



A6 to Manchester Airport Relief Road

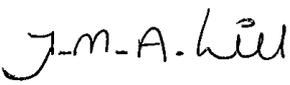
Design Statement

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Prepared by: 
 Jennie Lill
 Principal Engineer

Checked by: 
 Wico du Plooy
 Senior Engineer

Verified by: 
 Christian Elcome
 Associate Director

Approved by: 
 Martin Houghton
 Associate Director

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 Design Statement

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Sunley House, 4 Bedford Park, Croydon CR0 2AP
 Telephone: 020 8639 3500 Website: <http://www.aecom.com>

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1 Introduction

AECOM Transportation Lighting and Electrical has been commissioned to provide a detailed lighting proposal for the SEMMMS A6 to Manchester Airport Relief Road.

This proposal will take into consideration the requirements of Stockport Metropolitan Borough Council (MBC) as lead designer in liaison with Cheshire East Council and Manchester City Council. This proposal has been carried out in coordination with Network Rail, Electricity North West (ENWL), Manchester Airport Group (MAG) and Transport for Greater Manchester (TfGM).

All information regarding existing lighting has been obtained from GIS plans provided by Stockport MBC and desktop photography obtained from site and the internet. Suitable lighting levels for the proposed carriageway will be detailed in accordance with the requirements of the relevant Council in conjunction with the Design Manual for Road and Bridges and British Lighting Standards. Whilst one part of the British Standards (BS5489) has recently been updated the design standards were set at the start of this project prior to this update. Therefore the following versions have been used.

- BS5489-1:2003+A2:2008 – Code of practice for the design of road lighting
- BSEN13201-2:2003 Road Lighting Part 2: performance requirements

Compliance of the current lighting requirements is confirmed by modelling the proposed lighting design using an industry approved lighting software package. This proposal will detail selection of lighting equipment as requested by the relevant authority.

This lighting proposal should be read in conjunction with the following documents:

- Lighting layout drawings 60248122_1300_001 to 010.

The lighting proposals in this report are not intended to replace the individual specifications of the maintaining authorities. Individual specifications and approval procedures should be adhered to at every stage of the project.

2 Extent of Proposed Lighting

The extent of the proposed lighting includes approximately 14km of dual carriageway running from the A6 at Hazel Grove to the Manchester Airport Spur Road and for the purpose of this submission the proposed lighting has been split into 10 individual schemes as follows:

Lighting Scheme Description	Lighting Layout Drawing no.
1. Ringway Road West Junction 2. Realigned Ringway Road and Shadowmoss Road	60248122_1300_002
3. Styal Road Junction	60248122_1300_003
4. Wilmslow Road Junction	60248122_1300_004
5. Stanley Green Roundabout	60248122_1300_005
6. A34 Junction	60248122_1300_006
7. Woodford Road Junction	60248122_1300_007
8. Chester Road Junction & Link Road	60248122_1300_008
9. Macclesfield Road Junction	60248122_1300_009
10. A6 SEMMMS Junction	60248122_1300_010

Stockport MBC previously requested that the extents of the lighting for each scheme should be in accordance with the Design Manual for Road and Bridges (DMRB). However, this requirement has now been relaxed after consultation with all local authorities involved with the project. Where design limits have not been provided by the relevant authority the DMRB does provide criteria for assessing the extents of lighting required.

Within the DMRB, TD34/07 gives guidance on the extents of junctions to be lit as 1.5 times the Desirable Minimum Stopping Sight Distance as given in TD9/94. Therefore, based upon a design speed of approximately 85 kph the proposed lighting will extend from the centre of each junction or roundabout approximately 240m, in either direction and if necessary tie in with the existing lighting at the extent of each scheme.

Extract TD9/94

Design Speed (kph)	DMSSD (m)	1.5 x DMSSD (m)
85	160	240

At the proposed realigned Ringway Road and Shadowmoss Road the proposed lighting will cover the extents of the carriageway realignment all the way to the Styal Road Junction and tie in with the existing lighting at each end of the scheme.

Lighting on slip roads will extend to the end of the taper, where the slip road meets the main carriageway.

3 Existing Lighting

The proposed route of the works incorporates an existing section of the A555. This section is currently lit from Wilmslow Road, Heald Green to Woodford Road, Bramhall. There are also other areas of existing lighting along the proposed route.

The A6 Buxton Road uses Triumph lanterns manufactured by Thorn Lighting (see picture below). These are mounted at 10m, with a 1m outreach bracket and utilise high pressure sodium lamps which are likely to be either 150watt or 250watt High Pressure Sodium (SONT-P Plus Pia) lamps.



The Macclesfield Road Junction also utilises the Triumph lantern manufactured by Thorn Lighting (see picture above). These are mounted at 10m, with a 1m outreach bracket and utilise high pressure sodium lamps which are likely to be either 150watt or 250watt High Pressure Sodium (SONT-P Plus Pia) lamps. Also used at this junction is the Traffic Vision lantern manufactured by Philips Lighting (see photo on next page). These are mounted post top at 10m and again utilise high pressure sodium lamps which are likely to be either 150watt or 250watt High Pressure Sodium (SONT-P Plus Pia) lamps.

The Traffic Vision lantern is also used throughout the length of the existing A555 between Woodford Road Junction and Wilmslow Road Junction.



The Styal Road Junction uses Iridium lanterns manufactured by Philips Lighting (see photo below). These are mounted at 10m, with a 0.5m outreach bracket and utilise high pressure sodium lamps which are likely to be either 150watt or 250watt High Pressure Sodium (SONT-P Plus Pia) lamps.





Many of the roads alongside and joining the junctions use low pressure sodium (SOX) lamps in older more basic luminaires (see photo above). Some of these lanterns including those at Woodford Road Bridge will be affected by the proposed works. Usually if lanterns of this type are removed then newer lanterns using high pressure sodium lamps or white light would be installed as replacement. In many areas of the works this might require replacing several other lanterns in order to provide continuity of lighting type. However, due to the projects budgetary constraints it would be more practical to replace columns and lanterns on an individual basis with similar lanterns that use SOX lamps. Philips Lighting manufacture several more lanterns specifically for SOX lamps which could be used where replacement are needed.

The lighting proposals will ensure that any proposed lighting is compatible with this existing lighting or will make suitable recommendations regarding removal etc if lighting is not deemed to be required.

4 Proposed Lighting Class and Level

All highway lighting designs within the United Kingdom are governed by a set of recommendations which were also initially specified by Stockport MBC and are listed below.

- Design Manual for Roads and Bridges (DMRB) specifically sections TA49/07 (Appraisal of New & Replacement Lighting on the Strategic Motorway & All Purpose Trunk Road Network) and TD34/07 (Design of Road Lighting for the Strategic Motorway & All Purpose Trunk Road Network).
- BS5489-1:2003+A2:2008 – Code of practice for the design of road lighting

Although the DMRB contains much information on the decision processes on how Motorways and Trunk roads should be lit it does not provide actual lighting levels. It instead refers directly to the BS5489-1:2003+A2:2008 and also BSEN13201-2:2003 (Road Lighting Part 2: performance requirements).

An appropriate lighting category can be chosen by using Table B.2 from BS5489-1:2003. An extract of this table is show below.

BS5489-1:2003 Table B.2 – Lighting classes for motorways and traffic routes

Hierarchy description	Type of road/general description	Detailed Description	Traffic flow (ADT)	Lighting class
Strategic route	Trunk and some principal "A" roads between primary destinations	Routes for fast moving long distance traffic with little frontage access or pedestrian traffic. Speed limits are usually in excess of 40mph and there are few junctions. Pedestrian crossings are either segregated or controlled and parked vehicles are prohibited.		
		Single carriageways	≤15 000 >15 000	ME3a ME2
Main distributor	Major urban network and inter-primary links Short to medium distance traffic	Routes between strategic routes and linking urban centres to the strategic network with limited frontage access. In urban areas speed limits are usually 40 mph or less, parking is restricted at peak times and there are positive measures for pedestrian safety reasons		
		Single carriageway	≤15 000 >15 000	ME3a ME2
Secondary distributor	Classified road (B and C class) and unclassified urban bus	Rural areas (Zone E1/2) These roads link the larger villages and HGV generators to the strategic and main distributor network.		
		Dual carriageway	≤15 000 >15 000	ME3a ME2
			≤7 000 >7 000, ≤15 000 >15 000	ME4a ME3b ME3a

route, carrying local traffic with frontage access and frequent junctions	Urban areas (Zone E3) These roads have 30 mph speed limits and very high levels of pedestrian activity with some crossing facilities including zebra crossings. On-street parking is generally unrestricted except for safety reasons.	≤7 000 >7 000, ≤15 000 >15 000	ME3c ME3b ME2
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In order to make an assessment of the lighting class required it is important to understand the current or potential traffic flows on the road in question. Stockport MBC has provided projected traffic flow information for 2015 & 2030. This shows vehicle numbers well in excess of 15,000 on the Relief Road. From the table above it is clear that as the road is a Dual carriageway then ME2 would be an appropriate lighting category even if the road is classified as either a Strategic route or a Main distributor.

BSEN13201-2:2003 details the various lighting class for different category of roads. The light levels for the different class of ME roads (traffic routes) are shown in Table 1a below.

BSEN13201-2:2003 Table 1a

The average road surface luminance (\bar{L}), the overall uniformity of the luminance (U_0), the longitudinal uniformity of the luminance (U_l), the threshold increment (Tl) and the surround ratio (SR) are to be calculated and measured in accordance with EN 13201-3 and EN 13201-4.

Table 1a — ME-series of lighting classes

Class	Luminance of the road surface of the carriageway for the dry road surface condition			Disability glare	Lighting of surroundings
	\bar{L} in cd/m ² [minimum maintained]	U_0 [minimum]	U_l [minimum]	Tl in % ^a [maximum]	SR ^{2b} [minimum]
ME1	2,0	0,4	0,7	10	0,5
ME2	1,5	0,4	0,7	10	0,5
ME3a	1,0	0,4	0,7	15	0,5
ME3b	1,0	0,4	0,6	15	0,5
ME3c	1,0	0,4	0,5	15	0,5
ME4a	0,75	0,4	0,6	15	0,5
ME4b	0,75	0,4	0,5	15	0,5
ME5	0,5	0,35	0,4	15	0,5
ME6	0,3	0,35	0,4	15	no requirement

^a An increase of 5 percentage points in Tl can be permitted where low luminance light sources are used. (see note 6)

^b This criterion can be applied only where there are no traffic areas with their own requirements adjacent to the carriageway.

The standards also detail lighting classes for conflict areas. Conflict areas are categorised as areas where vehicles, other road users and pedestrians mix or junctions of complexity including roundabouts. Table B.3 below shows the conflict area classes for each traffic route lighting class.

BS5489-1:2003 Table B.3 – Lighting classes for conflict areas

Traffic Route Lighting Class	Conflict Area Lighting Class
ME1	CE0
ME2	CE1
ME3	CE2
ME4	CE3
ME5	CE4

From the table if a traffic route lighting class of ME2 is applied to the road then a conflict area lighting class of CE1 can be applied to the junctions and roundabouts. Table 2 below details the lighting level required for the conflict area (CE) lighting classes.

BSEN13201-2:2003 Table 2 – CE-series of lighting classes

Class	Horizontal Illuminance	
	E in lx (minimum maintained)	U _o (minimum)
CE0	50	0.4
CE1	30	0.4
CE2	20	0.4
CE3	15	0.4
CE4	10	0.4
CE5	7.5	0.4

There are several of the junctions that connect local roads with the new Relief Road. These local roads can be considered Secondary distributor roads as described in **BS5489-1:2003 Table B.2** on page 6. Using the same traffic flow information and the tables on the previous pages a lighting category of ME3a can be applied. Where these roads form their own junctions using **Table B.3** above the Conflict Area class of CE2 can be used.

However, subsequent to a meeting held by SMBC with all interested parties (including representatives from Cheshire East Council and Manchester City Council) on the 7th September 2012 it was agreed by all parties that a lighting category of CE2 would be applied to all junctions in line with Stockport MBC policy of using lighting category ME3b for slip roads.

As a consequence of CE2 being applied to the junctions the adjoining residential roads were classed as subsidiary roads and therefore can be classified under the S class series of lighting categories.

Summary of Revised Lighting class applied to each scheme

Lighting Scheme Description	Proposed Lighting class
1. Ringway Road West Junction	CE2/ME3b
2. Realigned Ringway Road and Shadowmoss Road	S3
3. Styal Road Junction	CE2/S3
4. Wilmslow Road Junction	CE2
5. Stanley Green Roundabout	CE2
6. A34 Junction	CE2
7. Woodford Road Junction	CE2/S1
8. Chester Road Junction and Oil Terminal Link Road	CE2/S1
9. Macclesfield Road Junction	CE2
10. A6 SEMMMS Junction	CE2/CE3

5 Proposed Luminaire and Lamp Specification

Following a design meeting with the local authorities held on 7th September 2012 the following design regime was established.

Stockport MBC specification is the Estilo lantern supplied by Holophane Ltd. These utilise the Cosmopolis lamp supplied by Philips Lighting.

Cheshire East also specifies the Estilo lantern supplied by Holophane Ltd. However, these utilise High Pressure Sodium lamps SONT-Plus Pia supplied by Philips Lighting

Manchester City Council uses the Iridium lantern supplied by Philips Lighting as detailed in their Private Finance Initiative (PFI) lighting specification from AMEY. These utilise High Pressure Sodium lamps SONT-Plus Pia supplied by Philips Lighting

6 Proposed Energy Management

Stockport MBC luminaires are to be fitted with Lucy Zodion 'Vizion' system with electronic ballast and node for connection via a local collector to the wider SMBC system.

Cheshire East luminaires are to be compliant with the 'ASK' Asset management system employed in the borough. This requires the lantern to have a node enabled with AMS (asset management system) for connection to the local collector and to the wider Cheshire East system

Manchester CC luminaires shall be provided with a Nema socket for a Zodion SS6 photo electric cell in accordance with the AMEY PFI specification.

7 Proposed Column/Bracket Specification and Mounting Height

Stockport MBC and Cheshire East luminaires are to be mounted side entry on Stainton or similar approved, medium duty, galvanised steel columns with a 1.5m bracket with inbuilt uplift of 5°.

Manchester CC luminaires are to be mounted side entry on Mallatite or similar approved, medium duty, galvanised steel columns with a 1m outreach bracket with an inbuilt uplift of 5°

The standard mounting height of all the columns is 10m as per the requirements of the maintaining authorities. However, there are two exceptions to this. Firstly, one Stockport MBC column has been proposed at 6m with a 0.5m outreach bracket. This is located on the new entrance to the Hazel Grove Golf Club access road on Buxton Road. The second is the proposed columns located within the Manchester Airport Take Off Climb Surface (TOCS). These have all been reduced to a height of 5m to limit the impact of luminaires glare on airfield operations. These lanterns are also mounted post top.

8 Vehicle restraint system (VRS)

Several of the existing junctions and slip roads employ a vehicle restraint system (VRS). Where this will interact with lighting equipment columns will be set back behind the barrier. There will be a minimum distance of 1m from the rear side of the barrier to the front face of the lighting column.

9 Environmental Impact Statement

Whilst the site is not an Area of Outstanding Natural Beauty (AONB) or of Special Scientific Interest much of the route passes through Greenfield areas. However, as far as is practical the proposed lighting has been designed to limit the impact on the local environment.

The use of 10m columns ensures that the lighting has a minimal impact visually on the landscape and the lighting equipment specified complements the existing lighting providing visual continuity.

The lantern specified employ flat glass protectors which minimise glare and ensures there is no light above the horizontal. This limits the obtrusive light in accordance with the Institute of Lighting Professionals 'Guidance notes for the Reduction of Obtrusive Light'. However, the lanterns do exhibit different levels of glare control. Those specified for Stockport MBC have a glare rating of G3 whilst Chester East have a glare rating of G4. The lanterns on Manchester CC have a rating of G2.

The DMRB within TD34/07 specifies a glare rating for the strategic road network of G6 although usually for rural locations a glare classification between G6 and G4 is viewed as acceptable.