricted by mature vegetation and trees. Therefore, there is a risk of rear end shunts or vehicle/pedestrian collisions at the stop line due to drivers not realising that there is a controlled crossing in Gravelly Way off the roundabout.

RECOMMENDATION

It is recommended that the proposed signalised crossing on Gravelly Way has adequate visibility from the A449 and/or the proposed crossing is adequately signed from all approaches to minimise the risk of conflict.

END OF PROBLEMS IDENTIFIED AND RECOMMENDATIONS FOR THIS SUPPLEMENTARY STAGE 1 AUDIT REV G

6 AUDIT TEAM STATEMENT

We certify that this audit has been carried out in accordance with GG 119.	
ROAD SAFETY AUDIT TEAM LEADER	
Name:	Neil Jones
Signed:	[redacted]
Position:	ITS Principal Consultant (Road Safety Engineering)
Organisation:	WSP
Date:	29/08/19
ROAD SAFETY AUDIT TEAM MEMBER(s)	
Name:	Lyn Turner
Signed:	[redacted]
Position:	ITS Principal Consultant (Road Safety Engineering)
Organisation:	WSP
Date:	29/08/19

Appendix A

DOCUMENT LIST

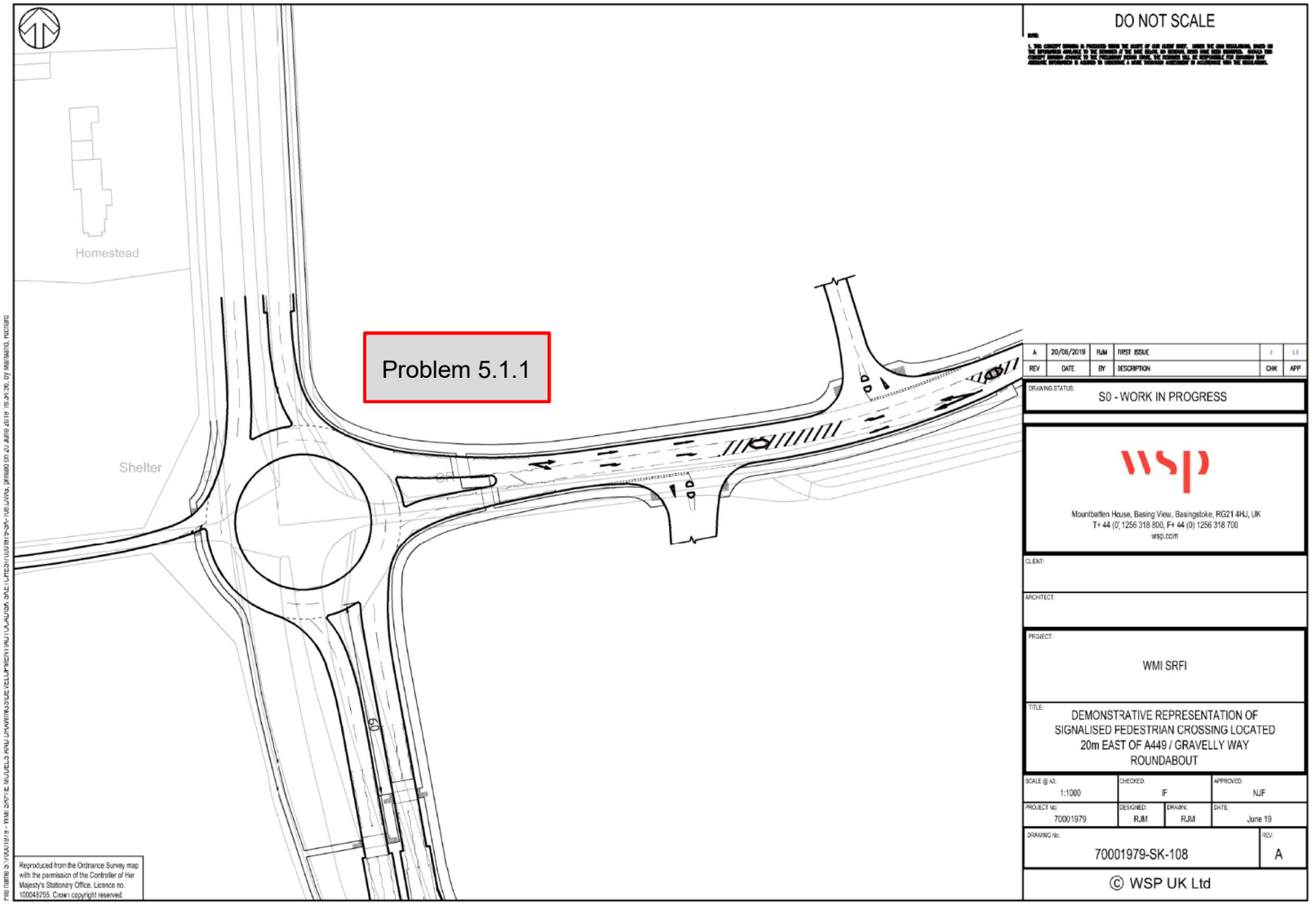
DOCUMENT LIST

Drawings:

70001979-SK-108-A - Demonstrative representation of signalised pedestrian crossing located 20m East of A449/Gravelly Way Roundabout

Appendix B

PROBLEM LOCATION PLAN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Homestead
Shelter
Problem 5.1.1
60
A 20/06/2019 RJM FIRST ISSUE
REV DATE BY DESCRIPTION CHK APP
DRAWING STATUS: S0 - WORK IN PROGRESS
Mountbatten House, Basing View, Basingstoke, RG21 4HJ, UK
T+ 44 (0) 1256 318 800, F+ 44 (0) 1256 318 700
wsp.com
CLIENT:
ARCHITECT:
PROJECT: WMI SRFI
TITLE: DEMONSTRATIVE REPRESENTATION OF SIGNALISED PEDESTRIAN CROSSING LOCATED 20m EAST OF A449 / GRAVELLY WAY ROUNDABOUT
SCALE @ A3: 1:1000
CHECKED: IF
APPROVED: NJF
PROJECT No: 70001979
DESIGNED: RJM
DRAWN: RJM
DATE: June 19
DRAWING No: 70001979-SK-108
REV: A
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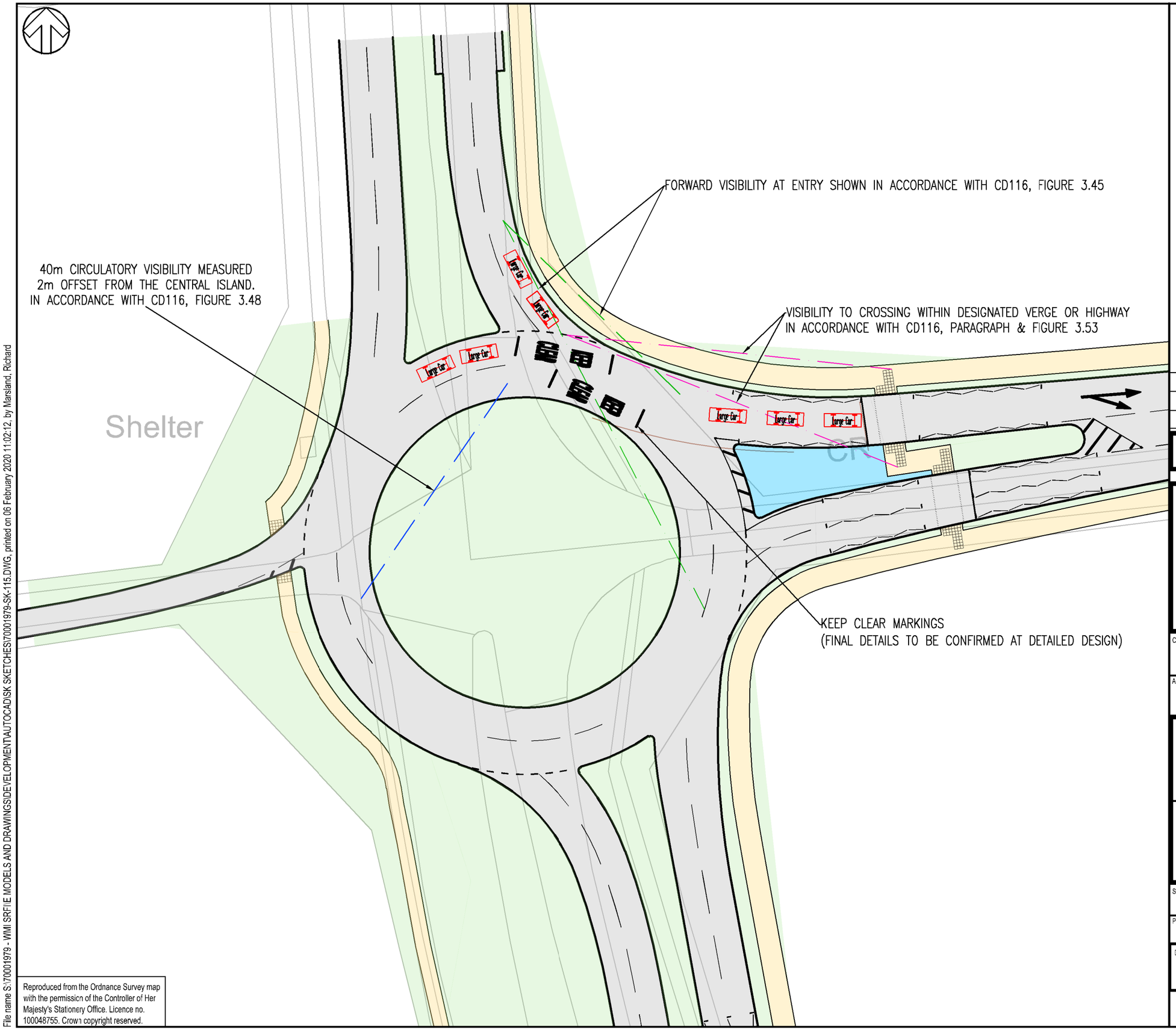
Annex 3



DO NOT SCALE

KEY

- FOOTWAY / CYCLEWAY
- ROAD
- VERGE / GRASS
- PEDESTRIAN DETERRENT SURFACE
- TACTILE PAVING
- VISIBILITY TO FULL WIDTH OF PEDESTRIAN CROSSING FROM A449 NORTH
- CIRCULATORY VISIBILITY ON APPROACH TO YELLOW BOX
- FORWARD VISIBILITY AT ENTRY

N.B. CIRCULATORY VISIBILITY DISTANCES MEASURED IN ACCORDANCE WITH CD116, TABLE 3.43

NOTE:

1. THIS CONCEPT DRAWING IS PRODUCED WITHIN THE SCOPE OF OUR CLIENT BRIEF. UNDER THE CDM REGULATIONS, BASED ON THE INFORMATION AVAILABLE TO THE DESIGNER AT THE DATE BELOW, NO RESIDUAL RISKS HAVE BEEN IDENTIFIED. SHOULD THIS CONCEPT DRAWING ADVANCE TO THE PRELIMINARY DESIGN STAGE, THE DESIGNER WILL BE RESPONSIBLE FOR ENSURING THAT ADEQUATE INFORMATION IS AQUIRED TO UNDERTAKE A MORE THOROUGH ASSESSMENT IN ACCORDANCE WITH THE REGULATIONS.

REV	DATE	BY	DESCRIPTION	CHK	APP
B	06/02/2020	RJM	YELLOW BOX CHANGED TO KEEP CLEAR MARKINGS	IF	NJF
A	04/02/2020	RJM	FIRST ISSUE	IF	NJF

DRAWING STATUS: S0 - WORK IN PROGRESS

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CLIENT:

ARCHITECT:

PROJECT: WMI SRFI

TITLE: PROPOSED A449 ROUNDABOUT & LINK ROAD CROSSING

SCALE @ A3:	CHECKED:		APPROVED:
1:1000	IF		NJF
PROJECT No:	DESIGNED:	DRAWN:	DATE:
70001979	RJM	RJM	February 20

DRAWING No: 70001979-SK-115 REV: B

File name S:\70001979 - WMI SRFI\E MODELS AND DRAWINGS\DEVELOPMENT\AUTOCAD\SK SKETCHES\70001979-SK-115.DWG, printed on 06 February 2020 11:02:12, by Marsland, Richard

Annex 4

Table 4 – A449 Pedestrian Crossings – 14:00-15:00 Shift Change Hour

Arm	2021 Base + Dev. Basic traffic split to NS / OS southbound. 60 sec cycle time.		2021 Base + Dev. Gravelly Way traffic to NS southbound. 60 sec cycle time.	
	Deg Sat	Max Q	Deg Sat	Max Q
Northbound	36.9%	5	36.9%	5
Southbound	36.0%	5	48.9%	6

Source: LINSIG Output

Table 5 – A5 / A449 Link Road (Gravelly Way) Pedestrian Crossings – AM Peak Hour

Arm	2021 Base + Dev. 120 sec cycle time.		2021 Base + Dev. 60 sec cycle time.	
	Deg Sat	Max Q	Deg Sat	Max Q
Eastbound	34.9%	5	42.4%	5
Westbound	16.2%	2	19.9%	2

Source: LINSIG Output

Table 6 – A5 / A449 Link Road (Gravelly Way) Pedestrian Crossings – PM Peak Hour

Arm	2021 Base + Dev. 120 sec cycle time.		2021 Base + Dev. 60 sec cycle time.	
	Deg Sat	Max Q	Deg Sat	Max Q
Eastbound	38.5%	6	46.7%	6
Westbound	20.8%	3	25.7%	3

Source: LINSIG Output

Table 7 – A5 / A449 Link Road (Gravelly Way) Pedestrian Crossings – 13:00-14:00 Shift Change Hour

Arm	2021 Base + Dev. 60 sec cycle time.	
	Deg Sat	Max Q
Eastbound	36.5%	4
Westbound	17.4%	2

Source: LINSIG Output

Table 8 – A5 / A449 Link Road (Gravelly Way) Pedestrian Crossings – 14:00-15:00 Shift Change Hour

Arm	2021 Base + Dev. 60 sec cycle time.	
	Deg Sat	Max Q
Eastbound	40.2%	5
Westbound	26.7%	3

Source: LINSIG Output

6.2 In all scenarios it can be seen that the crossings would operate satisfactorily and modelled queue lengths can be accommodated within the available link lengths.

7 SUMMARY

7.1 In summary, it can be seen that an appropriate signal controlled pedestrian / cycle crossing can be provided on the southern arm of the proposed A449 roundabout. This crossing can be provided in a way which does not result in the need for departures from design standard and does not result in any adverse queuing on the A449 in any scenario.

7.2 Consideration has also been given to the provision of a signal controlled crossing on Gravelly Way – this being the A449 / A5 Link Road. This crossing can also be provided in a way which does not result in the need for departures from design standard and does not result in any adverse queueing in any scenario on the proposed A449 / A5 Link Road.

7.3 Therefore, it can be seen that appropriate crossing facilities can be provided in order to serve the travelling public.

Annex 5

Key
00 Total Vehicles
Site
New road

A449
M6
A5
J12
A5
Crateford Lane
Site Road
Vicarage Road
Vicarage Road
M6
Straight Mile
Four Ashes Road
Station Drive
A449

256 537 95 A5
349 694 130
819 47
252 571 382
308 433
937 175
73 616 215
134 420 184
14 390
727 442
446 118
345 414 79
77 83
765 450
325 167
362 108
45 42
10 13 5
0 902 62
19 0 204
0 868 489
13 0 51
127 447 55
14 88 38
8 0 19
459 2
132 41
9 119
69 128 56
12 1056 208
15 55 584
20 1436 0

Data Source: HE VISSIM Model

West Midlands Interchange
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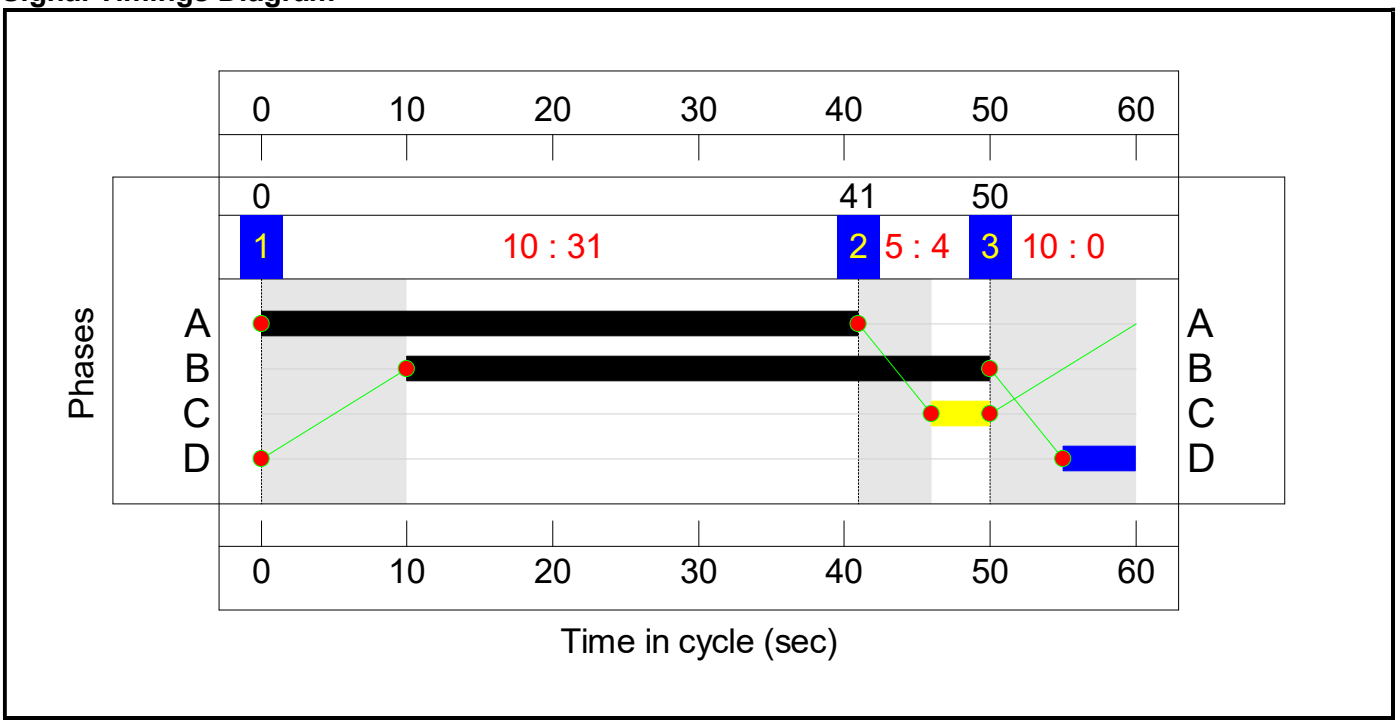
TITLE
2021 SCHEME, AM PEAK HOUR (0800-0900), ALL VEHICLE TRAFFIC FLOWS
Version 3, 09/10/2017

FIGURE No:
FIGURE T5

S:\70001979 - WMI SRFI\D Design and Analysis\Development\SPREADSHEETS\WMI Flow

Annex 6

Signal Timings Diagram



Scenario 4: '2021 PM Peak + Dev. 60 sec cycle time.' (FG2: '2021 PM Peak + Dev', Plan 1: 'Network Control Plan 1')

Traffic Flows, Actual

Actual Flow :

		Destination		
		A	B	Tot.
Origin	A	0	692	692
	B	371	0	371
	Tot.	371	692	1063

Phase Timings

Phase Name	Description	Phase	Green Period 1		
			Total Green	Start Time	End Time
A	Gravelly Way Eastbound Ahead	Traffic	41	0	41
B	Gravelly Way WB Ahead	Traffic	40	10	50
C	Pedestrians across	Pedestrian	4	46	50
D	Pedestrians across	Pedestrian	5	55	0

TA Report

Link Results

Item	Lane Description	Lane Type	Controller Stream	Position In Filtered Route	Full Phase	Arrow Phase	Num Greens	Total Green (s)	Arrow Green (s)	Demand Flow (pcu)	Sat Flow (pcu/Hr)	Capacity (pcu)	Deg Sat (%)	Arriving (pcu)
Network: Gravelly Way (A449 / A5 Link Road)	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**46.7%**	**-**
Gravelly Way Signal Crossing	**-**	**-**	**N/A**	**-**	**-**		**-**	**-**	**-**	**-**	**-**	**-**	**46.7%**	**-**
1/1	Gravelly Way Eastbound Ahead	U	N/A	N/A	A		1	41	-	692	2115	1481	46.7%	692
2/1	Gravelly Way WB Ahead	U	N/A	N/A	B		1	40	-	371	2115	1445	25.7%	371
Ped Link: P1	Unnamed Ped Link	-	N/A	-	C		1	4	-	0	-	0	0.0%	0
Ped Link: P2	Unnamed Ped Link	-	N/A	-	D		1	5	-	0	-	0	0.0%	0

Item	Leaving (pcu)	Turners In Gaps (pcu)	Turners When Unopposed (pcu)	Turners In Intergreen (pcu)	Uniform Delay (pcuHr)	Rand + Oversat Delay (pcuHr)	Storage Area Uniform Delay (pcuHr)	Total Delay (pcuHr)	Av. Delay Per PCU (s/pcu)	Max. Back of Uniform Queue (pcu)	Rand + Oversat Queue (pcu)	Mean Max Queue (pcu)	Back of Uniform Q At End of Red(pcu)	
Network: Gravelly Way (A449 / A5 Link Road)	**-**	**0**	**0**	**0**	**1.1**	**0.6**	**0.0**	**1.8**	**-**	**-**	**-**	**-**	**-**	
Gravelly Way Signal Crossing	**-**	**0**	**0**	**0**	**1.1**	**0.6**	**0.0**	**1.8**	**-**	**-**	**-**	**-**	**-**	
1/1	692	-	-	-	0.8	0.4	-	1.2	6.3	5.0	0.4	5.4	3.1	
2/1	371	-	-	-	0.4	0.2	-	0.5	5.3	2.4	0.2	2.5	1.8	
Ped Link: P1	0	-	-	-	-	-	-	-	-	-	-	-	-	
Ped Link: P2	0	-	-	-	-	-	-	-	-	-	-	-	-	

C1 PRC for Signalled Lanes (%): 92.6 Total Delay for Signalled Lanes (pcuHr): 1.76 Cycle Time (s): 60
PRC Over All Lanes (%): 92.6 Total Delay Over All Lanes(pcuHr): 1.76