

West Sussex County Council: Highways and Transport Signal Design Standards: Issue 8 (October 2019)

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Signal Design Standards (Issue 8)

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Issue notes: WSCC Traffic Signals Design Standards Issue 8 incorporates a full document review to incorporate the latest standards, including updates on acceptable detection methods, methods of control, and updated DFM times.

1. Introduction

- 1.1 The aim of this note is to provide a guide to enable promoters of schemes to prepare traffic signal designs which address the specific requirements of West Sussex County Council (WSCC).
- 1.2 Traffic signals for both vehicle and pedestrian control in West Sussex are required to meet a number of requirements in both function and installation, to produce a consistency of approach for the benefit of the public who use the signals and to aid in maintenance. As a result this guide should be read with reference to WSCC's standard detail drawings, the most relevant of which are contained within the appendix of this document.
- 1.3 The National Code of Practice MCH 1969 shall apply throughout the design and installation cycle. In addition, the 'Guide to Good Practice' shall be used as a reference (when published by EITAC).
- 1.4 The standards complement, but do not replace, Department of Transport the Environment and the Regions (DETR) advice notes, guidelines, manuals, etc.
- 1.5 Any deficiencies found in the design shall remain the responsibility of the promoter of the scheme for a period of 1 year from the date of the takeover of the site following a successful site commissioning or for a year following the date that the associated development is opened and the initial impact of the full traffic and pedestrian flows are realised, whichever is the greater. It is therefore the responsibility of the promoter to ensure that all data regardless of source is correct, and that the consequence of any imposed conditions are well documented and acknowledged.
- 1.6 On completion of the installation a site acceptance test (SAT) will be conducted with a representative from the WSCC Traffic Signals team and WSCC's term contractor. The following documentation will be required:
 - SAT form;
 - electrical test certificate;
 - take over certificate;
 - on completion of the SAT, site validation will be required to verify bus priority, remote monitoring, CCTV operation, timing parameters, and MOVA setup;
 - to complete the design package, an as-built drawing, controller configuration, and a validation report must be supplied to the WSCC Traffic Signals team.

2. Method of Control

- 2.1 The method of control to be adopted will be determined by the location of the signal installation having specific regard to its proximity to other installations and to the operational envelope, traffic patterns, etc., the site is required to serve. Consideration should be given, for example, to sudden surges in flow from entertainment facilities, abnormal patterns from other activities in the area, and any other feature of traffic pattern and behaviour, which the signals will be required to serve.

2.2 The method of control used for signals are:

- MOVA – latest software specification;
- Compact MOVA – latest software version;
- VA (Vehicle Actuated);
- CLF.

2.3 The method of control in use for pedestrian signals are:

- VA;
- MOVA.

In all cases either Puffin, Pegasus, or Toucan with nearside Puffin-type presentation shall be used.

2.4 MOVA is the preferred method of control for signalised junction sites, with VA or CLF as the fall-back mode.

2.5 VA or CLF shall be used in place of MOVA for sites which have characteristics which will not be best served by the adoption of MOVA. Such proposals will require justification.

2.6 For pedestrian crossings, the method of control is dependent upon the speed limit and the 85th percentile approach speed. The recommended operation will be as per Local Transport Note 2/95, although MOVA should be considered for 85th percentile greater than 35mph and would be the preferred method of control for 85th percentile greater than 45mph.

2.7 All signalised junctions must incorporate the installation of CCTV cameras located in suitable positions to enable all approaches to the junction to be remotely monitored. The system must conform to the latest WSCC CCTV standard, included within 'Appendix A: Product Specification for CCTV Camera Installations', and will preferably be connected via a 3G SIM (supplied by WSCC), however if the signal strength is insufficient an ADSL line will be required. Further details can be obtained from the WSCC Traffic Signals team by phoning 01243 642105 or emailing traffic.signals@westsussex.gov.uk.

3. Signal Staging

3.1 Complex staging of the signals shall be avoided because it causes inflexibility in control.

3.2 The requirement for pedestrian facilities shall always be considered and included where appropriate. Unless otherwise agreed they shall be to the Puffin format to allow the cycle time to be minimised and thus the service to pedestrians maximised. The use of an all-red stage will usually cause serious delay in the form of an excessively long cycle time and would require detailed justification.

3.3 Where significant numbers of buses are operating, special assistance to public transport shall be considered. This may include:

- bus lanes;
- selective detection;
- bus by-passes.

- 3.4 The requirement for cycling facilities shall always be considered, especially if the proposed signal facility is part of a cycle route. Special provision for cyclists shall be made, including advanced start with low-level cycle indicators, cycle detection or in extreme circumstances, dedicated cycle stages.
- 3.5 Parallel Stage Streaming and alternative stage selection by time of day or week are both techniques which should be used as appropriate.
- 3.6 For mid-block crossings, Puffin and Toucan in all cases a VA or MOVA controller build shall be supplied.
- 3.7 Pre-timed maximum shall be used where appropriate on mid-block crossings.
- 3.8 There should be consideration for a forward call facility on dual-stage crossings, where deemed appropriate.

4. Timings

- 4.1 Minimum green times shall be: 7 seconds for normal traffic phases; 5 seconds for indicative right turn green arrows. Dummy phases shall be given minimums appropriate for their purpose.
- 4.2 Vehicle intergreen times shall be calculated for the conflict points of the worst case in accord with TA/16/07 ref TAL 1/06.
- 4.3 Where a phase has an 85th percentile of more than 35mph or the posted speed limit is more than 30mph, on a maximum change, the intergreen shall be extended by 2 seconds.
- 4.4 Intergreens to pedestrian phases shall be calculated on the basis of the conflict point being just past the most remote pedestrian movement of the pedestrian phase that gains right of way.
- 4.5 Pedestrian Green Man times at signals shall be calculated as for a Puffin crossing of the same width and as specified in TAL 1/06
- 4.6 Pedestrian clearance times shall be calculated using the clearance times as for a Puffin. Whether the pedestrian clearance is extendable shall depend on the location of the site within the highway network. The decision shall be justified.
- 4.7 Any phase intergreen less than 5 seconds will be subject to audit unless the phase gaining right of way is an indicative green arrow phase.
- 4.8 Phase delays shall be used to minimise overall delay, whilst having regard to safety and interpretation of movements on other phases by drivers. On occasion it may be necessary to sacrifice a few seconds of theoretical capacity in the interest of safety, e.g. where two or more traffic phases should sensibly start together.
- 4.9 Ripple changes are permitted.
- 4.10 Time synchronisation via the remote monitoring system must be configured to ensure the controller clock maintains a correct time automatically.

4.11 Consideration should be given to the appearance of a variable Green Man, where pedestrian activity is high, i.e. outside schools. This will generally be timetabled to coincide with the high pedestrian demand.

- Minimum green limits:
 - traffic phase = 7;
 - pedestrian phase up to 9m = 5;
 - pedestrian phase greater than 9m = 6;
 - intergreen = 5.
- Pedestrian sequence timings:
 - gap = 1;
 - FRC = 1 (3 for 85th percentile greater than 35mph);
 - minimum = 3;
 - maximum = width of crossing / 1.2;
 - CLR = 0;
 - XTR = 0;
 - demand extension = 1;
 - push button, kerbside and on-crossing extension = 1.
- Starting intergreen = maximum intergreen - 3.
- Detector names:
 - loops = (phase letter)(loop type)(sequential number if required)
e.g. AX1, AX2, BSL, BX, BY, BZ;
 - MVDs = MVD(Phase Letter)(sequential number if required)
e.g. MVDA, MVDB1, MVDB2;
 - detector = (Type)(Phase letter)(sequential number if required)
e.g. IRDA1, IRDA2, ONCB3, ONCB8, KSB, PBB1, PBB4, AR;
 - bus input = BUS(Phase)(sequential number if required)(R = Request, C = Cancel)
e.g. BUSA1R, BUSA2R, BUSAC.
- DFM times as below:
 - loops and MVDs = active 30 minutes, inactive 18 hours;
 - push buttons (PB) = active 10 minutes, inactive not set;
 - on-crossings (ONC) = active 30 minutes, inactive 18 hours;
 - kerbside (KS) = active 1 hour, inactive 72 hours;
 - bus inputs (BUS) = active 5 minutes, inactive not set;
 - IRDs and all-red (AR) = active 1 hour, inactive 18 hours;
- Bleeper drivers to be timetable controlled: on = 07:00; off = 22:00.
- Clock sync via Telent Remote Monitoring System (RMS).
- Special conditioning:

- kerbside safety feature to be included on all pedestrian facilities with push button and kerbside detectors paired;
- auxiliary 1 switch to be configured as VA select;
- MOVA mode running lights AUX1 LED;
- MOVA Inactive reports via DFM;
- Door Open reports via DFM;
- Green Man appearance count at mid-block crossings.
- The parameters for timetabling events within the Master Time Clock can be found in 'Appendix C: Timetable Entry Requirements' unless significant justification can be provided.

Table 1: Active/inactive states in DFM

Detector	Active	Inactive
Loops	A	A
MVD	A	A
BUS	I	N
Push button	N	N
Kerbside	N	N
On-crossing	A	A

5. Detection

- 5.1 Stages that are not always required shall be demand-dependent.
- 5.2 Pedestrian phases may be non-demand dependent when walk with traffic as long as there is no additional delay to vehicles. If an all-red stage is required, type 0 appearance should be considered but will be site-specific and cyclic DFM's must be taken into account.
- 5.3 Where 'on-crossing' detection is provided, each crossing shall be a separate phase and monitored accordingly, and each detect will have a separate input to allow independent monitoring.
- 5.4 Far-side pedestrian push buttons shall generally be mounted at 45 degrees for mid-block crossings. For dual crossings and junctions, angles are site-specific and shall be specified on site by WSCC.
- 5.5 Near-sided pedestrian push buttons on mid-block crossings shall be 'narrow angle of view' positioned to maximise convenience for the user. They shall be installed at an angle of 22.5 degrees from the pedestrian stud line, 67.5 degrees from the line of the carriageway.
- 5.6 Near-sided pedestrian push button angles at dual crossings and signal junctions will require greater consideration and shall be 'narrow angle of view', due to the chance of motorists viewing the red-man-green-man signal; in these circumstances, angles are site specific and shall be specified on site by a WSCC signal engineer. Consideration should also be given to using far-side signals in certain circumstances.

- 5.7 Detection may be by any type of detector. The use of above-ground detection (AGD) is encouraged, providing the detection characteristics are appropriate for the application. The TOPAS specifications 2512B, 2505A, 2506A, and 2507A shall be applied as appropriate. The use of secondary or tertiary standard configurations will require justification.
- 5.8 Loop placement shall take account of ironworks, covers, and drains in the carriageway during the design and not leave this to be determined during installation.
- 5.9 Presence detectors shall normally be 3m long in the direction of travel of the vehicles passing over them to allow for a 2m separation between vehicles. This shall be adjusted as appropriate in special circumstances. The location of the loop shall be justified but for an early cut off it is expected that it will normally be forward of the stop line.
- 5.10 Pedestrian detection shall use the appropriate device for both on-crossing and footway detection. It will be necessary to justify the adoption of a specific type or model if it is not in common use.
- 5.11 Footway detection for pedestrians is not mandatory but is normal and omission shall be justified. It is the responsibility of the designer to ensure that the coverage of the detection is appropriate for the width of the crossing and the safety interlock feature is configured.
- 5.12 All above-ground detection shall be connected up using standard plug and sockets, not wired direct. If the installers remove the plug sockets during installation, they will be required to replace them.
- 5.13 Slot cutting requires 50mm of cover, with single part backfill. All slots shall be air dried before the backfill is poured. Loops may be laid in the base course of the carriageway, providing that the finished depth of cover does not exceed 60mm.
- 5.14 All detector feeder cables laid in the carriageway, which exceed 5m, shall be armoured.
- 5.15 Standard bus detection for hurry calls or green waves utilise the VIX priority system.
- 5.16 Magnetometers or any battery-operated detection system and AGD316 stop line detectors are not approved for use within West Sussex.

6. Cable, Duct, and Pole Requirements

- 6.1 Pedestrian push button units and all other extra low voltage equipment on all LV installations are to be wired on a separate core cable(s) to the vehicle signal cables.
- 6.2 Each signal pole shall be cabled directly to the controller. The looping of any cables between signal poles will not be accepted. ONLY in exceptional circumstances, and as directed by the Engineer, will alternative means of cabling be acceptable. Signals installed on roads with a speed limit of 50mph or more shall have passively safe low access poles and quick disconnect system.
- 6.3 A separate 16-core cable shall be used to each push button pole for the push button and audible, and for future detection for Puffin type facilities.

- 6.4 A cable drawing shall be incorporated within the construction drawing, showing clear distinction between LV and ELV.
- 6.5 Signal cables shall not pass through ducts or boxes used for any other service.
- 6.6 Mains and extra low voltage shall not be mixed in the same cable.
- 6.7 Detector inputs shall not be brought back on the same cable carrying the LV supply to signal heads or push buttons.
- 6.8 The core provision shall provide not less than 25% spare cores overall to each pole.
- 6.9 Where Puffin/Toucan controllers are linked, there shall be a minimum 16-core cable provided.
- 6.10 All poles shall be mounted in a retention socket. A suitable system, the RS-Retention Socket system, can be obtained from NAL Ltd – see 'Appendix B: Approved Suppliers' Details'. Alternatives of equivalent specification will only be accepted if prior written approval from a WSCC traffic signals engineer is obtained.
- 6.11 All footway chamber lids shall have a Skid Resistance Value (SRV) of not less than 45.
- 6.12 Where the misuse of the footway by goods vehicles is anticipated, heavy-duty frames and lids rated to 25 tonnes or greater shall be used.
- 6.13 A length of duct (minimum 50mm diameter) should run from each loop jointing chamber under the kerb and up through the road surface at the edge of the carriageway at the point where the loops will enter.
- 6.14 Chamber base section is to be set on a 150mm x 50mm concrete edging with 6mm clean gravel infill as a soak away.
- 6.15 Ducting shall be designed on the basis of a completely closed system and take note of the following:
 - cables carrying 240v lamp power shall occupy separate ducts from cables carrying extra low voltage (push button/audible, detection, etc.) although they will use the same chambers;
 - one spare duct shall be supplied on each road crossing;
 - not more than eight cables shall be laid in each duct;
 - the designer shall demonstrate that there is sufficient capacity in the ducts for the number of cables proposed;
 - each road crossing shall terminate in a chamber;
 - any corner with an angle less than 135 degrees shall be turned in a chamber.
 - no straight run shall exceed 50m between chambers.
- 6.16 Chambers of the following sizes should generally be used:
 - immediately by a pedestrian controller 600mm x 600mm x 600mm;
 - immediately by a junction controller a minimum of 600mm x 600mm x 600mm;

- at the end of road crossings, intermediate chambers in runs 450mm x 450mm x 600mm;
- for detector jointing 450mm x 300mm x 300mm.

Any variations from these sizes shall be noted on the drawing

- 6.17 Ducts shall be in accordance with NJUG Standards, orange 100mm diameter with 'traffic signals' stamped at regular intervals. All carriageway crossings shall have not less than two ducts. Draw cords shall be left in ducts on completion of cable installation.
- 6.18 Ducts and chambers shall be obtained from one of the approved suppliers listed in 'Appendix B: Approved Suppliers' Details'. Alternatives of equivalent specification will only be accepted if prior written approval from a WSCC traffic signals engineer is obtained.
- 6.19 All traffic signal poles must be of spigot low access design. An example of this can be supplied on request.
- 6.20 Signals installed on roads with a speed limit of 50mph or more shall use passively safe low access poles with a quick disconnect system.
- 6.21 Where there is a requirement for poles greater than 4m, hinged poles must be installed. Any sites where they are omitted will require justification and written approval from a WSCC traffic signals engineer.

7. Controller Requirements

- 7.1 The controller shall conform to the latest specification of TOPAS 2500A (formerly TR2500, TR2210, and MCE 0141) and will incorporate an externally visible DFM lamp which can be readily seen from the carriageway.
- 7.2 There shall be provision for the supply of a second controller configuration within 12 months of commissioning, to embody detail changes to timings and set up found necessary in the post-commissioning phase, at no additional cost to WSCC.
- 7.3 The mains input shall be to a Haldo pillar positioned close, but no closer than 1m, to the controller, in a position where the chance of impact by vehicles leaving the road is minimised.
- 7.4 All junction controllers and pedestrian facilities shall be provided with an Outstation Monitoring Control Unit (OMCU), which is compatible with the Telent RMS in-station currently used by WSCC Traffic Signals. Communication will normally be via GSM, however where the GSM signal is unacceptable then consideration will be given to installing a standard domestic BT circuit.
- 7.5 All junction controllers should be fitted with integral MOVA running version 8 or greater.
- 7.6 The SCN of the site shall be displayed on the controller cabinet in characters approximately 50mm high (i.e. 3621). The method of application shall be approved by WSCC.
- 7.7 A fault-reporting sticker should be displayed on the controller cabinet, beneath the SCN, detailing fault number and email address to contact.

- 7.8 On completion of installation all cabinets, BT pillars, Haldo, and other similar devices shall be base sealed if the equipment installed does not form a water and airtight seal.
- 7.9 On sites where bus priority is to be installed (VIXs) a separate power supply controlled via a dedicated RCD is required.
- 7.10 On all signalised junctions the controller must accommodate the installation of the CCTV equipment including a dedicated power supply and communications as specified in paragraph 7.4. Further details can be found within 'Appendix A: Product Specification for CCTV Camera Installations'.
- 7.11 Controller and associated equipment are to be manufactured by the WSCC traffic signals term maintenance contractor. Alternatives of equivalent specification will only be accepted if prior written approval from a WSCC traffic signals engineer is obtained.
- 7.12 The controller configuration to be created by an approved WSCC supplier, TCT Consultancy Ltd – see 'Appendix B: Approved Suppliers' Details'.
- 7.13 Factory acceptance test (FAT) is to be conducted on the new controller with a representative from the WSCC Traffic Signals team and their maintenance contractor represented.
- 7.14 As standard, the Manual Mode of operation must be disabled, before the controller arrives on site and is commissioned. This is to be tested during the FAT. Should the Manual Mode be required, it must first be enabled via a handset command.
- 7.15 A method of counting the amount of times a pedestrian facility is used must be configured and accessible via the remote monitoring system.
- 7.16 Any detection which requires power-cycling to enable communication, i.e. Wi-Fi, must be wired via a dedicated momentary switch.
- 7.17 WSCC will accept an all-in-one controller/base unit as long as the following criteria have been considered:
- the finished height will not have an impact to the general public within West Sussex, such as obstruction of view from private property;
 - consideration has been given to the potential for infestation to occur and the suitability of an all-in-one unit.

8. Loop Design

- 8.1 All loops shall be cut per lane. The only exception to this is the Y and Z loops of the system D loops, which may have their loop cable joined in the loop pits. Otherwise where a multiple-lane approach is encountered, loops shall be cut individually, and if necessary can then be joined at a terminal block within the controller.
- 8.2 The need for unidirectional detection shall form part of the detector design and used as appropriate for MOVA and stop line detection.
- 8.3 The need for exit loops and short link lengths may be dictated by site performance, vehicle pathways, and the junction design.
- 8.4 On MOVA sites each vehicle phase shall have separate stop line detection.
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- 8.5 On MOVA sites where the loop positions are determined by vehicle speed, which cannot be measured before the site is operational, permission can be sort from the WSCC Traffic Signals team to cut the loops post-commissioning. In these circumstances the duct network shall extend to an extent agreed with the WSCC traffic signal engineer.
- 8.6 There is a potential danger of loops cut in footways being a trip hazard therefore any loops, especially cycle loops in cycle ways or footways, shall be enclosed in 25mm plastic conduit which is laid in the hardcore base prior to the surfacing of the footway. In general the depth shall allow for 50mm of cover above the conduit surround.
- 8.7 All phases not in the reversion stage will require stop line detection.
- 8.8 Where advanced cycle stop lines are installed on phases not included in the reversion stage, these will include dedicated above-ground cycle detection (thermal). Any sites where they are omitted will require justification and written approval from a WSCC traffic signals engineer.

9. Signal Design

- 9.1 WSCC standard details shall be used where appropriate. Any variation to these shall be noted on the drawing.
- 9.2 All optics shall be single light source ELV LED with a minimum six-year warranty, not tungsten filament lamps.
- 9.3 On all two-lane carriageways, the normal layout shall be both a nearside primary and offside primary signal heads.
- 9.4 Separately signalled phases facing in the same direction shall not be included unless there is sufficient physical separation to allow the inclusion of a nearside primary signal on both phases. Any deviation from this will require full justification and approval from a WSCC signal engineer.
- 9.5 Where there are three lanes on one approach, high level primary optics shall be specified. All optics shall be single light source ELV LED with a minimum six-year warranty, not tungsten filament lamps. High level optics may also be required where approach speeds are high or the topography indicates the need. The introduction of high level optics may introduce the need for similar provision at an existing installation to minimise the risk of confusion between the two sites. This shall be considered as part of the design and safety audit.
- 9.6 Where there are three lanes, nearside and offside secondary signals shall be specified. Secondary signals shall be not less than 7m from the stop line.
- 9.7 Where an early cut off is used, the secondary for the phase which is terminated early shall normally be on the 'nearside' of the junction.
- 9.8 Where opposing phases on a junction appear simultaneously, arrows shall not be used for the ahead or right turn movements because drivers expect to have right of way when these are used. They may be used for segregated left-turn movements.
- 9.9 Specific attention shall be given to the presentation of the signals to both drivers and pedestrians to maximise the effective presentation of the

signals and minimise the risk of confusion. In particular the potential for 'see through' for pedestrian optics shall be considered (including the standard use of narrow view pedestrian units). Where appropriate, special cowls, tunnel, cut away louvre, etc., may be used. Each shall be specified in detail. Where long tunnel cowls are used, any louvres shall be mounted at the outer end only (100mm) and not for the whole length to minimise reflection within the cowl. In appropriate situations, cut away cowls will give better performance than louvres because there can be no reflection from the cut away side.

- 9.10 Clearance for all street furniture shall be at least to Design Manual Road and Bridges Standard. Where there is the regular presence of special vehicles, such as car transporters, which have special overhang requirements, these shall be taken into account.
- 9.11 All movements subject to Heavy Goods Vehicle turns shall be checked using proprietary software. These checks are required to show that sufficient road space is available to enable the movement to be carried out safely.
- 9.12 On routes subject to regular use by special loads, any necessary provision shall be included in the design. This shall include requirements for removable poles or special clearances.
- 9.13 It is Council policy that sight lines shall be preserved. Where relevant grass or hard surfaces shall be used, shrubs that obstruct sight lines shall be removed. Each tree within the sight lines, shall be considered on its merits, and any which it is proposed to remove should be checked for tree preservation orders.
- 9.14 Where formal pedestrian facilities are provided (i.e. red and green man) then tactile paving (red, 400mm square) shall be laid in 'L shape' with the stem on the right-hand side nearer the approaching traffic. For one-way streets where the traffic approaches from the left, consideration shall be given for the stem to be on the left.
- 9.15 A pedestrian push button shall be supplied no more than 400mm from the outside right-hand edge of the tactile paving. An additional push button will be required if the stem of the tactile paving is on the left.
- 9.16 If the crossing passes through an island, where it is not intended for pedestrians to wait, or where it does not form part of a staggered system, then generally tactile paving should not be laid within this island.
- 9.17 The width of the crossing shall be consistent throughout and shall normally be between 2.4m and 3m unless it is to be shared with cyclists when it shall be a minimum of 4m. Any deviation from these widths will require justification and written approval from a WSCC traffic signals engineer.
- 9.18 The outside edge of the pedestrian studs shall be in line with that of the tactile paving.
- 9.19 The footway slope to the dropped kerb shall be preferably 1 in 20 and no steeper than 1 in 12.
- 9.20 The drop kerb shall be flush with the carriageway surface with an absolute maximum permissible up stand of 6mm. It is the designer's responsibility

to address any issues that may arise due to surface water run-off, and to include for them in the design.

- 9.21 Where signal poles and guard rail are immediately adjacent, the poles shall be installed in line with the guard rail to minimise obstruction to pedestrians. This will probably require the use of swan-neck poles to maintain adequate clearance for signal heads.
- 9.22 The pedestrian heads shall be placed so that pedestrians on the crossing look toward traffic approaching on the far side of the road.
- 9.23 Tactile devices shall be fitted at all push button units. In addition an audible device should be fitted where allowed.
- 9.24 Staggered pedestrian facilities shall be considered on all crossings over 14m wide. The stagger shall normally be to the left and additional push buttons will be installed at the opposite side to the approaching vehicles. Only in exceptional circumstances will a right-hand stagger be accepted. In these circumstances the designer shall fully justify the use of right-hand stagger, and shall demonstrate that full care has been taken to ensure that pedestrian indications cannot be wrongly interpreted.
- 9.25 An absolute minimum clear width of 2m shall exist throughout the pedestrian area within the cage created by the guardrail. This shall be increased to 3m if cyclists share the facility
- 9.26 The distance between the limits of crossing shall be at least 3m, only in exceptional circumstances will a distance less than this be accepted. In these circumstances the designer shall fully justify the departure and include sufficient measures such as louvres to ensure that issues such as 'see through' have been addressed.
- 9.27 There shall be preferably 3m between the stop line and the studs. If this needs to be reduced to a minimum of 2m the designer shall fully justify the departure from standard.
- 9.28 Each design shall include an area of hard standing to allow for a maintenance vehicle to park. This area shall be accessed by 45-degree kerb units or similar. Where this is not achievable the designer shall carry out a risk assessment to assess if any measures are required to enable safe access by the maintenance engineer, which shall include identifying a suitable parking location that allows easy access to the controller.

10. Controller UTC Interface

- 10.1 UTC is no longer used in West Sussex.

11. Presentation of Designs

- 11.1 All designs shall be prepared using AutoCAD and KeySignals. On completion of works, a copy of the 'as installed' drawing shall be supplied in an AutoCAD format agreed by the WSCC Traffic Signals team. The file may be 'zipped' when supplied. All files supplied in electronic format shall be certified as virus checked and the software used with generation number, shall be quoted.
- 11.2 The drawing shall include a cable drawing and a staging drawing (if appropriate).

- 11.3 Special requirements relating to street furniture and signalling detail (special mounting arrangements, four-in-line heads, long cowls, louvres, etc.) shall be outlined on the drawings and within notes accompanying the drawings.
- 11.4 Standard BS EN12368 (formerly BS 505) symbols shall be used.
- 11.5 All designs and installations shall be subject to Safety Audit either in accordance with HD 19/03 or IHT Standards. This shall include the completed Signal Controller Specification. The completed and Audited specification shall be signed and dated by the Engineer who carried out the Audit. The original of all Audits shall be retained in the WSCC Traffic Signal team's site file.
- 11.6 The drawing shall be accompanied by notes as dictated by the Code of Practice detailing all alternative signal designs that have been considered and reasons for choosing the design presented.
- 11.7 Specific reference to any design detail that does not comply with these standards or the appropriate DETR advice notes, etc.
- 11.8 All signal poles shall be numbered, starting with the pole closest to the controller and proceeding in a clockwise direction around the facility.

Appendix A: Product Specification for CCTV Camera Installations

All new traffic signal junctions being introduced into West Sussex must be equipped with a CCTV unit(s) to enable better monitoring of the network and to aid the diagnosis of faults at the junction. Additional sites where monitoring is essential (e.g. rising bollard sites) will also require a camera set up.

The CCTV system installed must capture the intersection and all approaches to the traffic signals using static cameras. The number of cameras required to achieve this will be dependent on the possible mounting locations and the complexity of the junction.

West Sussex County Council (WSSCC) employs the Telent Remote Monitoring System (RMS) which enables operators to monitor CCTV cameras and new installations must therefore be compatible with this system.

The County Council employs ADSL broadband lines and 3G routers to connect the cameras to the system and new installations should be compatible with the WSSCC operating systems. Additional information can be obtained from the WSSCC Traffic Signals team by phoning 01243 642105 or emailing traffic.signals@westsussex.gov.uk.

Alternatives of equivalent specification will only be accepted if prior written approval from a WSSCC traffic signals engineer is obtained. (Contact details as above.)

WSSCC currently supports the following specification when installing a camera.

A typical installation for a hardwired camera setup will have:

- a suitable mount/pole to affix the camera unit to;
The camera unit needs to be set at a suitable height in order to be able to view all of the specified area. This may be achieved by the addition of a bracket to an existing, standard pre-drilled, traffic signal pole or by the installation of a separate pole. If a separate pole is required then it shall be mounted in a retention socket. A suitable system, the RS-Retention Socket system can be obtained from NAL Ltd.
- a hardwired Power over Ethernet (PoE) IP CCTV camera(s) which supports RTSP streaming with H.264 compression;
- preferred camera, which is HikVision DS-2CD2022WD-I and can be supplied by WSSCC Traffic Signals Maintenance contractor;
- each camera shall be cabled directly to the controller;

The looping of any cables between signal poles will not be accepted. Only in exceptional circumstances, and as directed by the Engineer, will alternative means of cabling be acceptable.

- a PoE switch and suitable power supply installed in the traffic signals controller;
- duct grade CAT 5 camera interface cable;
- either:
 - WSSCC-approved ADSL broadband line linking the camera site to the internet via the WSSCC network;

- WSCC-approved ADSL router – to be arranged in conjunction with the above broadband line, configured to establish a connection on the Telent RMS Virtual Private Network (VPN);
- or
- WSCC -approved 3G router, configured to establish a connection on the Telent RMS VPN.

Appendix B: Approved Suppliers' Details

Product	Supplier
Ducts, chambers and covers	NAL Ltd, Weir Lane, Worcester, WR2 4AY. Website: www.nal.ltd.uk . E J Liberty, Liberty House, Liberty Way, Attleborough, Nuneaton, CV11 6RZ. Website: www.ejco.com .
Pole retention systems	NAL Ltd, Weir Lane, Worcester, WR2 4AY. Website: www.nal.ltd.uk .
Aluminium passive safe poles	Hydro Pole Products Ltd, Sapa House, Ravensbank Drive North, Moons Moat, Redditch, Worcestershire, B98 9NA. Website: www.hydro.com/en-gb .
Controller	Telent Ltd, Unit 7, The Brunel Centre, Newton Road, Crawley, West Sussex, RH10 9TU. Website: www.telent.com/traffic .
Controller configuration	TCT Consultancy Ltd, 11 Noon Gardens, Verwood, Dorset, NH31 7WQ. Website: www.tctconsultancy.co.uk .
MOVA configuration and validation	Integrated Traffic Services Ltd, 62 Fruitlands, Malvern, Worcestershire, WR14 4XA.

Appendix C: Timetable Entry Requirements

No.	Day Type	Time	Event List
1	WKD	07:00:00	1
2	WKD	09:30:00	2
3	WKD	12:00:00	3
4	WKD	14:00:00	2
5	FRI	15:00:00	4
6	SEL1	16:00:00	4
7	WKD	19:00:00	7
8	SAT	08:30:00	5
9	SAT	19:00:00	7
10	SUN	10:30:00	6
11	SUN	18:00:00	7
12	WEK	07:00:00	9
13	WEK	22:00:00	10