

Siemens Mobility – Intelligent Traffic Systems
Technical Note

Lambra Road / Access Road, Barnsley
Henry Boot Construction
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1 Introduction

1.1 Document Scope

1.1.1 This document provides a traffic signal design pack for the provision of a traffic control system at Lambra Road / Access Road, Barnsley in accordance with Barnsley Metropolitan Borough Council (BMBC) specification and contains:

- Design Considerations
- Design Risk Assessment

1.2 Project Overview

1.2.1 Siemens has been instructed to complete traffic signals design for 2 new junctions on Lambra Road in Barnsley

1.3 Design Brief

1.3.1 To produce a detailed traffic signal design, including all associated documentation, in accordance with our responsibilities as CDM designer.

1.4 Related Documents

1.4.1 This document supports the following documents:

- Traffic signal design drawing(s) - 857494982-SIE-00-XX-DR-Y-0001
- Controller Specification(s) - 857494982-SIE-00-XX-SP-Y-0001

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2 Design Considerations

2.1 Personnel

2.1.1 The key personnel involved in the traffic signal design hold all relevant and necessary qualifications. Competence of staff is established under Siemens' QA procedures.

2.2 Scheme Safety Argument

2.2.1 The following safety argument is intended to;

- make the case that potential hazards have been reduced to an acceptable level;
- establish that any aspects of the scheme outside the scope of, or not in accordance with, Departmental Advice, Standards or TSRGD are adequately safe;
- justify the speed related design standard applied to the scheme

Potential Hazards

2.2.2 A design risk assessment has been completed detailing a list of possible hazards and an assessment of the risks posed using the severity × likelihood = risk factor methodology (refer to section 3 Design Risk Assessment for further details). Steps have been taken to ensure, where reasonable and practical, risks are eliminated from the design.

2.2.3 Where eliminating risk has not been possible and the risk factor is evaluated to be higher than an acceptable level, proposed control measures have been introduced to control the risk. For a full list of residual hazards, refer to paragraph 3.4.1, Residual Risks.

Speed Related Design

2.2.4 A cruise speed survey was carried out on site. Wesley Road was found to have an 85th percentile speed of 11.88 ms^{-1}, and Lambra Road westbound had an 85th percentile speed of 14.33 ms^{-1}.

2.2.5 Whilst an informal speed survey has been completed, it is not a substitute for a detailed speed survey to determine an accurate 85th percentile speed. This is required to confirm various elements, such as, but not limited to;

- Site stopping distance (forward visibility)
- Detector type
- Speed detection requirements
- Signage requirements and locations

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Traffic signal layout

2.2.6 Each approach has 2 primaries and 1 secondary signal, as there are several issues with signal visibility. Each phase has standard operation, with opposed right turns. The pedestrian crossings will all use near-sided signals, with tactile and audible units to be installed.

Method of control and detection

2.2.7 This junction will be controlled using MOVA, with MOVA loops on all approaches except from the access road, which will use an MVD for vehicle detection. It will also be configured to operate under SCOOT control, with SCOOT loops on the access road, at the top of Wesley Road, and on the eastbound approach of Lambra Road. The SCOOT loop on Lambra Road Westbound isn't shown on this drawing, as it will be installed as part of the Pontefract Road / Lambra Road project. The Access Road will also have a call-cancel queue loop, and the MOVA IN loop on Wesley Road will also operate as a queue loop, to give priority to Wesley Road when it is backing up towards the roundabout.

Intergreens

2.2.8 Vehicle to vehicle intergreens have been calculated in accordance with the Department for Transport Traffic Advisory Leaflet 1/06 General Principles of Traffic Control by Light Signals (TAL 1/06). Intergreens between traffic and pedestrians have been calculated in accordance with TAL 5/05 Pedestrian Facilities at Signal Controlled Junctions. Calculated intergreens have been assessed and adjusted by an experienced traffic signal design engineer to suit local conditions.

Red Lamp Monitoring (RLM)

2.2.9 On detection of a RLM1 fail in the controller, an additional 2 seconds will be added to the intergreen from the traffic phase to any conflicting pedestrian phase.

2.2.10 On detection of a RLM2 fail in the controller, any pedestrian phase that conflicts with the traffic phase will be inhibited.

Passive / Non-passive poles

2.2.11 A pole risk assessment has been carried out to determine whether the use of passive equipment is appropriate at this site. The assessment evaluates the relative risk of traditional steels poles vs. passive poles taking account of pedestrian presence and environmental conditions such as location of the pole, equipment on the pole, likely speed of vehicles etc. If the assessment shows a limited benefit from one to the other, economic factors are introduced to help determine the most suitable solution for this site. The pole risk assessment is an electronic document which can be provided on request.

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2.2.12 The passive pole risk assessment completed for this site has determined that there is no requirement for passively safe poles.

2.3 Standards and Approvals

2.3.1 The proposed layouts are in accordance with the Departmental Advice, Standards, the TSRGD and BMBC specification, except with regards to the following:

- TD 50/04 – Intervisibility zone
- TD 50/04 - Visibility of at least one primary traffic signal head
- TD 9/93 – Stopping Sight Distance

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3 Design Risk Assessment

3.1 General

3.1.1 A design risk assessment (DRA) has been completed to assess and consider the implications of the proposed traffic signal design with regards to safety. The risk assessment considers the severity and likelihood of a hazard to cause harm or loss in the form of a risk factor.

3.1.2 Any hazards with a risk factor of 8 or below are deemed to be at an acceptable level of risk. Any hazards above are considered unacceptable and a control measure should be introduced to reduce the likelihood of a hazard causing harm or loss.

3.1.3 Where reducing the risk factor to a level of 8 or below has not been possible, even after the introduction of a control measure, the hazard in question is deemed as having a residual risk associated with it. All hazards within the DRA which have a residual risk are listed in section 3.4 of this document.

3.1.4 Where residual risks have been identified, they are distinguished on the drawing with a hazard symbol, as shown in Figure 1.



Figure 1

3.1.5 There may be other hazards identified in the DRA which, although brought down to an acceptable risk factor, it is felt are worth highlighting. These hazards are listed in section 3.5 of this document.

3.2 Severity Explained

No injury or loss (1)

3.2.1 In effect this is a near miss.

Minor injury or loss (2)

3.2.2 A minor injury can be treated using first aid and does not result in lost time beyond the application of first aid. Minor loss would be any costs incurred by the incident which together amount to less than £100.

Significant injury or loss (3)

3.2.3 A significant injury to be treated using professional medical attention and would result in lost time beyond the application of medical assistance. Significant loss would be any costs incurred by the incident which together fall between £100 and £2,500.

Major injury or loss (4)

3.2.4 Any reportable accident resulting in permanent injury or disfigurement is considered as a major injury. Major loss would be any costs resulting from an incident which together fall between £2,500 and £10,000.

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Fatality (5)

3.2.5 Any incident resulting in a fatality or losses in excess of £10,000 is considered as a severity 5 incident.

3.3 Risk Factor

3.3.1 The risk factor is calculated as:

Risk Factor = Severity × Likelihood

Severity	Likelihood: Very Unlikely (1)	Unlikely (2)	Possible (3)	Likely (4)	Very Likely (5)
1	1	2	3	4	5
2	2	4	6	8	10
3	3	6	9	12	15
4	4	8	12	16	20
5	5	10	15	20	25

Low risk	Medium risk	High risk

3.4 Residual Risks

3.4.1 Any residual risks identified as part of the design risk assessment are detailed below.

Hazard Identified	**Initial Risk Rating**	**Control Measure**	**Revised Risk**
D1 - Horizontal alignment Whilst the southern and eastern approaches are straight, the northern Lambra Road and Access Road approaches, although having slow approach speeds due to the alignment, have sharp bends on the approaches which restricts forward visibility to the traffic signals, particularly on the Access Road approach.	15	Additional off-side primary signals have been provided for both phases A and D which will help with visibility of signals. A 6m pole with high level repeater signal has also been provided on Pole 5 (nearside primary for Phase D). Also, slow approach speeds will help to mitigate this hazard.	10

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D2 - Vertical alignment Wesley Street approach is on a fairly steep downward gradient but this won't obstruct the signals. The new car park ramp with retaining wall to be added on the Access Road could cause visibility hazards, depending on its dimensions.	20	A 6m pole with high level repeater is to be used as phase A nearside primary signal (Pole 5) to improve forward visibility of the traffic signals on the Access Road approach.	15
D6 - See through issues Nearside pedestrian signals will be used, and orientated at 30 degrees so that drivers won't be able to see them. All 4 pedestrian phases will start and end at the same time. Drivers waiting on the access road may assume that the green signal gives them right of way over the car park exit.	15	Give Way white lining should be regularly maintained to ensure that right of way is clear. A give way sign to diag. 602 and louvres on the amber and green aspects of the primary signals on this approach should be considered.	10
D11 - Private access affected Slow-moving loading vehicles entering the loading bay on the Lambra Road north exit from the junction may cause traffic to back-up through the junction.	12	No control measures possible.	12
D14 - Visibility of pedestrians Pedestrians using the phase F crossing under the bridge will be poorly lit and not visible to drivers approaching the junction from the south on Lambra road.	20	Existing lighting to be upgraded to a suitable standard for a pedestrian crossing, without impinging on the conspicuity of the traffic signals, and permanently switched on. If this isn't achievable, then this crossing should be removed from the design and a pedestrian guard rail provided to prevent risky pedestrian movements.	15

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D20 - Street lighting Street lighting is insufficient for the proposed design, as pedestrians using the Phase F crossing under the bridge on Lambra Road may not be visible to drivers, as there is only one lamp column under the bridge.	16	Existing lighting should be upgraded to a suitable standard for a pedestrian crossing, and permanently switched on, without detracting from the conspicuity of the traffic signals on the Lambra Road approach.	12

3.5 Other Notable Hazards

3.5.1 Other hazards which have been deemed as being beneficial to be highlighted, even though the risk rating has been lowered to an acceptable level, are detailed below.

Hazard Identified	Initial Risk Rating	Control Measure	Revised Risk
D4 - Location of traffic signal controller The traffic signal controller will be placed away from the carriageway and won't obstruct pedestrians, but the location is currently grass.	6	A hard standing concrete surface will be installed around the controller to keep it clear and accessible.	3
D7 - Physical obstructions The bridge construction over Lambra Road prevents drivers on this approach seeing the other stoplines.	8	A Traffic Signals Ahead warning sign to diag. 543 will be installed on this approach to warn drivers of the signals ahead.	4

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D10 - Queuing traffic - sufficient storage Three of the approaches (Access Road, Wesley Road and Lambra Road Southbound) have restricted space to provide sufficient space for queueing. and the fourth approach on access road has a queue loop to detect large queues, and then priority can be given to this phase to clear them.	9	The SCOOT / MOVA loop CIN7_SC2 on Wesley Road will be configured to also act as a Queue loop to Hurry Call Stage 2 and prevent traffic backing up onto Alhambra Roundabout. The other 2 approaches will be reliant on effective MOVA and SCOOT operation, but there is still a risk that queues will form due to the potentially large amount of car park and loading activities.	6

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