

Solihull MBC Developers Design and Adoption Guide



Solihull
METROPOLITAN
BOROUGH COUNCIL



Contents

1. Glossary of terms
2. Adoption Guide
3. Design guidance
4. Construction Manual
5. Preliminary Agreement requirements
6. Site clearance
7. Drainage
8. Earthworks and Investigation works
9. Road construction
10. Kerbs
11. Footway and Cycleway Construction
12. Street lighting and Street Furniture
13. Structures
14. Landscaping

1. Glossary Of Terms

The under mentioned terms are given their full meaning here and will be used in the body of this manual in abbreviated form.

Their meaning to be construed as herein stated:

‘Approval’ or ‘Technical Approval’ shall mean the checking and approval by the SMBC Officer of the detailed plans, drawings, specifications and requirements against applicable safety standards and best practice employed or recommended in highway design works.

‘Approval in principle’ – the term given to the technical approval of structures.

‘BBA Certificate’ shall mean a certificate to confirm that a product has been suitably tested and approved for use by the British Board of Agreement.

‘BS’ shall mean the British Standard Specification current at the time the work is carried out.

‘BS EN’ shall mean the British and European Standard Specifications current at the time the work is carried out.

‘Building Control’ – Duty of a responsible body (such as a building inspector to whom the responsibility has been delegated by an agency or government) to ensure through periodic inspection that the construction work on a site is according to the approved drawings and conforms to the relevant requirements and specifications.

‘Clerk of Works’ – The person who will be carrying out the inspection of the works on behalf of the Highway Authority.

Client – Any Organisation or Individual for whom a construction project is carried out

‘Commuted Sum’ - The commuted sum is the value of the maintenance of all new works and energy that is required over a 25 year period.

‘Completion Certificate’ –The certificate issued by the Highway Authority when the works on existing highway land have been completed to the satisfaction of the SMBC Officer

‘Contractor’ – Company or Individual who carries out the actual construction works

‘Designer’ – Any person who as part of a business or organisation prepares or modifies designs relating to construction work

‘Developer’ – The person or organisation responsible for the development.

‘DfT’ shall mean The Department for Transport.

'Distribution Network Operator' (DNO) – The organisation responsible for the overhead and underground electricity supply network.

'Drainage Easement' – An agreement with the Highways Authority and the Landowner to allow access for routine maintenance and repairs to drainage apparatus.

'SMBC' shall mean Solihull Metropolitan Borough Council.

'Final Certificate' (issued for Section 38 works) – The certificate issued by the Highway Authority when the works on private land have been completed to the satisfaction of the SMBC Officer.

'Highway Authority' shall mean Solihull Metropolitan Borough Council.

'Independent Distribution Network Operator (IDNO)' - Develop, operate and maintain local electricity distribution networks.

'Land Compensation' – Monetary payment for loss in value to personal property due to highway works covered by the Land Compensation Act 1973.

'Licences' - Issued by the Highway Authority permitting the Developer to undertake works within the highway e.g. licence to erect scaffolding.

'Maintenance Certificate' – (issued for Section 278) The certificate issued by the Highway Authority at the end of the maintenance period (normally 12 months) when all remedial works have been completed to the satisfaction of the SMBC Officer.

'MCHW' shall mean the Manual of Contract Documents for Highway Works by the Department for Transport.

'Part 2 Certificate' (issued for Section 38 works) – The certificate issued by the Highway Authority when all works described in the specification and shown in the drawings are completed.

'Planning Authority' – Solihull Metropolitan Borough council

'Principal Contractor' – The person or organisation appointed by the Client to be responsible for the execution of the highway works where there is more than one Contractor

Principal Designer - The person or organisation appointed by the Client in Projects involving more than one Contractor

'SMBC Officer' shall mean the authorised representative for Solihull Metropolitan Borough Council who will manage the scheme and provide technical advice and assistance on behalf of the Highway Authority. This person may change as different stages of the process are reached.

'Resident SMBC Officer' shall mean the authorised representative for Solihull Metropolitan Borough Council who will manage significant highway schemes and provide technical advice and assistance on behalf of the Highway Authority. This person will be primarily based on the works site.

Sustainable Drainage Systems (SuDS) - A sequence of management practices and control structures designed to drain surface water in a more sustainable manner than most conventional techniques.

'Traffic Regulation Order' (TRO) – Traffic Regulation Orders are required to support most regulatory signs (i.e. – no right turn, no entry, no loading, waiting restrictions) and other

Solihull MBC Developers Design and Adoption Guide



restrictions such as speed limits, bus lanes and mandatory cycle lanes as stated in the Traffic Signs Regulations and General Directions 2016.

'Works Permit' – This is the term given to the permission to work that forms part of a Section 278 Agreement. A Works Permit application form is available on the Councils Website.

Project Engineer- SMBC Engineer who reviews the scheme design during technical review process and issue technical approval letter and Legal Instructions to Legal Section to draft the Legal Agreement.

SMBC Officer- The person who will be carrying out the inspection of the works on behalf of the Highway Authority, also known as Clerk of Works.

2. Adoption Guide

Solihull Metropolitan Borough Council (SMBC) is the Local Highway Authority for all publicly maintained roads in the Borough other than motorways and trunk roads, and as such, is responsible for the adoption of new roads and the improvement of existing roads within the Borough. An adopted road is one which is maintained by the Council at public expense.

This section outlines SMBC's procedures for managing the adoption of roads under Section 38 of the Highways Act 1980, and for the construction of works on existing public highway under Section 278 of the Highways Act 1980.

Areas which the Highway Authority will normally adopt include carriageways, footways, main footpaths, cycle ways, verges, drainage features such as attenuation ponds and highway structures which are constructed in accordance with the appropriate standards and are for the use of the general public.

All land required for sight lines will be adopted as part of the highway where the road is of distributor class. Where sight line areas are not adopted it will be a condition of planning consent that these sight lines areas are not obstructed.

The Highways team are always on hand for early discussions and assistance prior to submitting detailed applications.

The team at SMBC are also able to offer the following services:

- Full design of road layouts for access roads and estate roads
- Construction of roads through our partner contractor Balfour Beatty
- Design, installation and maintenance of street lighting
- Landscaping design, installation and tree planting
- Travel Planning

These services are available at competitive rates and offer the benefits of right-first-time solutions and timely adoptions.

SERVICES OFFERED BY SMBC

SMBC offer a host of design based services. If the proposals are designed by SMBC they would **not be** subject to a technical approval charge. The services SMBC offers are detailed below.

Street Lighting

SMBC Street Lighting Team has the expertise to design and install street lighting layouts for Section 278 and Section 38 Schemes. If designed and installed by SMBC then the team are able to maintain the system before adoption. Street Lighting layouts designed by SMBC will

receive automatic technical approval, therefore, SMBC designed schemes would not be subject to a technical approval charge.

If you would like a quotation for a street lighting design please contact Darron Allen, darronallen@solihull.gov.uk, 0121 704 6535.

Traffic Signals and Controlled Crossings

SMBC Urban Traffic Control Team has the expertise to design and implement traffic signal junctions and signal crossings for Section 278 and Section 38 Schemes. Traffic signal controlled layouts designed by SMBC will receive automatic technical approval, therefore, SMBC designed schemes would not be subject to a technical approval charge.

If you would like a quotation for a traffic signal layout please contact James McNeil, jmccneil@solihull.gov.uk, 0121 704 7100.

Landscaping

Solihull Council's award winning Conservation & Historic Environment, Landscape Architecture, Urban Design and Ecology Team can provide a wide range of complementary services to protect and enhance the local built and natural environment, local character and distinctiveness; where biodiversity is valued and resources are used efficiently. Our place making expertise seeks to promote sustainable development, safe walkable neighbourhoods and to promote civic pride through high quality public realm.

Below are some examples of the services the team could provide:

- Landscape Design, Planting Plans and Construction;
- Urban Design, Master Planning and Public Realm Design;
- Ecological Surveys and Assessment;

Solihull MBC Developers Design and Adoption Guide



- Habitat Creation, Management, Mitigation and Restoration Schemes.

For further information please visit the team's web site:

<https://socialsolihull.org.uk/peopleplacenature/>

If you would like a quotation for survey, design and management services please contact Mike Eastwood meastwood@solihull.gov.uk, 0121 704 6391

All other S38 / S278 / S184 General Enquiries

Please contact Duljit Madahar Duljit.madahar@solihull.gov.uk 0121 704 6487

HIGHWAY AGREEMENTS

Section 38 Agreement

Section 38 of the Highways Act 1980 allows SMBC as Highway Authority to enter into a legal agreement with a Developer to adopt highways, provided they are constructed to SMBC's requirements, standards and specifications.

Road adoption is a term used to describe the Council taking on maintenance/ ownership of a new street. A 'private street' is a street which is not maintained at public expense and means that the Highway Authority has no responsibility for its maintenance.

In the case of existing private streets which have not been constructed under a Section 38 Agreement, the Council may, if requested to do so, adopt the street providing they are of a suitable standard. In some cases they may require additional work to be carried out to bring them up to adoptable standards under Section 228 of the Highways Act 1980.

Section 278 Agreement

Where schemes require alterations or improvements to the existing public highway, Section 278 of the Highways Act 1980 allows for SMBC to enter into a legal agreement with a Developer to enable the Developer to make alterations or improvements to the public highway.

The works must be carried out by SMBC's term contractor or a contractor approved by SMBC. The Developer is normally responsible for all aspects of the works on the public highway, from design through to supervising construction and ensuring that the works are fully and finally completed to SMBC's satisfaction.

Combined Section 38 and Section 278 Agreement

Section 38 Agreements may be combined with a Section 278 Agreement if works on the existing highway are involved. Section 278 Agreements may also be combined with a Section 38 Agreement if adoption of land forming part of the altered/improved highway is required.

Section 184 Licence – Application

Applications for alterations to an existing access or formation of a new vehicle access serving more than one domestic dwelling, a commercial or industrial development will be dealt with by the Highways Team as a S184 Licence. The reason for this is to provide a consistent approach throughout the Borough and to ensure fees are imposed which cover the time spent on the applications. We will ensure accesses are constructed so that they are fit for purpose and meet the requirements of any relevant planning conditions.

What needs to be done before any works commence?

- The cost of the works should be secured in the form of a bond, or a cash deposit.
- Our inspection fee is paid on submission of the application.
- Detailed engineering plans are submitted to and technically approved by a highways officer.
- Following technical approval a S184 permit is issued.
- Statutory undertakers should be contacted to locate any issues with existing services.
- You must indemnify us (protect us from legal responsibility) against any claims by third parties arising from the highway works. Before we will approve your contractor they must provide us with written evidence that they have, as a minimum, £5 million public liability insurance with no limit on the number of claims.
- A pre-start meeting should be arranged with the relevant highways officer (details will be provided with notification of technical approval). At least five working days' notice should be given before any works commence. You will need to contact the Highways Team in order to get the works inspected.

How can I get the S184 deposit/bond returned quickly?

The process of reaching technical approval of the plans should be completed well before any works commence. The works should be constructed to our standard and inspected by the relevant member of the area office. When the Inspector, on behalf of the Highway Authority, is satisfied that the access has been constructed fit for purpose a provisional certificate of completion will be issued and the deposit/bond will be reduced to £5000 or 25% (whichever is greater). The remainder will be returned after a 1 year maintenance period.

Can I have my bond reduced if I carry out partial construction of the works?

No. A provisional certificate that will enable reduction of the bond will only be issued if all the works are completed to the satisfaction of the SMBC officer.

What is a satisfactory construction standard?

For the design requirements see the SMBC design guide The Guide is available from the SMBC website. We will also ask for the private access drive and any turning space to be surfaced with tarmacadam, concrete or similar hard bound material (not loose aggregate) for a distance and depth, dependent on the use, behind the highway boundary. This is to reduce the possibility of deleterious material being deposited in the highway (loose stones etc.).

How do I get Technical Approval for my access?

You will be required to submit plans showing the following items:

- Details of access onto the highway including gradients (generally 1:10 max).
- Details of surface water such that it does not run onto the public highway.

- Clearly defined delineation details showing extent of public highway.
- Prominently located signs/street nameplates with the words “Unadopted Private Drive”
- Standard construction details to Solihull MBC specifications.
- Any additional site specific details & requirements of the planning permission.

In some instances the scope of a Section 184 Agreement may be extended to cover additional minor works such as relaying a short length of kerbing either side of a new access, re-positioning a road gully, or for the provision of a street light to illuminate the access.

The works will be placed on the highway register as a permanent record for future searches from third parties.

Surety / Bond

To protect the Council, the Developer will be required to provide a financial security in order to ensure that there is adequate provision to allow the Section 38 / 278 Works to be completed should the Developer default on his obligations under the Section 38/278 Agreement. This may include unfinished or defective works. The bond amount calculation is mentioned later within the Fees and charges section:

Please note: if a Road Safety Audit Stage 4 (RSA 4) is required the remaining bond will be retained until completion of the RSA 4 and associated works.

The security may be in the form of:

- a bond in SMBC’s agreed format with a reputable financial institution (Bank/Insurance company) approved by SMBC
- a deposit of the equivalent sum deposited with SMBC until issue of the final certificate of completion of the Section 38/278 works.

SMBC reserves the right, having given notice to the Developer, to use this surety to carry out works if tasks, have not been completed within 30 days of the end of the maintenance period.

Entering into a Section 38 / 278 Agreement

The Developer is advised to consult SMBC’s Planning and Highway sections, in good time, prior to submitting an application for planning permission. Especially if the proposed highway works are extensive. This will provide an opportunity to discuss new ideas, identify potential pitfalls and resolve any highway issues relating to the proposed development prior to submission of any planning application.

- Before entering into a Section 38/278 Legal Agreement the Developer must:

- Obtain full planning permission for the development from the planning authority.
- Obtain Technical Approval from the highway Services.
- Prove title to the land proposed to be dedicated as public highway within the Agreement.

To commence the Section 38/278 adoption procedure, the following should be submitted to SMBC:

- Covering letter indicating the type of agreement the Developer wants to enter into, i.e. S38, S278 or combined S38/278 Agreement
- Completed S38/S278 application form
- An application Technical Review fee.
- Electronic copy (in pdf format) of all information submitted for technical approval

Fees / Payments to SMBC

Fees Payable with Timeline

- **Technical Review Fee** – Payment of the Technical Review Fee shall be made before commencement of the technical review process. Payment of all outstanding fees shall be made before issue of the Technical Approval letter.
- **Legal fees** will be charged separately by SMBC Legal Team.
- **Construction Supervision and Post Completion Work Fees** – Payment of the estimated construction supervision and post completion work fee shall be made prior to the relevant S38 / S278 agreement being signed.
- **Testing** - All schemes will be subject to testing of the construction materials. The cost of this testing is dependent upon the size of the scheme.
- **Adoption Fees** – Time spent on undertaking adoption process will be invoiced monthly, with the final payment (including VAT) being made before issue of the Adoption Certificate.
- **Supplementary Fees** - The Developer will also be responsible for payment of all additional fees incurred by the Council for design checks and design reviews carried out for non-standard / specialist items of work. For Section 38 works, the Technical Review Fee calculations are based on an estimate of the costs of construction of a standard highway, i.e. carriageway, footway and verge. It does not include for any non-standard / specialist items. Specialist items of work may include structures and major junctions both new and alterations to existing.
- **Additional Fees** - Work in addition to that listed in the fee estimate (i.e. additional meetings, reviews and responses, dealing with any matters arising from Asset Management Audits, the initial liaison with local residents, stakeholders and emergency services etc) may incur additional fees.

Summary:

Fee	How calculated	When Payable
Technical Review Fee	Based on estimated works cost	Before commencement of the technical review process
Legal Fees	Fixed charge	Before completion of the S278 / S38 Agreement
Construction Site Supervision and Post Completion Work	Based on estimated works cost and time charged.	Before completion of the S278 / S38 Agreement.
Commutated Sums	Based on scope of works	Before completion of the S278 / S38 Agreement.
Testing	Based on scheme cost	As requested, but before issue of the Adoption Certificate
Safety Audits	Fixed Charge	If the Highway Authority's response is required, payment is required before issue of the HA's response.
Supplementary Fees	Varies	In advance/on request. For site inspection of non-standard items will be payable within 21 days of commencement of works on site
Additional Fees	Time Charged	In advance/on request.
Adoption Fees	Time Charged	Before issue of the Adoption Certificate (Estimate)

Calculation of the Bond

The bond is calculated by using 150% of the estimated works cost or either the tendered works price if known of which the highest figure is used. A 20% contingency will also be added to this figure.

The Bond amount is reduced to 50% of the Works cost after the substantial completion certificate is issued.

The Bond is fully released when the Final Completion Certificate has been issued and Final Adoption completed.

Traffic Regulation Orders and Statutory Notices

The Developer will be responsible for all costs and expenses associated with any Traffic Regulation Orders and statutory notices that are required as a result of the Works.

Note:

An additional fee will be charged for any supplement or alteration to the proposal requested by the Developer after granting of Technical Approval or post completion of the Agreement, unless the change is at the specific request of SMBC.

The Land Compensation Act 1973 And The Noise Insulation Regulations 1975

Under the Land Compensation Act 1973 people affected by the proposed development works may be entitled to claim compensation if the value of their property is depreciated by noise and other specified physical factors arising from the use of a new or altered highway.

The Noise Insulation Regulations 1975 require SMBC to offer noise insulation or grants to occupiers of dwellings subjected to noise at or above the specified level due to the use of a new or altered highway.

The Section 38 / S278 Agreement contains a clause requiring the Developer to indemnify SMBC against the full costs of any payments and fees SMBC make under these regulations and any other third party claims. SMBC will notify the Developer of any claim received and also about any offers of noise insulation.

THE TECHNICAL APPROVAL PROCESS

Information

The S38 / S278 highway works associated with your development will be progressed through Highways Services for technical review and delivery. We would be happy to arrange to meet you to discuss your scheme further if you would like to suggest some dates / times which are convenient.

S278 and S38 schemes are delivered through a phased approach, with the Developer (or their agent) working with Highway Services to progress the scheme to construction. The two phases are summarised below. It should be noted that legal fees will be charged separately by SMBC's Legal Team.

No S38 / S278 works shall commence on site until the Technical Approval and Legal Agreement are in place. If any S38 / S278 works have been undertaken prior to these approvals being granted then the works will be carried out under the developers own risk and will lead to complications to the adoption process.

Phase 1 – Technical review

In the (usual) case where the Developer has appointed their own Principal Designer and design team, the design for the highway works must be subjected to a technical review by the Council's engineers, for which a fee is payable in advance. The fee is based on the cost of the works. We will need a general arrangement drawing in .DWG format in order to prepare our estimate.

The purpose of this review is to ensure that the scheme is suitable for the highway. The drawings and the detail required for the technical review is set out in Appendix 2 and 3 of this document. It is strongly recommended that this is passed to the developers design team as soon as possible.

Phase 2 – Site supervision and post-completion work

SMBC will inspect construction of your works using a Site Engineer and a Clerk of Works, and where appropriate, other specialist disciplines. The Developer or agent will be expected to be responsible for the day-to-day supervision of the road works construction. The developer must manage the commercial aspects of contract administration through the construction phase, albeit with some decisions needing our prior approval.

The developer must give SMBC staff access to the works in progress at all times, if problems arise, we will be happy to discuss possible solutions with you, but it will still be the responsibility of the Developer / Contractor to make sure that the works are satisfactorily completed in accordance with our requirements and specification.

Timescales

It is difficult to give any indication of timescales for each of the phases; however we will work closely with you to understand the aspirations for a start date on site. The main determining factor though is the quality of the information provided by the design team for the technical review phase which is why it is important that they have early sight of our requirements.

Design Submission

To ensure that the Section 38/278 Works are carried out in a manner and to a standard that is acceptable to SMBC, detailed proposals must be submitted for review and approval this is referred to as Technical Approval.

To enable a comprehensive check to commence a full set of design documents must be provided and fee; only on receipt of this submission can the 6 week timescale begin. All drawings and plans provided must be drafted by competent highway design consultant(s) and specialists appointed by the Developer.

SMBC will only grant Technical Approval when:

We have reviewed all information submitted

The Developer has supplied any additional or amended details requested.

Only when the review process is complete, and the Agreement is complete can work commence on site.

Note:

The Developer will be required to enter into a formal agreement with Severn Trent Water in respect of sewers and pumping stations in accordance with Section 104 Water Industry Act 1991 and provide written assurance that Severn Trent Water will adopt sewers within the Section 38/278 Works. Private sewers within the Section 38/278 Works are not accepted by SMBC and will not be adopted. Adoption of the Section 38/278 Works cannot take place until proof of the adoption of the private sewers etc. by Severn Trent Water has been provided to SMBC.

Design Standards

SMBC is keen to receive new innovative designs and has produced a Design guide as its highway design standard for new developments. The design proposal should hold true to the aims of this and any other design manuals SMBC has adopted. Where the SMBC guide does not provide detailed guidance, e.g. the design of major junctions, DfT DMRB standards should be adopted. The Developer should seek confirmation from SMBC of the appropriate design standards to be used. The proposal must also be in compliance with current legislation relating to highway matters. SMBC will expect the design to be in accordance with current guidance and recommendations issued by the DfT, however we do recognise that each situation has to be considered according to specific site characteristics.

Note:

SMBC uses Warwickshire County Council's (WCC) Highway Construction Details (HCD), unless otherwise agreed, the most recent version of these can be found at www.warwickshire.gov.uk/highwayconstruction.

Phased Construction

Developments which are proposed to be carried out in phases **MUST** have a turning facility provided at the end of any unlinked roads until the link into a further phase is provided.

Committed Sums

SMBC shall seek committed sums for:

- All Non Standard Footway and Carriageway Surfacing materials..
- Highways Structures (including walls, culverts, bridges etc) and Special Features etc.
- Street Lighting, Street Furniture, Traffic Signals and illuminated road signs
- Landscaping within the proposed highway, including trees; and shrubs.
- All drainage methods including Kerb Drainage, Gullies, ponds, etc
- Fencing and VRS safety barriers.
- Rain Gardens
- Public Art
- Public open spaces

Safety and Quality Audits

In line with good practice the Developer must commission and submit Stage 1/2 Road Safety Audits for proposed Section 38/278 works, and make all subsequent changes agreed by SMBC as the local highway authority required to address any road safety issues identified in the audit(s). Safety Audits must be carried out by an accredited Safety Audit team that is independent from the Designer(s) and approved by SMBC. We do encourage shared space and other novel designs so please bear this in mind when carrying out Safety Audits. The Developer will be responsible for commissioning and paying for all Safety Audits and corrective actions. SMBC will require Safety Audits for all highway works covered by S278

Agreements. RSA 3 and the Designers Response must be carried out within 1 month of the Substantial Completion for all S38 / S278 works.

Note:

For further information please see:

http://www.solihull.gov.uk/portals/0/ParkingTravelRoads/Road_Safety_Audits.pdf

Traffic Regulation Orders

Where a development requires changes to an existing traffic regulation order (TRO) or a new TRO is required, the Developer will be required to pay all costs associated with this, including all consultation, advertising and legal costs. TRO's are subject to statutory procedures and consultations. This can be a very lengthy process and a successful outcome is not guaranteed. The Developer is advised to seek advice on the likely timescale and take this into account when programming the proposed works. Examples of TRO's are:

- waiting restrictions
- speed limits
- banned movements
- prohibitions of driving
- residents' parking schemes

Traffic Calming and Other Traffic Management Schemes

Where the works involve the introduction of new traffic calming features on existing highway, e.g. road humps, the developer will consult interested parties, such as emergency services, bus companies, parish or town council, councillors and residents. This may include a public exhibition and other consultations beyond minimum statutory requirements. Statutory consultation under S90 of the Highway Act 1980 is required in respect of any vertical traffic calming measures proposed on existing highway. After SMBC has received and analysed

comments, a decision will be forwarded to the Developer. The Developer must incorporate in the design any changes resulting from the consultation process.

The Developer must pay all costs in connection with the consultation process whether or not the outcome is successful.

Stopping Up of Public Highway

In instances where a scheme requires the permanent closure of existing public highway a Highways Stopping Up Order will be required.

Stopping Up requests related to development are typically dealt with through the planning process and should be highlighted at the time of your application and referenced within it. Stopping up requests which include all-purpose highway will normally be dealt with by the National Case Work Team and applications should therefore be submitted directly to the DfT.

Further information on this process is available here:

<http://www.gov.uk/government/publications/stopping-up-and-diversion-of-highways>.

Applications affecting footpaths, bridleways and cycle tracks only are dealt with by the Local Authority under Section 257 of the Town and Country Planning Act 1990. Such orders are only made by the Council as the Local Planning Authority to enable development to be carried out.

Should a Developer wish to apply to stop-up or divert a public footpath, bridleway or cycle track to enable a development to be carried out, please ensure that the matter is raised with the planning officer and is referenced in any subsequent planning application.

Street Naming and Numbering

SMBC is responsible for the naming and numbering of streets within the Borough. The Developer is advised to submit their application for new postal address / alteration to the Planning Department.

CONSTRUCTION STAGE

Information required prior to start of works

Where works are proposed to be carried out under a Section 38 / 278 Agreement, the Developer must not begin construction unless and until:

- technical approval has been granted;
- A Dilapidation survey of the access roads surrounding development has been undertaken and agreed with SMBC.
- the Section 38/278 Agreement has been completed and signed and an appropriate surety is in place;
- SMBC has been provided with written confirmation that the Developer has notified the Health and Safety Executive (notification via form F10) that they are client for the works for the purposes of the Construction (Design and Management) Regulations 2015
- Principal Designer (Safety) has been appointed, and details of the appointment have been provided/agreed with SMBC
- all necessary fees have been paid to SMBC;
- SMBC has been provided with details of the appointed Contractor in order for SMBC to validate the Contractor's suitability to carry out the Section 38/Section 278 Works.
- SMBC has been provided with evidence of the appointed Contractors public liability insurance.
- SMBC has been provided with and approved the traffic and pedestrian management proposals for any works on existing highways (S278) in connection with the development.
- a pre-start meeting has been held with SMBC representatives

Notification of start of works

The Developer must give SMBC notice in writing of their intention to begin S38/278 works. For works of more than 10 days duration the notification period is at least 3 months. The Developer is advised to contact SMBC's Street Works section for further information on the notice period required for the extent/nature of the proposed works.

In addition to notifying SMBC, the developer may be required to notify local residents / businesses in the immediate vicinity of the site and road users via appropriate signage, details of which should be agreed with SMBC in the first instance.

Pre-start meeting

The meeting should be attended by the Developer, Designer, Contractor and, SMBC's officers from Highway Services and Neighbourhood Services.

Health and safety

The Developer must comply with all aspects of the Construction (Design and Management) Regulations 2015 and indemnify SMBC against all claims, liabilities and actions should they fail to do so. The Developer is also required to submit full details of any traffic management proposals in accordance with Chapter 8 of the Traffic Signs Manual as published by the DfT for the construction of the road works for approval by SMBC officers in Highway Services.

Site inspections

Inspection of the Section 38 / 278 Works will be carried out by SMBC officers in Highway Services. The Developer must provide access to inspect the works at all times. The Developer retains responsibility for supervising the work and for making sure that it is carried out in a proper and safe manner, and in line with the specification. If problems arise, SMBC will consider possible solutions with the Developer, but it will still be the Developer's responsibility to instruct the Contractor and make sure that the works are satisfactorily completed in accordance with SMBC's requirements.

Timescale for completing works

Once the works have commenced, it is the Developer's responsibility to complete the works to SMBC's satisfaction within timescales in the agreed programme of works, and to make sure adoption takes place within a reasonable timescale to minimise any potential risks or inconvenience to residents.

Note:

Any anomalies/amendments encountered following completion of the S38/278 Agreement and before the issue of the Final Certificate will require formal amendment to the plans appended to the Section 38/278 Agreement. This may require the completion of a Supplemental Agreement. The Developer will be responsible for any costs associated with the drafting and completion of the Supplemental Agreement and any additional supervision fees that may be required.

Other Requirements:

During the construction phase, the Developer will be required to provide SMBC with revised Works Information, including revised drawings and revised information (as and where necessary), to allow SMBC to review and approve if appropriate.

MAINTENANCE AND ADOPTION

Combined S38/278 Works

Substantial Completion Certificate

The Substantial Completion Certificate must be formally requested in writing by the Developer from SMBC. The Certificate will be issued once the following Section 38/278 Work items have been completed (including completion of any defective works) in accordance with the approved drawings and to the satisfaction of SMBC:

- All highway drainage.
- All kerbs and foundations and where appropriate kerbs including lowering at vehicle and pedestrian crossings.
- Carriageway sub-base, base course and any supporting structures thereto.
- Carriageway binder course and surfacing .
- Demarcation of sight lines and clearance vision splays.
- Pedestrian access ways/areas
- Carriageway surface course and/or carriageway binder course
- Vision splays and verges
- Street lighting
- Street furniture
- Street name plates
- Road markings (if applicable)
- All other works described in the Specification and shown on the Drawings
- Where required, Stage 3 Road Safety Audits completed and all changes required carried out satisfactorily.

Following a request for the Substantial Completion Certificate

The inspection process is as follows:

- i. As soon as is reasonably practicable a joint inspection of the Section 38/278 Works will be undertaken by SMBC and the Developer. SMBC will produce and supply a Defects List (if applicable) to the Developer.
- ii. The Developer will within 1 month from the date of receipt (or such other period of time as notified in writing by SMBC) complete the works as identified on the Defects List.
- iii. When SMBC is satisfied all works identified have been carried out in accordance with the Section 38/278 Agreement and to SMBC's specification or as otherwise directed by SMBC, the Part 2 Certificate will be issued. The issue of the Part 2 Certificate will commence the 12 months maintenance period. The bond supporting the Agreement will then be reduced. The Developer will remain fully responsible for maintaining the works until the Final Certificate of Completion is issued.
- iv.

Note:

The issue of the Part 2 Certificate will constitute the road being 'first open to public traffic' for the purposes of Section 1(9) of the Land Compensation Act 1973. The Section 38/278 Agreement will make provision for the Developer to indemnify SMBC from any claims relating to the works including those made under the Land Compensation Act 1973.

Even though the road is 'open to public traffic' it will not, in respect of the Section 38 Works, constitute the road becoming highway maintainable at the public expense. The road will remain private until the Final Certificate of Completion is issued. Similarly, in respect of any Section 278 Works carried out, the works will not be deemed to form part of the highway maintainable at public expense until the issue of the Final Certificate of Completion and Developer will be responsible for all maintenance activities such as cleansing, grass mowing, etc.

Defects and Notice to Surety

SMBC may without prejudice to any other rights, claim or seek remedy under the Section 38/278 Agreement:

- In respect of an Agreement supported by a Bond or Surety, send to the Surety a Notice in writing ("Default Notice") specifying the works required to be carried out, containing an estimate by SMBC of the cost of carrying out the outstanding works and of the cost of administration, supervision, execution, completion and maintenance of the works for a period of 12 months prior to the road(s) becoming a highway maintainable at the public expense, or in the case of existing highway forming part of highway maintainable at the public expense.
- In the case of the financial security being in the form of a cash deposit lodged with SMBC, send to the Developer notice in writing ("Default Notice") specifying the work to be carried out, containing an estimate by SMBC of the cost of carrying out the outstanding works and of the cost of administration, supervision, execution, completion and maintenance of the works for a period of 12 months prior to the road(s) becoming a highway maintainable at the public expense, or in the case of existing highway forming part of highway maintainable at the public expense, and without further notice to the Developer apply the sum held upon deposit in the execution of carrying out the defective works.

Final Certificate

At the end of the 12 month Maintenance Period the Developer must request in writing the Final Certificate from SMBC. Prior to adoption, the Developer will be required to submit a copy of the completed Health and Safety File in accordance with the Construction, Design and Management 2015 Regulations.

The inspection process for the issuing of the Final Certificate will follow the process outlined above for the issue of the Substantial Completion Certificates. If SMBC is satisfied that all works identified have been carried out in accordance with the Section 38/278 Agreement and SMBC's specification or as otherwise directed by SMBC, the Final Certificate will be issued.

The issuing of the Final Certificate is notification to the Developer of adoption of the Section 38/278 Works by SMBC. Any roads open to public traffic forming part of the Section 38/278 Works will be highway(s) maintainable at the public expense. The Bond or deposit provided in support of the Agreement may now be cancelled / refunded.

Should the Developer not have carried out the defective works, (if any), nor requested the Final Certificate within 12 months of the date of issue of the Substantial Certificate, SMBC may apply the remedies set out in the section entitled 'Defects and Notice to Surety' above.

S278 Works

The Certificate of Substantial Completion

The Certificate of Substantial Completion must be formally requested in writing by the Developer from SMBC. The Certificate will be issued once the Section 278 Works have been completed (with the exception of minor defects) in accordance with the approved drawings and on completion of the Stage 3 Road Safety Audit, and resolution of any remedial items identified in the Audit and agreed by SMBC to be required for reasons of road safety.

Following a request for the Certificate of Substantial Completion the site inspection process will be as follows:

- i. As soon as is reasonably practicable a joint inspection of the Section 278 works will be undertaken by SMBC and the Developer. SMBC will either issue the Certificate of Substantial Completion and supply a Defects List (if applicable) to the Developer, or confirm a list of outstanding items required to be completed.
- ii. The Developer shall within 12 months from the agreed date of Substantial Completion (or such earlier period of time as notified in writing by SMBC) referred to as the Defects Correction Period complete the works as identified on the Defects List.
- iii. When SMBC is satisfied all works identified have been carried out in accordance with the Section 278 Agreement and to SMBC's specification or as otherwise directed by SMBC, the Certificate of Substantial Completion will be issued. The issue of the Certificate of Substantial Completion will commence the 12 month Defects Correction Period. The Bond supporting the Agreement will then be reduced. The Developer will remain fully responsible for maintaining the works until the Final Certificate of Completion.

Note:

The issue of the Certificate of Substantial Completion will constitute the road being 'first open to public traffic' for the purposes of Section 1(9) of the Land Compensation Act 1973. The Section 278 Agreement will make provision for the Developer to indemnify SMBC from any claims relating to the works including those made under the Land Compensation Act 1973.

Even though the road is 'open to public traffic', in respect of the Section 278 Works carried out, the works will not be deemed to form part of the highway maintainable at public expense until the issue of the Final Certificate of Completion. The developer will carry out the following maintenance activities.

- Sweeping/cleaning/litter picking
- Grass cutting
- Gully emptying
- Street lighting
- Landscape maintenance

Defects and Notice to Surety

If the defect works as set out in the Defects List have not been completed, SMBC will seek/consider legal advice to ensure the works are completed. SMBC may without prejudice to any other rights, claim or seek remedy under the Section278 Agreement:

- In respect of an Agreement supported by a Bond or Surety, send to the Surety a Notice in writing ("Default Notice") specifying the works required to be carried out, containing an estimate by SMBC of the cost of carrying out the outstanding works and of the cost of administration, supervision, execution, completion and maintenance of the works for a period of 12 months prior to the road(s) becoming a highway maintainable at the public expense, or in the case of existing highway forming part of highway maintainable at the public expense.
- In the case of the financial security being in the form of a cash deposit lodged with SMBC, send to the Developer notice in writing ("Default Notice") specifying the work to be carried out, containing an estimate by SMBC of the cost of carrying out the outstanding works and of the cost of administration, supervision, execution, completion and maintenance of the works for a period of 12 months prior to the road(s) becoming a highway maintainable at the public expense, or in the case of existing highway forming part of highway maintainable at the public expense, and without further notice to the Developer apply the sum held upon deposit in the execution of carrying out the defective works.

Certificate of Final Completion

At the end of the 12 month Defects Correction Period the Developer must request in writing the Final Certificate from SMBC. Prior to handover/adoption, the Developer will be required to submit a copy of the completed Health and Safety File in accordance with the Construction, Design and Management 2015 Regulations.

The inspection process for the issuing of the Final Certificate will follow the process outlined above for the issue of the Certificate of Substantial Completion. If SMBC is satisfied that all works identified have been carried out in accordance with the Section 278 Agreement and SMBC's specification or as otherwise directed by SMBC, the Certificate of Final Completion will be issued.

The issuing of the Certificate of Final Completion is notification to the Developer of adoption of the Section 278 Works by SMBC. Any roads open to public traffic forming part of the

Section 278 Works will be highway(s) maintainable at the public expense. The Bond or deposit provided in support of the Agreement may now be cancelled / refunded.

Should the Developer not have carried out the defective works, (if any), nor requested the Final Certificate within 12 months of the date of issue of the Certificate of Substantial Completion, SMBC may apply the remedies set out in the section entitled 'Defects and Notice to Surety' above.

HEALTH & SAFETY/ROAD SAFETY AUDITS AND QUALITY AUDITS

Road Safety Audits and Quality Audits

Road Safety Audits or Road Safety Reviews in accordance with DfT standard HD 19/03 and or SMBC's Road Safety Audit policy will be required on all developments that require alterations to the existing public highway. SMBC's road safety officers will confirm if Road Safety Audits are required for other developments. SMBC's road safety officers will also decide if Vulnerable Road Users Audits are required for any particular site.

The developer will be responsible for arranging and submitting Road Safety Audits and / or Quality Audits in line with Solihull Council's Road Safety Assessment Policy and Procedure (a copy of which is available on the SMBC website). This will include submission of Audit reports along with the designer comments, for review and response. Prior to the issue of the Substantial Completion Certificates (Section 38 Agreements) / Substantial Completion (Section 278 Works), the developer will be responsible for submitting a Stage 3 Road Safety Audit, for review and response, prior to the final adoption.

Note:

The Developer should refer to SMBC's Road Safety Audit policy for the requirements for Quality Audits.

Attention is drawn to the timing of these audits and their likely duration that may have programme implications for the development.

The Developer shall obtain SMBC approval of the Audit Team in advance of the Audit.

Departures from Standards

Where necessary, the Developer shall provide Proposed Departure from Standards Applications. Each Application shall state:

- The design standards to which the Departure(s) relate(s);
- The precise details of the Departure(s); and
- The justification for the Departure.

The Application shall be in the form of a report containing all of the information needed to assess it.

The Construction (Design and Management) Regulations 2015

Before works start, the Developer must provide written proof that they have informed the Health and Safety Executive in writing that they are appointed client for the works for the purposes of the Construction, Design and Management 2015 Regulations (CDM Regulations). SMBC will not sign the Agreement until the Developer has provided this proof.

(Note: As defined in the CDM Regulations, client means any person for whom a project is carried out. As client for the works, the Developer will be responsible for meeting the Regulations and making sure that the works are designed and constructed in line with the Regulations). Prior to Final Completion and adoption, the Developer will be required to submit a copy of the completed Health and Safety File in accordance with the Construction, Design and Management 2015 Regulations.

**APPENDIX C
SUBMISSION FOR TECHNICAL APPROVAL -
DRAWING / INFORMATION CHECKLIST**

This list is intended to enable Developers to check that all aspects of the design have been included and/or are adequate for submission to SMBC. However, it must be noted that this list is not necessarily comprehensive and that additions/omissions may be appropriate and requested for each development.

Application/Submission for Technical Approval	
	<p>An application is made for Technical Approval for a new road(s) or for work on the existing highway to be constructed in accordance with SMBC Materials / Design Specifications and “Manual for Streets” to be considered for adoption as a road maintainable at public expense. The application should include:</p> <ul style="list-style-type: none"> • Covering letter indicating that the Developer wants to enter into a Section 38/278 Agreement • Proof of ownership of the land (S38 works). A copy of the conveyance, or up-to-date copy entries and filed plan if the plan is registered at HM Land Registry • Land dedication plan (if applicable (S278/38)) • Completed application form • Application fee • A copy of the planning permission • Stage 1 and 2 safety audit or quality audit as agreed with SMBC. • complete and compliant set of drawings (in electronic pdf format as listed below): <ul style="list-style-type: none"> • 1:2500 or 1:1250 scale A4 location plan showing the planning application site boundary edged red; • General Engineering Arrangement/Layout Plans (minimum scale 1:500), including details of service routes, tree and lighting locations. • Cross sections and longitudinal sections of the proposed road. <ul style="list-style-type: none"> a) longitudinal section on the centre line of each road showing: <ul style="list-style-type: none"> - existing ground levels and proposed centre line and channel levels at a

maximum of 20m intervals related wherever possible to Ordnance Datum or otherwise to an identified datum

- the section should also show distance in figures from the point of origin,
- gradients of the proposed road, length and radius of vertical curves

- and invert levels of manholes;
- proposed pipe sizes and gradients between manholes.

- Suitable scales are 1/500 horizontal and 1/100 vertical

b) cross-sections should be provided where necessary at appropriate intervals to a natural scale of 1/100 showing:

- existing and proposed levels; these should show crossfalls of carriageways and footways and cutting and embankment levels and slopes,

- together with any retaining walls adjacent to the proposed highway; whether or not they are part of the adopted highway;

- kerb and pavement construction details should be shown on a typical cross-section

- Complete construction details
- Surface and foul water drainage plans (minimum scale 1:500)
- A plan showing the general Street Lighting arrangement, to include all columns, illuminated signs and bollards.
- Lighting calculations to support the street lighting arrangement
- Details of landscaping including species and tree pits / planting details.
- A3 Adoption/Legal Plan
- Stopping Up Order Plan
- AutoTRACKing details.
- Surfacing Drawing.
- Section 104 Adoptable Drainage Details.

APPENDIX D INFORMATION TO BE SHOWN ON DRAWINGS

General Note:

- Please make sure that information on drawings is legible
- The extent of the development site boundary should be shown on all relevant drawings.
- Include north point on all relevant drawings.
- Housing/ building information should be shown in grey scale, i.e. made less prominent on drawings.
- Show current and proposed highway boundary.

Drawing	Information to be included
Location Plan	Planning application site boundary edged red
S38/S278 Legal Plan	<ul style="list-style-type: none"> • All assets proposed for adoption should be shown on key. • The full extent of the S38/S278 areas must be shown. • Include (if known) name of existing/proposed road(s)
Stopping-Up Order Plan	Include key showing proposal
Site Clearance	Include items for removal.
General Arrangement Plan	<ul style="list-style-type: none"> • Extent of scheme with key dimensions, ie, road/footway widths • Landscape proposal • Street Lighting proposal • Surface finishes • Vehicle/pedestrian crossovers
General Engineering Layout	<ul style="list-style-type: none"> • Chainages at maximum 20m intervals • Highway features, i.e. traffic calming measures, tactile paving, etc • Proposed and existing levels (clearly differentiated) • Drainage – proposed and existing • Street Lighting - proposed and existing • Landscape detail • Existing and proposed services • Visibility splays
Surfacing and Kerbing Plan	<ul style="list-style-type: none"> • Detail of surface finishes (including colour) • Detail of kerbing (i.e. type HB2, BN etc) • Location of vehicle/pedestrian crossovers • Location, type and colour of tactile paving • Highlight shared areas

Drawing	Information to be included
	<ul style="list-style-type: none"> • Location and form/type of traffic calming features
Existing and Proposed Services	Include key showing proposal
Traffic Signs, Roadmarkings and Street Furniture	<ul style="list-style-type: none"> • TSRGD Diagram numbers and markings (dimensions, traffic signs schedule, post size, mounting height, planting depth etc) • Highway features, i.e. traffic calming measures • Street name plates • Street furniture items and type, i.e. bollards, bins, seats etc
Drainage	<ul style="list-style-type: none"> • Highlight drainage proposed for adoption • Show existing and proposed detail in plan and in cross section • invert and cover levels • Any necessary consents from the Environment Agency (in the case of a watercourse being a main river), the Lead Local Flood Authority (in the case of a watercourse being an ordinary watercourse), the Canal and River Trust or Severn Trent Water • S104 Details
Cross Sections	<ul style="list-style-type: none"> • Existing and proposed levels • Ensure sections should correspond with chainages shown on plan. • Gradients
Longitudinal Sections	<ul style="list-style-type: none"> • Chainages • Existing and proposed levels • Gradients
Construction Details	Include all relevant standard details
Street Lighting	<p>Using a base plan at an appropriate scale that clearly shows the relationship to the adoption status of the highway (public, private, 3rd party):</p> <ul style="list-style-type: none"> • Location and detail of proposed and existing columns (including heights), illuminated bollards and signs • Existing and proposed cable networks (ownership should be clearly indicated if the power supply is to be provided by and Independent Distribution Network Operator (IDNO))

**Solihull MBC Developers
Design and Adoption Guide**



Drawing	Information to be included
AutoTracking Plan	<p>Movement of Refuse Vehicle (current largest refuse vehicle should be used)</p> <p>Movement of buses on bus routes</p>
Traffic Management	<ul style="list-style-type: none"> • Construction phasing • Construction Access • Site compound, storage, welfare facilities etc <p>Detailed traffic management plan for each phase of the works to be provided in advance of construction works starting.</p>
Haul Routes	<p>Details of construction traffic routes to the site to be provided for each phase of the works.</p>
Traffic Signals and Controlled Crossing	<p>This drawing (or set) should identify the layout of traffic signal and controlled crossing facilities. The detail should include:</p> <ul style="list-style-type: none"> • the locations and types of signal controllers; • the locations of traffic signal poles and signal heads, pedestrian aspects, push-button units, on-crossing detectors, kerbside detectors, microwave vehicle detectors, detection loops and any other equipment necessary for the operation of the facility or facilities; • all road markings within and around the facility or facilities and the referenced positions of all traffic signs (including bollards) within and around the facility or facilities. Road marking and traffic sign reference details should match those shown on the Traffic Signs and Road Markings drawing(s); • ducting layouts, sockets, footing/foundation details for equipment, access chambers, crossing-specific kerbing arrangements and tactile paving; and • all pedestrian guard railing within and around the facility or facilities. This should match the information shown on the Fencing and Road Restraint Systems drawing(s).
Miscellaneous	<p>This drawing (or set) should identify all works which are not covered by the other drawing titles listed. Items to consider include but are not limited to:</p> <ul style="list-style-type: none"> • work for Statutory Undertakers (to enable service diversions and the like); and • accommodation works.
Other documents to be provided	<ul style="list-style-type: none"> • A copy of the Planning Permission for the associated development, including the details of any conditions; • Details of any tree preservation orders for trees affected by the Section 278 or S38 works;

**Solihull MBC Developers
Design and Adoption Guide**



Solihull
METROPOLITAN
BOROUGH COUNCIL

Drawing	Information to be included
	<ul style="list-style-type: none">• Where relevant, a copy of any plans or drawings to be included in the Section 278 or S38 Agreement (other than Land Dedication);• A copy of the notice (Form F10) sent to the Health and Safety Executive.

Summary of information to be shown for each highway feature

LEGAL PLAN	
Highway Feature	Colour Code
Boundary of Developer's Ownership	Red outline
Land to be dedicated as highway	Yellow
Section 38 areas	Pink
Section 278 areas	Light blue
Landscape/grass areas/verges	Hatched Green over pink or blue areas
Highway drainage	Dark Blue
Street lighting	Red dot
Highway easement for future maintenance	Hatched orange over pink or blue areas
Public open space and amenity areas	Green
Road signs/road nameplates	Blue

CARRIAGEWAY	
Show in plan the following:	Show in section the following:
Width	Gradient
Horizontal Alignment	Cross sections (with gradients)
Crossfall/Gradients/Camber	Vertical Alignment (with gradients)
Junction Layout	Construction depth/details
Junction Radius	Kerb Detail
Junction Visibility	Ramp Detail
Forward Visibility	Speed Restriction Detail
Visibility Splay	Visibility Splay - Height/ Means of Retention (rear of splay)
Traffic Calming Measures – spacings etc	Existing and proposed levels
Street Lighting	
Landscape Details	
Gullies	
Kerb details	
Ramp Detail	
Service Routes	
Traffic Signs	
Existing and proposed levels	
Auto Tracking	
Surface Finishes	

FOOTWAYS/FOOTPATHS	
Show in plan the following:	Show in section the following:
Width	Cross sections (with gradients)
Horizontal Alignment	Vertical Alignment (with gradients)
Pedestrian Crossings	Construction depth/details
Pedestrian Barriers	Edging
Vehicle Crossings	Vehicle Crossing Construction
Service Routes	Pedestrian Barrier Detail
Street Lighting	Gullies
Landscape Details	Cutting Slope
Bollards	Embankment Slope
Gullies	Retaining Wall
Cutting Slope	Existing and proposed levels
Crossfall/Gradients/Camber	
Embankment Slope	
Retaining Wall	
Kerbing	
Edging	
Traffic Signs	
Existing and proposed levels	
Surface Finishes	
Street name plates	

MAINTENANCE/SERVICE MARGINS	
Show in plan the following:	Show in section the following:
Width	Cross sections (with gradients)
Pedestrian Crossings	Vertical Alignment (with gradients)
Vehicle Crossings	Construction depth/details
Service Routes	Edging
Boundary Demarcation	Vehicle Crossing Construction
Existing and proposed levels	Pedestrian Barrier Detail
	Existing and proposed levels

HIGHWAY BOUNDARY	
Show in plan the following:	Show in section the following:
Retaining Walls	Cutting Slopes
Boundary Fence/Wall	Embankments Slopes
Embankment	Retaining Walls
Cutting	Wall/Fence/Bank Details
Highway Overhang	Existing and proposed levels
Existing and proposed levels	

DRAINAGE	
Show in plan the following:	Show in section the following:
Surface Water Outfall	Surface Water Manholes
Surface Water Pipework (including sizes and gradients)	Surface Water Outfall
Surface Water Manholes	Surface Water Pipe/Gully Detail
Gully positions and associated connections	Foul Water Pipe/Gully Detail
Foul Water Pipework (including sizes and gradients)	Foul Water Manholes
Foul Water Manholes	Foul Water Outfall
Foul Water Outfall	Trench Bedding/Backfill
Existing and proposed levels	Depth of Cover
	Existing and proposed levels

OFF STREET FACILITIES (ADJACENT TO PROPOSED HIGHWAY)	
Show in plan the following:	Show in section the following:
Dimension of parking spaces	Proximity of Parking Spaces
Proximity of Parking Spaces	Drive Construction
Alignment	Parking Space Gradient
Garage Set-Back	Parking Space Construction
Drainage (Communal storage tanks in private gardens/areas are discouraged)	Drainage Details (Communal storage tanks in private gardens/areas are discouraged)
Vehicle Turning	Existing and proposed levels
Pedestrian Visibility	
Vehicle Visibility	
Existing and proposed levels	

3.Design Guidance

Key Objectives

It is important when designing new developments that the design does not only centre on highway and transportation issues but also focuses on other important aspects that make up a development and cater for the people who will use them, and not just cars.

There needs to be a clear distinction between roads and streets. Roads are essentially a highway feature that is primarily concerned with accommodating the movement of vehicular traffic. Streets on the other hand are usually lined with buildings and public spaces, and while movement both vehicular and pedestrian is still important, the place function is of more importance.

A sense of place encompasses a number of aspects but most notably in streets these are:

- local distinctiveness;
- visual quality; and
- propensity to encourage social activity.

The choice of materials to be used, street furniture, landscaping and overall layout can have a huge impact on achieving a sense of place.

Designs of new developments should meet the following objectives:

- design of high quality developments that are sustainable;
- ensure that streets are designed primarily for people / cyclists whilst still maintaining their use by other types of street users;
- link the development to the surrounding networks for pedestrians, cyclists, buses and motor vehicles;
- offer an alternative and more sustainable mode of travel to people than the car;
- pedestrian access should be designed for people of all ages and abilities;
- provide a parking system that does not dominate the street scene and is safe and secure;
- make use of simple, high quality materials that are sustainable whilst also being durable and economic in terms of maintenance; and
- design for community safety.

General Outline

To achieve the key objectives it is understood that there will need to be a greater flexibility in highway design standards in order to embrace these ideas and those presented as best practice in the Manual for Streets” (MfS). Guidance that contains too many rules and restrictions can prevent innovative schemes from being developed. However this more flexible approach will place even more responsibility on designers to ensure that their proposals are maintainable, can operate safely and are sustainable.

This guide covers the following developments that will be served by public streets. The development figures stated are typical examples and are not definitive criteria. Each development will have its own characteristics which will help define layouts and features based on location, settings, connectivity

etc. Developers are encouraged to discuss with the Council at an early stage the goals for their individual proposals:

- shared surface residential streets serving typically up to 20 dwellings;
- residential developments serving typically up to 1000 dwellings;
- mixed use developments which generate a similar level of traffic flow to that generated typically by 1000 dwellings;
- industrial and commercial developments serving typically up to 20 hectares of developable land and
- local distributor roads linking development areas.

A natural hierarchy of street and road form is specified to determine the user priority of the space created, balanced with the need to transport people and goods. The following street/road standards are covered within this guidance document:

- shared surface streets and mews courts;
- local residential streets;
- Residential Streets
- connecting streets;
- private drives
- non-residential access roads; and
- local distributor roads.

Mixed use developments need to be flexible depending on the type and intensity of non-residential use. For developments where the traffic flow is not expected to be above that which could be generated by 600 dwellings, the connecting street could provide appropriate guidance on the highway standards that may be expected. These should be agreed with the highway authority as soon as practicable.

Any street or road that is intended to serve more than 600 dwellings will need to be discussed with the Council and be designed under the general principles encouraged within these guidelines. The design should include a layout to encourage vehicles to travel at appropriate speeds, be based on predicted traffic and pedestrian flows and in accordance with appropriate elements in "Design Manual for Roads and Bridges". However if the development is to serve a larger estate than those listed above this does not mean that the design principles set out in this document should not be adhered to. The guidance given for local distributor roads needs to be formally agreed with the highway authority as soon as practicable.

Street Types

Residential Street Hierarchy.

When considering the layout and design of new developments a permeable network of streets will provide greater connectivity to people within the development and these linked layouts will lend themselves to a more socially acceptable aspect to the area.

Developments, whose streets end in a number of culs-de-sac, often with small uninviting alleyways linking the streets, do not promote a safe and easy route for pedestrians. Linked streets are encouraged as these will allow greater connectivity for pedestrians, cyclists and wheelchair users.

For new developments an assessment of the existing area functions surrounding the proposed site in terms of movement and place is required. This will enable the main areas to be connected and required linkages, both within and to the site, to be identified to ensure that the important desire lines can be accommodated. This process will ensure that the new development integrates with the surrounding area to enhance it rather than disrupting it or acting as an environment that becomes curtailed from the surrounding community.

The hierarchy of the streets needs to provide a logical transition from the external road networks, where motor vehicle movements are the primary concern to residential streets, where the needs of pedestrian and non motor vehicle users will come to the fore. To achieve this it is essential that the streets within a development form a hierarchy that considers the levels of vehicle and pedestrian/cycle activity that each should accommodate together with specific requirements for bus routes.

Culs-de-sac should be avoided in residential developments but sometimes due to boundaries or other

site constraints, layouts may dictate their inclusion. They may be useful at reducing traffic levels on some developments, however, through routes for pedestrians and cyclists from culs-de-sac should be given careful consideration and designers must ensure that pedestrian and cycle routes are overlooked preferably with active frontages.

The three types of adoptable residential streets that are set out in this design guide are as follows:

- shared surface streets, private drives and mews courts;
- local residential streets
- Residential Streets
- connecting streets.

Whilst it is recognized that there is a need to have a hierarchical system for streets in order for the Council to impose a level of control on roads that are to be adopted, the MfS warns against a rigid hierarchy that is based on vehicular movements. Therefore this guide and the streets identified within it have been designed on the basis of the number of dwellings and type and volume of traffic that are

likely to use them. This is only a starting point for the design of the streets and the choice of design elements included within it should include an assessment of place and movement as suggested in MfS section 2.4.

Shared Surface Streets

Shared surface streets are road layouts for the joint use by pedestrians and vehicles but pedestrians must visibly have priority within the street with pedestrian safety of primary concern. They may be likely to have pedestrian and cyclist activity, particularly from small children. Vehicle speeds must be very low no more than 15 mph and be self-enforcing through good design. Shared surface streets include mews courts, courtyards, squares and Home Zones.

It is essential that shared surface streets are recognised as visually and functionally distinct from other streets. This can be provided by layouts featuring gateways, changes in highway widths, changes in direction, suitable surfacing materials, landscape features and street furniture.

The commencement of the shared surface street must be associated with a road junction or a change in direction. The entrance to a shared surface street shall be defined by a shallow ramp or rumble strip. This may be reinforced by a gateway feature. Footways should be provided at the beginning of shared surface streets to beyond the entrance ramp and the start of the block paving.

Thought can be given to how different kinds of surface materials can help to distinguish on street parking areas and delineate different parts of the highway. Careful consideration of parking arrangements is necessary for the shared surface to function safely. It is important to ensure that parking facilities are adequate and conveniently sited so that vehicles are not left on the area of shared surface that is required for vehicles, pedestrians and cyclists.

The overall layout of shared streets may be formal, i.e. courtyard or informal, i.e. mews courts. The highway layout should be designed to be incorporated with the defined space but carriageways and footways may vary in width throughout the street to suit the street scene. The design should allow a vehicle movement path to be maintained throughout the street around any incorporated features such as parking spaces or landscaping elements or changes in alignments. Vehicle tracking may be required to demonstrate that minimum widths are provided to enable vehicles to safely pass through.

Service strips or maintenance verges can be paved or soft landscaped with grass. The highway boundary should be defined by continuous edging kerbs along the back of the service strip. Small pockets of land around lighting columns should be included within the adoptable area.

The shared surface can extend between buildings although vehicle paths should have a 600mm margin to any building or boundary face. Where buildings abut the street, lighting columns may be fixed to buildings subject to an agreement with the owners of the properties. The proposed adopted

highway shall drain away from any abutting buildings. Gullies or drainage channels must not be provided against buildings.

Culs-de-sac of length greater than 25m or accessed off a collecting street or higher category of road require a turning area. Culs-de-sac of length greater than 180m may require an emergency access and should be discussed with the highway authority and the fire service.

To meet the adoption standards of the highway authority a shared surface street should be designed to comply with the following requirements.

**Solihull MBC Developers
Design and Adoption Guide**



Shared Surface Street	
Number of dwellings to serve	Typically in the order of 20 in a cul-de-sac .The figures are to be taken only as a guide and may be increased depending on the development's character and layout.
Number of access points to primary roads or main network	Single access point for a cul-de-sac and two access points for a through route or loop road. Where shared surface streets join a connecting street or a road of a higher category, the first 10m length should be constructed as a local residential street to enable a gradual reduction in design speed for a shared surface.
Design speed	15 mph
Carriageway width (Only applicable where there is a designated carriageway)	Variable, but with a minimum overall adopted highway width of 7.5m. This width should provide safe provisions for pedestrians and cyclists so to ensure priority over motor vehicles.
Footway width	Not required unless a particularly strong pedestrian desire line or through route is identified through a link analysis and a separate path is required.
Verges	Maintenance verges or service strips are required. Landscape verges are not normally permitted due to maintenance liabilities but desired landscaping features may be incorporated into the overall street scene.
Length between speed control Features	Maximum 40m with initial shallow ramp or rumble strip at entrance.
Access to properties	Provide direct access to dwellings.
Pedestrian crossing facilities	Have priority - shared use.
Provisions for cyclists	Have priority - shared use.
Minimum forward visibility	20m, visibility above this should be minimised to deter excess speed.
Vertical curve	Minimum vertical curve length to be 20m or a minimum "K" value of 6.
Bend	All bends and changes in direction should be subject to a tracking analysis to confirm there are no safety implications with the layout.
Gradient	Maximum gradient 7% or 8% over short lengths. Minimum gradient 1% to comply with block paving requirements.
Crossfall	1:40
Junctions	<ul style="list-style-type: none"> • Junction radius onto a local residential street to be a maximum of 6.0m. Radius should be kept to a minimum to maintain pedestrian desire lines. Tracking shall be used to confirm suitability for use by appropriate vehicles. • Minimum length of straight before a main road channel line to be 10m and at a grade not greater than 2.5%.. • No access will be permitted off the entry radius of a bell mouth. • Private drive visibility 2.0m x 20m for a single access and 2.4m x 20m for shared drives. • Junction with main road to be 75-105 degrees.

Local Residential Streets

A local residential street will serve up to 150 dwellings. These streets may provide direct access to the existing external road network but will primarily be used to provide access to a Residential Street that will then in turn link to the development.

Vehicle tracking should be used to confirm turning radius at junctions to minimise vehicles speeds, provide safe turning movements and to maintain pedestrian desire lines where possible.

To meet the adoption standards of the highway authority a local residential street should be designed to comply with the following requirements:

Local Residential Street	
Number of dwellings to serve	Typically up to 50.
Design speed	20 mph
Carriageway width	5.0m Width Roads to be widened through bends to enable vehicles to pass safely.
Footway width	1.8m minimum footway on both sides.
Verges	1m minimum if provided.
Length between speed control Features	Every 60m. We would expect the design speed to be achieved through horizontal features – we would only seek vertical features as a last resort or in addition to horizontal features.
Access to properties	Provide direct access to dwellings.
Pedestrian crossing facilities	Safe convenient locations for pedestrian crossings will be required on desire lines, by either raising the carriageway to footway level or by the use of dropped kerbs. All crossings to have tactile paving.
Provisions for cyclists	Facilities for cyclists should be provided.
Minimum forward visibility	25m
Vertical curve	Minimum vertical curve length to be 25m or a minimum “K” value of 6.
Road Widening	radius (m) 80 60 50 40 30 20 width (m) 5.65 5.75 5.8 5.85 5.9 6.1
Gradient	Maximum gradient 7% and minimum gradient 0.7%.
Crossfall	1:40
Junctions	<ul style="list-style-type: none"> • 6.0m radius onto a residential street. Vehicle tracking shall be used to confirm suitability of junctions. • Minimum length of straight before a main road channel line to be 10m and at a grade not greater than 2.5%. • Minimum junction spacing along a road to be 20m for opposite junctions and 40m for adjacent junctions. • Crossroads are permitted. • Side road junction visibility requirement to be 2.4m x 25m. • No access will be permitted off the entry radius of a bell mouth. • Private drive visibility 2.0m x 25m for a single access and 2.4m x 25m for shared drives.

	<ul style="list-style-type: none"> • Junction with main road to be between 80 and 100 degrees.
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Residential Streets

These streets begin to provide a greater balance in use between pedestrians, cyclists and motor vehicles. They will provide for this wide range of movement modes and will be the type of streets where direct access to properties can be provided.

A residential street will serve up to 150 dwellings. These streets may provide direct access to the existing external road network but will primarily be used to provide access to a local distributor road that will then in turn link to the wider local network.

These streets will not be designed to cope with large volumes of traffic and as such the geometry of them will be different to connecting streets and local distributor roads in terms of tighter junction radii and reduced forward visibility. They should be designed as urban streets and incorporate the ideas put forward in MfS.

Culs-de-sac should be avoided where possible. If it is absolutely necessary due to boundary constraints, they should have a maximum length of 180m. Turning facilities should be provided if the cul-de-sac is longer than 25m, and if the length of the cul-de-sac is greater than 100m then additional turning facilities may be required.

Although the provision of more than one access is encouraged, where this is not possible a single vehicular access may be accepted providing the internal network forms a loop, with the shortest possible connection between this loop and the point of access.

Vehicle tracking should be used to confirm turning radius at junctions to minimise vehicles speeds, provide safe turning movements and to maintain pedestrian desire lines where possible.

To meet the adoption standards of the highway authority a local residential street should be designed to comply with the following requirements:

Residential Street	
Number of dwellings to serve	Typically up to 150.
Number of access points to primary roads or main network	Single point of access serving up to 150 dwellings – emergency accesses should also be considered.
Design speed	20 mph
Carriageway width	5.5m Width Roads to be widened through bends to enable vehicles to pass safely.
Footway width	1.8m minimum footway on one side of carriageway and a 3.0m shared cycle / ped footway on other side.
Verges	1m minimum width if provided.
Length between speed control Features	Every 60m. Not more than 10 speed reduction measures, we would expect the design speed to be achieved through horizontal features – we would only seek vertical features as a last resort or in addition to horizontal features.
Access to properties	Provide direct access to dwellings.
Pedestrian crossing facilities	Safe convenient locations for pedestrian crossings will be required on desire lines, by either raising the carriageway to footway level or by the use of dropped

	kerbs. All crossings to have tactile paving.
Provisions for cyclists	Facilities for cyclists should be provided on a shared footway with a 500mm margin between carriageway and this shared footway.
Minimum forward visibility	25m
Vertical curve	Minimum vertical curve length to be 25m or a minimum "K" value of 6.
Road Widening	radius (m) 80 60 50 40 30 20 width (m) 5.65 5.75 5.8 5.85 5.9 6.1
Gradient	Maximum gradient 7% and minimum gradient 0.7%.
Crossfall	1:40
Junctions	<ul style="list-style-type: none"> • As a guide, junction radii onto a local distributor road / connecting street to be 10.5m or 6.0m. Vehicle tracking shall be used to confirm suitability of junctions. • Minimum length of straight before a main road channel line to be 10m and at a grade not greater than 2.5%. • Minimum junction spacing along a road to be 20m for opposite junctions and 40m for adjacent junctions. • Crossroads are permitted. • Side road junction visibility requirement to be 2.4m x 25m. • No access will be permitted off the entry radius of a bell mouth. • Private drive visibility 2.0m x 25m for a single access and 2.4m x 25m for shared drives. • Junction with main road to be between 80 and 100 degrees.

Connecting Streets

These are the streets that provide the structure for any new residential development and their primary role will be to connect the development to the surrounding highway network and important places. These streets are designed to serve between 150 and 300 dwellings and provide a transition between the major roads outside the development and the streets within the residential areas. They will act as the primary vehicular access to the development and will form the spine of the permeable network of streets within the residential areas where pedestrian and cyclist movements will come more to the fore. In the design it has been considered that these routes would be used to carry bus routes through the development.

Major developments must allow for 'full size' bus penetration. Bus stops should be determined following consultation with the highway authority and confirmation will be required if bus showcase style bus boarders are required.

The streets should allow access by public transport, cater for higher traffic flows and permit some direct frontage access. The connecting street should assist in reducing vehicle speeds into local residential streets. This should be achieved by providing a traffic calming feature between 40m and 60m from the distributor road.

These streets should be kept as short as practicable.

The use of a connecting street helps to reduce the number of access points on distributor roads. On streets where more than 300vph are expected facilities for cyclists are required.

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Connecting Street	
Number of dwellings to serve	Typically between 150 - 300 dwellings and may be varied depending upon the development layout.
Number of access points to primary roads or main network	At least two point of access.
Design speed	25 mph but at particular locations, such as schools and shops, a design speed of 20mph will be required.
Carriageway width	5.5m minimum unless on a Bus route is provided should be a minimum of 6.75m
Footway width	3.0m minimum shared cycle / pedestrian footway on both sides
Verges	1.0m minimum, increased to 3m minimum where trees are included.
Length between speed control Features	Maximum length is 70m.
Access to properties	Frontage access to dwellings is permitted but there must be turning areas within the private drive off the highway.
Pedestrian crossing facilities	Safe convenient locations for pedestrian crossings will be required on desire lines, by either raising the carriageway to footway level or by the use of dropped kerbs. All crossings to have tactile paving.
Provisions for cyclists	Facilities for cyclists will be required on shared footways..
Minimum forward visibility	33m
Vertical curve	Minimum vertical curve length to be 30m or a minimum "K" value of 10.
Minimum radius bend	40m
Gradient	Maximum gradient 7% and minimum gradient 0.7%.
Crossfall	1:40 Bends of radius less than 600m shall have adverse camber eliminated to give a uniform crossfall towards the inside of the bend.
Junctions	<ul style="list-style-type: none"> • Junction radii on to a local distributor road to be 10.5m. • Minimum length of straight before a main road channel line to be 20m and at a grade not greater than 2.5%. • Minimum junction spacing along a road to be 30m for opposite junctions and 60m for adjacent junctions. • Side road junction visibility requirement to be 2.4m x 33m. • Left turn into a connecting street to have a forward visibility radius of 19m for 10.5m junctions and 10m forward visibility radius for 6.0m junctions.

Local Distributor Roads

These roads are designed to distribute traffic within districts and link primary and secondary distributors with residential roads. They should be safe free flowing roads for vehicles and must not be a cul-de-sac. Roads should be designed such that it can be anticipated the 85 percentile speeds are not higher than the speed limit.

Right turning lanes should be provided for new developments generating in excess of 300vph during the peak periods.

To meet the adoption standards of the highway authority a local distributor road should be designed to comply with the following requirements:

Local Distributor	
Number of Dwellings to serve	Typically serve 300 to 600 dwellings and can serve mixed developments.
Number of access points	Minimum of two.
Design speed	Generally 30 mph but at particular locations such as schools a design speed of 20mph will be required.
Carriageway width	Carriageway width to be 6.75m .
Carriageway widening	Road widening shall be provided to avoid a 15m articulated vehicle cutting across the centre line. Road widening to be applied in accordance with the following table bend radius (m) 150 100 80 55 50 45 40 35 road width (m) 7.5 7.6 7.7 7.8 7.9 8.1 8.3 8.5 forward visibility (m) 45 45 45 45 45 40 35 30
Footway width	3m minimum footway / cycle way on both sides of carriageway.
Verges	2m minimum, increased to 3m minimum where trees are included.
Length between speed control Features	None unless a specific need is identified.
Access to properties	Direct frontage access will be acceptable if it can be demonstrated that adequate turning facilities are provided on each dwelling plot. Measures may be needed to restrict cars from parking on footways and verges.
Pedestrian crossing facilities	Safe convenient locations for pedestrian crossings will be required on desire lines, by either raising the carriageway to footway level or by the use of dropped kerbs. All crossings to have tactile paving.
Provisions for cyclists	Facilities for cyclists will be on shared footways.

Solihull MBC Developers Design and Adoption Guide



Minimum forward visibility	45m
Vertical curve	Minimum vertical curve length to be 40m or a minimum "K" value of 10.
Minimum radius bend	80m Transition curves required where the centre line radius is less than 300m and the speed limit is greater than 40 mph.
Gradient	Maximum gradient 7% and minimum gradient 0.7%.
Crossfall	Crossfall 1:40 Bends of radius less than 600m shall have adverse camber eliminated to give uniform crossfall towards the inside of the bend.
Junctions	<ul style="list-style-type: none"> • Junction radius from local distributor onto major road 10.5m. • Side road junction radius 10.5m. • Minimum junction spacing along road to be 40m for opposite junctions and 80m for adjacent junctions. • Side road junction visibility requirement to be 9.0m x 45m for junctions serving non-residential or mixed developments and 4.5m x 45m for junction serving residential developments. • Frontage access restricted to shared drives at half the above junction spacing with turning areas provided within the drive. • Frontage access restricted to shared drives at half the above junction spacing

Distributor Roads

These roads are designed to distribute traffic within districts and link primary and secondary distributors with residential roads. They should be safe free flowing roads for vehicles and must not be a cul-de-sac. Roads should be designed such that it can be anticipated the 85 percentile speeds are not higher than the speed limit.

Right turning lanes should be provided for new developments generating in excess of 300vph during the peak periods.

To meet the adoption standards of the highway authority a local distributor road should be designed to comply with the following requirements:

Solihull MBC Developers Design and Adoption Guide



Distributor Roads																												
Number of Dwellings to serve	Typically over 600 dwellings and can serve mixed developments.																											
Number of access points	Minimum of two.																											
Design speed	Generally 30 mph but at particular locations such as schools a design speed of 20mph will be required.																											
Carriageway width	Carriageway width to be 7.3m.																											
Carriageway widening	Road widening shall be provided to avoid a 15m articulated vehicle cutting across the centre line. Road widening to be applied in accordance with the following table <table border="1" style="font-size: small; width: 100%;"> <tr> <td>bend radius (m)</td> <td>150</td> <td>100</td> <td>80</td> <td>55</td> <td>50</td> <td>45</td> <td>40</td> <td>35</td> </tr> <tr> <td>road width (m)</td> <td>7.5</td> <td>7.6</td> <td>7.7</td> <td>7.8</td> <td>7.9</td> <td>8.1</td> <td>8.3</td> <td>8.5</td> </tr> <tr> <td>forward visibility (m)</td> <td>45</td> <td>45</td> <td>45</td> <td>45</td> <td>45</td> <td>40</td> <td>35</td> <td>30</td> </tr> </table>	bend radius (m)	150	100	80	55	50	45	40	35	road width (m)	7.5	7.6	7.7	7.8	7.9	8.1	8.3	8.5	forward visibility (m)	45	45	45	45	45	40	35	30
bend radius (m)	150	100	80	55	50	45	40	35																				
road width (m)	7.5	7.6	7.7	7.8	7.9	8.1	8.3	8.5																				
forward visibility (m)	45	45	45	45	45	40	35	30																				
Footway width	2m minimum footway on both sides of carriageway and also a 2m wide two way cycle lane on at least one side. Should be increased to 3m minimum in areas of denser pedestrian movements (shops, schools, etc).																											
Verges	2m minimum, increased to 3m minimum where trees are included.																											
Length between speed control Features	None unless a specific need is identified.																											
Access to properties	No direct frontage access permitted. Measures may be needed to restrict cars from parking on footways and verges.																											
Pedestrian crossing facilities	Safe convenient locations for pedestrian crossings will be required on desire lines, by either raising the carriageway to footway level or by the use of dropped kerbs. All crossings to have tactile paving.																											
Provisions for cyclists	Facilities for cyclists will be required off the carriageway.																											
Minimum forward visibility	45m																											
Vertical curve	Minimum vertical curve length to be 40m or a minimum "K" value of 10.																											
Minimum radius bend	80m Transition curves required where the centre line radius is less than 300m and the speed limit is greater than 40 mph.																											
Gradient	Maximum gradient 7% and minimum gradient 0.7%.																											
Crossfall	Crossfall 1:40 Bends of radius less than 600m shall have adverse camber eliminated to give uniform crossfall towards the inside of the bend.																											
Junctions	<ul style="list-style-type: none"> • Junction radius from local distributor onto major road 12m. • Side road junction radius 10.5m. • Minimum junction spacing along road to be 40m for opposite junctions and 80m for adjacent junctions. • Side road junction visibility requirement to be 9.0m x 45m for junctions serving non-residential or mixed developments and 4.5m x 45m for junction serving residential developments. 																											

Non-Residential Access Roads

These types of development will by their very nature be more focused towards vehicular than pedestrian movements. The developments will still require the designer to consider the interaction of all street users, in particular the interaction between HGV's and cyclists and the inclusion of good pedestrian links to all public transport stops.

Access roads serving industrial, commercial and office developments should connect directly to a distributor road and must not be served through residential estates. Non-residential development access roads should be safe free flowing roads for vehicles. Developments greater than 8 hectares should preferably not be served by a single access. Minor industrial estates will always be served by a cul-de-sac. The maximum length of a cul-de-sac is 180m otherwise an emergency access will be required.

Access roads serving sites generating 300 or more HGV turning movements a day are to be provided with an overall carriageway width of 9.5m so as to enable ghost islands and turning lane facilities to be provided.

Footways must be provided on both sides of the carriageway where there is frontage development. Cycle facilities should be provided as be provided where more than 2,000 employee/visitor vehicle movements per day are expected. Opportunities should be sought to provide more direct and convenient pedestrian and cycle access to employment/retail sites by creating footpath and cycle track links along desire lines. Safe convenient locations for pedestrian crossing facilities must be provided and formed with dropped crossings and tactile paving complying with DfT standards. Secure, covered cycle parking must be provided at visible locations close to employee/visitor entrances to premises. For industrial and retails developments, footways abutting the carriageway are required to be constructed as strengthened footways.

Premises must have adequate turning spaces to ensure that vehicles can enter and leave the carriageway in a forward direction. On minor estate roads it is permissible for vehicles servicing premises of less than 5,000 sq.m gross floor area with accesses off turning heads to manoeuvre vehicles within the carriageway turning head.

Junctions and accesses should be designed so as to avoid large vehicles having to cross onto the wrong side of the road whilst turning on major industrial roads and office/retail roads. It has been noted that collisions tend to increase with increasing numbers of junctions and accesses. Provision shall be made for public transport to serve the development.

For all business premises, any gates to individual sites, gatehouses, security offices and weighbridges should be set back at least 15m from the Highway boundary. Where large numbers of long vehicles can be expected, the distance should be increased to 30m. Sufficient off-street parking must be provided.

Solihull MBC Developers Design and Adoption Guide



Non-Residential Access Roads																												
Number of access points	The number of accesses should be kept to a minimum.																											
Design speed	30mph																											
Carriageway width	For industrial estates carriageway width to be 7.3m or 9.5m for roads serving sites generating 300 or more HGV movements per day. For office/business and retail developments carriageway width to be 7.3m or 9.5m where cycle lanes are provided, comprising of a 6.5m general carriageway width with a 1.5m advisory cycle lane on each side.																											
Carriageway widening	Road widening shall be provided to avoid a 15m articulated vehicle cutting across the centre line. Road widening shall not be required for developments consisting only of offices. Road widening to be applied in accordance with the following table. <table style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="padding: 0 10px;">bend radius (m)</td> <td style="padding: 0 10px;">150</td> <td style="padding: 0 10px;">100</td> <td style="padding: 0 10px;">80</td> <td style="padding: 0 10px;">55</td> <td style="padding: 0 10px;">50</td> <td style="padding: 0 10px;">45</td> <td style="padding: 0 10px;">40</td> <td style="padding: 0 10px;">35</td> </tr> <tr> <td style="padding: 0 10px;">road width (m)</td> <td style="padding: 0 10px;">7.5</td> <td style="padding: 0 10px;">7.6</td> <td style="padding: 0 10px;">7.7</td> <td style="padding: 0 10px;">7.8</td> <td style="padding: 0 10px;">7.9</td> <td style="padding: 0 10px;">8.1</td> <td style="padding: 0 10px;">8.3</td> <td style="padding: 0 10px;">8.5</td> </tr> <tr> <td style="padding: 0 10px;">forward visibility (m)</td> <td style="padding: 0 10px;">45</td> <td style="padding: 0 10px;">40</td> <td style="padding: 0 10px;">35</td> <td style="padding: 0 10px;">30</td> </tr> </table>	bend radius (m)	150	100	80	55	50	45	40	35	road width (m)	7.5	7.6	7.7	7.8	7.9	8.1	8.3	8.5	forward visibility (m)	45	45	45	45	45	40	35	30
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forward visibility (m)	45	45	45	45	45	40	35	30																				
Footway width	Footways 2m wide on both sides with a crossfall of 1:30.																											
Verges	2m minimum, increased to 3m minimum where trees are included.																											
Length between speed control Features	None unless a specific need is identified.																											
Pedestrian crossing facilities	Safe convenient locations for pedestrian crossings will be required on desire lines, by either raising the carriageway to footway level or by the use of dropped kerbs. All crossings to have tactile paving.																											
Provisions for cyclists	Facilities for cyclists will be required either on carriageway, advisory routes or off carriageway routes where more than 2,000 employee/visitor vehicle movements per day are expected.																											
Minimum forward visibility	45m																											
Vertical curve	Minimum vertical curve length to be 30m or a minimum "K" value of 10.																											
Minimum radius bend	Minimum radius bend 80m Transition curves may be required where the centre line radius is less than 300m. This will depend on typical vehicles that may use the roads and safety implications.																											
Gradient	Maximum gradient 7% and minimum gradient 0.7%.																											
Crossfall	Crossfall 1:40 Bends of radius less than 600m shall have adverse camber eliminated to give uniform crossfall towards the inside of the bend.																											
Junctions	<ul style="list-style-type: none"> • Junction radii for industrial developments to be 15m. • Junction radii for office only developments to be 12m. • Minimum junction spacing along a road to be 40m for opposite junctions and 80m for adjacent junctions to premises that are greater than 15,000 sq.m. gross floor area. • Minimum junction spacing along a road to be 20m for opposite junctions and 40m for adjacent junctions to premises less than 15,000 sq.m. gross floor area. 																											

	<ul style="list-style-type: none">• Junction visibility requirement from side roads on to non residential access roads to be 9m x 45m.• Junction visibility requirement from private accesses on to non residential access roads to be 4.5m x 45m.• At junctions, the gradient of the minor road should not exceed 1:30 for the first 20m from the major road channel line.
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Footways and Footpaths

General requirements

Footways are provided for the use by pedestrians and generally abut the carriageway or are separated from the carriageway by a verge. Footpaths are provided for the use by pedestrians but can take an independent route and not run parallel or alongside a carriageway. The design standards for footways and footpaths are identical.

Footways shall be provided along all distributor roads. They are required along all roads where there is a developed frontage to provide direct access to all dwellings and premises. Major footpath routes linking large developed areas to local facilities should not pass through a shared surface carriageway.

All footpaths must be overlooked and preferably have some frontage access. The ends of footpaths should be intervisible without any concealed areas to provide a feeling of security to any pedestrian. Footways will normally be required to follow the line of forward visibility sight lines along roads in order to avoid possible obstructions being placed within the vision area.

Footways should follow the back of visibility lines at road junctions to encourage pedestrians away from the widest crossing point. Footways will need to be widened if this results in narrow areas of grass verges.

Widths

Minimum footway widths should normally be 2m on either side of the carriageway (refer to individual type requirements) although in certain situations one footway may be acceptable if there is no likelihood of pedestrians utilising a second footway. In such a case, sufficient land may need to be dedicated as adopted verge if there is a reasonable likelihood of a footway being needed at any time in the future. The minimum width should increase to 3m in areas of identifiably higher levels of pedestrian activity, such as adjacent to schools, shops, bus stops, etc. Greater widths may be required at specific points (e.g. around bus shelters)

Gradients and Crossfalls

The desirable maximum longitudinal section gradient of adoptable footways or footpaths is 1 in 20 (5%). If this is not achievable then the specific circumstances should be discussed with the Council. Where possible it is preferable to have a crossfall between 1 and 3 per cent. This is a manageable crossfall for most footpath users and in particular wheel chair users and also provides good drainage. Where possible, footways shall drain towards the carriageway channel. This will avoid the need to install additional drainage in the footway that may become a maintenance issue.

Vertical Clearance

A general vertical clearance of 2.1m should be provided on footways and 2.4m on cycleways.

Steps

Where flights of steps are included in a footway or footpath, provision should be made for a complementary ramped route. If a ramp cannot be accommodated within the space available, then the design of the steps should take account of a person assisting a disabled person in a wheelchair.

Steps shall have a constant rise of between 100mm minimum and 150mm maximum with a preferred width of 330mm wide (minimum 280mm), should be non-slip and marked with a non-slip edging at the head of each flight. The dimensions must be such that the product of tread plus twice the riser is between 550mm and 600mm. Nosings should be splayed off rounded to a 6mm radius. There should be a minimum of 3 steps in a flight and a maximum of 12, with resting places between successive flights. Resting places should be at least 1200mm long, preferably 1800mm.

Handrails must be provided, they should be smooth and continuous where there is more than one flight of steps and should be terminated no less than 300mm past the end of the flight and "closed" to the stair wall.

Handrails should be set at a height of between 900 - 1000mm above the tread of each step and should be round in section, between 40-50mm in a diameter and with a minimum gap to the wall of 50mm, 60mm preferred.

Handrails should be provided on sides, a minimum of 1200mm apart and a maximum of 1800mm apart.

Non slip hazard paving should be provided at the top and bottom of steps.

Crossing Points

Dropped kerbs should be provided at all junctions and particular pedestrian desire lines, including connections to external footpaths.

Dft Guidance on the use of tactile paving should be used and at all times the use of simple, appropriate, well-detailed, high quality materials should be a key objective.

In some locations pedestrian guard rails are required for safety reasons to protect pedestrians and guide them to the appropriate crossing point, although wherever possible unnecessary "street clutter" should be avoided.

Where a pedestrian refuge is provided, the dropped kerbs should be aligned with the refuge. A minimum refuge width of 1.50 metres should be provided.

Where dropped kerbs are provided across the minor route within a major/minor junction they can lie within the corner of radius for junctions with radii of 6m. However for junctions with radii of 10 or 15 metres, they should be positioned further from the major route to reduce crossing distances.

For low levels of development, dropped crossings are preferable to the provision of kerb radii to give priority to pedestrians.

Pedestrian crossing points can be delineated by raised plateaux, but they should not be designed to give pedestrians a false sense of security.

Designing for Disabled People

Principles

The design guide considers the needs of disabled people within all elements of the design guidance, so that their requirements are incorporated from the start of the process, rather than added as an afterthought.

Potential obstacles to be aware of include steps, steep gradients, narrow passages or footways, badly located street furniture, excessively smooth surfaces and poor attention to construction details. Changes of gradients at bends (especially at side street crossings) need to be carefully designed to prevent tipping over of wheelchairs.

Ramps

A pedestrian ramp is generally defined as a pathway with a slope of more than 1 in 20 (5%).

It provides an alternative access to stairs for wheelchair users. The preferred gradient is 1 in 20 (5%) for a length no greater than 10m. The maximum gradient is 1 in 12 (8.3%) for a length no greater than 2m. Resting places are required if more than one flight is needed.

These should be level and the full width of the ramp with a preferred length of 2m. Stepped ramps should be avoided.

Ramps should preferably be 2m wide to permit wheelchair to pass and not less than 1.2m over short lengths. A 100mm high upstand should be provided to protect the sides of the ramp and handrails are required at 900-1000mm above the surface.

Ramps into individual buildings must not be located within the adopted footway.

If there are problems in achieving the above requirements, the specific circumstances should be discussed with the Council.

Tactile Paving

Tactile paving to assist blind or partially sighted people should be utilised in accordance with the DETR guidance on the Use of Tactile Paving Surfaces. Suitable alternatives may be considered in particular circumstances.

Design Standards

Principles

Cycle routes in developments should meet the same basic criteria as pedestrian routes; namely convenience, safety, attractiveness, and directness.

Cycle linkages between key areas within the development and around it should be designed into a scheme from the start, with particular attention to routes to schools, local facilities and adjacent neighbourhoods.

New infrastructure for cyclists should link to existing and intended routes that form part of the existing and proposed Solihull Strategic Cycling Network.

Evaluating how cyclists are best provided for in a scheme should be addressed within the Design and Access Statement, and is considered in detail in Local Transport Note (LTN) 1/04, and on the Cycling England website (www.cyclingengland.org.uk)

Cycle Lanes

The minimum widths for different types of unsegregated and segregated shared-use paths are given below. This will be essential where higher flows are expected. Desirable minimum widths are also provided; again these should be increased where high flows of pedestrians or cyclists are planned for. Where significant cycle flows are expected the width for cycles should be 3m.

It should also be noted that these are effective widths. Where a path is bounded by a wall, hedge or railing an additional 0.5m width will be required for each bounded side. Similarly for paths adjacent to the carriageway a buffer zone will be required. Normally this should be 1m but may be a minimum of 0.5m where space is limited.

Minimum Widths

Type of Segregation	Footway Width (m)	Cycletrack Width (m)	Segregation (m)	Total Width Required (m)
verge	2.0	2.0	0.5*	4.5
level change	2.0	2.0		4.0
railing / barrier	2.0	2.0	0.5	4.5
raised white line	2.0	2.0		4.0
un-segregated (two-way flow)				3.0

Note:

Add 0.5m to each side that abuts a wall, railing or other barrier

Add 0.5m to widths as a buffer zone when track runs parallel to the carriageway

* Where the minimum 0.5m width segregation verge is used, the type of path construction should avoid use of any raised edgings so that conventional grass mowing can still be carried out

Access Controls

Where off-road cycle tracks are installed away from the carriageway, access measures such as “K” frames or bollards should be used to prevent access by cars or motorbikes. All access barriers must comply with Disability Discrimination Act (DDA) regulations. These measures should be installed if abuse is considered likely.

If the pedestrian and cycle routes are parallel but segregated by level difference, the preferred widths are 2m for each route. See LTN 2/04.

Visibility

Where a cycle track joins a carriageway, an appropriate x-distance must be provided with a normal minimum of 2.5m. Where a crossing or a junction with a carriageway is approached by means of a “jug handle” arrangement the x-distance can be reduced to 1.0m, or if the cyclist is physically slowed to a stop immediately before the crossing or junction by means of a barrier. Further details are in DMRB 6/3 Part 5.

Further Guidance

For further guidance on the design of cycle routes, please read:

- Cycle Friendly Infrastructure (IHT, CTC, DoT 1996);
- The National Cycle Network Guidelines and Practical Details Issue 2 Sustrans 1997;
- Local Transport Note 1/04 Policy, Planning and Design for Walking and Cycling;
- Local Transport Note 2/04 Adjacent and Shared Used Facilities for Pedestrians and Cyclists;

and

- Local Transport Note 2/08 Cycle Infrastructure Design.

Cycle Parking

For apartments, communal cycle facilities should be provided which are secure, conveniently located, and covered. They should enjoy good natural observation, be lit, and should not obstruct pedestrian or cycle routes.

Commercial and industrial developments should be provided with secure, conveniently located, and covered long stay cycle parking facilities as specified in the UDP. This can take the form of lockers or lockable compounds. They should be located where they are easily observed by the development's occupants, be lit, and should not obstruct pedestrian or cycle routes, or pedestrian desire lines. Short stay provision should also be provided for visitors of the site in the form of Sheffield Stands or similar, situated in full view as close as practical to the main entrance of the building.

Public Transport

Road Width for Buses

The minimum carriageway width for conventional two-way operation on distributor roads and connecting streets should be 6.75m. Where bus services will use local residential streets, a minimum carriageway width of 6.0m will be required. Lane width should not be reduced to less than 2.8m at any point. Where there is likely to be high levels of cycling in bus lanes, a width of 4.5m is preferred for shared lanes and the minimum width should be 4.0m. Widths below 4.0m are not recommended for bus lanes physically bounded on both sides, unless they are over very short distances.

As a general principle, parked cars should be discouraged from parking on the carriageway on bus routes. Where a development layout suggests on street parking is likely, additional carriageway width will be required or parking bays provided. "Bus Only" routes can not have frontage access.

Bus Stop Location

Once a bus route has been planned within a residential layout, the number and location of bus stops must be considered together with the footpath system, so as to establish the optimum positioning.

Bus stops should be located so that the maximum walking distance from any dwelling is 400m. This should be reduced to 250m for areas with a significant proportion of elderly people. In shopping, commercial and industrial developments the maximum walking distance should be 250m.

Planning applications for new residential developments with at least 50 dwellings and commercial/industrial developments with 100 new employees should be supported with a plan showing the nearest existing bus stop locations and any new proposed bus stop locations.

Wherever possible, bus stops should not be located in junction visibility splays or opposite junctions. For safety reasons, bus stops on opposite sides of the road should be staggered by about 45m, preferably so that the buses stop "tail to tail" and move away from each other. Where it is not possible to reasonably achieve the staggered layout bus stops should be placed directly opposite each other. Where lay-bys are provided the stagger distance may be reduced. At local centres, stops should be sited at the main pedestrian access to the centre, and in all cases, stops should be located so as to avoid causing a nuisance or loss of privacy to residents. In all cases, consideration should be given to where pedestrians are likely to cross the road and dropped kerbed crossings should be provided in appropriate locations.

Bus Lay-by

Lay-bys are not normally required unless there is over-riding safety or operational considerations. Special considerations include use of the stop as a bus terminus, bus stop location on the outside of a bend and an expected above average stop time (i.e. school site, local centre etc). When required bus lay-bys should be designed to enable the appropriate type of buses to dock correctly with the bus boarding point. Bus lay-bys should be located where the bus driver has a good rear view of approaching traffic. A contrasting surface colour and texture, e.g. by use of pavoids, to the rest of the carriageway is recommended.

Footway Width at Bus Stops

The normal footway width is 2.0m but consideration should be given to an increased minimum width of 3.0m to facilitate pedestrian movement at bus stopping points where shelters and/or seats are to be sited and numbers of passengers are expected to congregate and wait for buses. There should be a minimum clear width of 1.2m past any shelter but where the area is likely to have a large amount of pedestrian movements, a minimum clear width of 2.0m is required.

Traffic Calming on Bus Routes

Proposals for the installation of traffic calming features on proposed or existing bus routes must be discussed with service providers. For bus routes, generally only horizontal features should be used for traffic calming.

On residential streets where speed control is appropriate, consideration of speed cushions or speed tables should be made as an alternative to conventional round top road humps. In general, vertical measures such as road humps should be avoided where possible.

Traffic calming measures on bus routes should not be located within 12m of a bus stop.

Bus Showcase Routes

On certain main bus routes in the city, a partnership involving the local authority, the passenger transport authority and local bus operators exists to achieve quality improvements which include the design of improved bus stop facilities. Where appropriate, Bus Showcase stops should be designed to a specification in agreement with the highway authority and the passenger transport authority. Developers will need to liaise closely with the passenger transport authority regarding the selection of the appropriate bus shelter and its supply and installation. Signing and passenger information at the boarding point will also need to be agreed.

Maintaining Services During Development

During the construction period adequate arrangements must be made to ensure the continuation of existing bus services. If a diversion is necessary, the needs of boarding and alighting passengers should be met at the nearest point of closure at the developer's expense.

Large developments should be phased in such a way so that bus services can be introduced at an early stage. This may include temporary turning facilities to ensure the safe running of the service.

Developers may have to subsidize early provision of a bus service so that it is available when residents/workers start to move in so that the public transport habit can be established at the outset.

Bus Shelter and Flags

Bus shelters, stops and flags are significant features in the street scene. High quality bus shelters at such stops significantly improve the quality of both the streetscape and the total journey. Location is determined by policy and operational considerations based on passenger convenience, pedestrian

and vehicular safety, and the number and frequency of services. Bus shelters, stops and flags are permitted development under part 17 of the General Permitted Development Order 1995. The design of bus stops should comply with the following guidelines;

- shelters and flags should have a minimum clear passageway around them of 2m where possible;
- shelters should be able to accommodate the numbers of passengers likely to wait for services as well as provide travel information;
- it is important to consider impact on adjoining buildings and spaces (e.g.residential units), and visual setting including listed buildings and conservation areas, and the relationship to street trees;
- standard blue shelters are used on PrimeLines and Showcase routes;
- seating, information and litter bins should be provided; and
- bus stop poles should be installed only where shelters are not provided.

Speed Restraint (Traffic Calming)

Need for Speed Restraint

Speed restraint is an important feature of modern residential areas to ensure that design speeds for each type of street are not exceeded. It increases the safety of motorists, pedestrians and cyclists by putting them on a more equal footing and minimising the potential for collisions. It is widely known that

collisions occurring at slower speeds result in less serious injuries so speed restraint measures are highly recommended where pedestrians and vehicles may come into contact with each other. Such features must be carefully selected so as to reduce any negative aspects including increased noise.

Through residential areas, drivers should be encouraged to reduce their speed progressively as they move further from a distributor road. An abrupt speed reduction measure is not acceptable. Instead, a series of measures should gradually reduce the speed of the vehicles. It is essential that it is not legislation only that is relied upon in order to slow the traffic. This should be done through the design of the road and adjacent developments, making it clear to drivers that they are in a reduced speed zone. Any measures implemented should be located at regular intervals in order that drivers are not given the chance to speed up in between and should be incorporated from the outset and not introduced as an “after thought”.

For the purpose of this design guide, “residential areas” are defined as those served by connecting streets, local residential streets and shared surface streets. The recommendations therefore do not necessarily apply to higher category roads. However, suitable features may need to be investigated at the interface with the higher category road.

Speed restraint measures may include the use of 20mph Zones.

Purpose of Speed Restraint Features

Speed restraint should not be on a scale that residents suffer unreasonable delay in traveling from their properties to main roads. It should be used to reduce vehicle speeds progressively and to encourage this reduced speed through developments.

The design of the street scene should both influence and encourage appropriate speeds in a residential area. A driver’s perception of a safe speed can be influenced by building form and spacing as well as the use of contrasting materials and landscaping.

Roads within speed restraint areas must not form convenient through routes which may cause a greater disturbance to residents.

The design of speed restraint measures must include consultation with Centro (the West Midlands Passenger Transport Executive), public transport operators, emergency services, cyclist groups and disability groups.

Speed Restraint Measures

Vehicle speeds can be reduced using a number of methods, the majority of which involve changes in either the vertical or horizontal alignment of the road. Each method provides both a physical and visual indication that the driver is entering a zone with a reduced design speed.

Vertical features are one of the most effective forms of speed reduction but selection of such features will depend on individual circumstances. Their use should be kept to a minimum and should be used as a necessary support to horizontal features. Speed restraint features must comply with Department for Transport standards and guidelines.

Although not exhaustive, typical examples of speed restraint measures which may be considered relevant are indicated below. However, it should be re-iterated that forward visibility should not be so great as to encourage high speeds.

Narrowings

A narrowing of the road width can be used to reduce speeds on residential roads. A narrowing can either be a build out (one side only) or a pinch point (both sides).

Cyclists will benefit from lower speeds but can be put in danger from overtaking vehicles if there is insufficient room at the narrowing. Narrowings of a width between 3.0 to 4.0m are not recommended unless a cycle by-pass is provided.

On connecting streets and local residential streets, the width should be reduced to 3.0m and can incorporate a ramp to encourage further slowing. The use of ramps on bus routes or roads with a large flow of heavy goods vehicles however is discouraged for comfort and noise reasons. Cycle bypasses (width 1.0 - 1.5m) on each side of the carriageway are preferred as they prevent cyclists

being squeezed and mean cyclists do not have to deviate from their desired course. Where cycle bypasses are not possible, the road should be reduced to 3.0m or should be 4.0m or greater. A formal vehicle priority system should be incorporated in conjunction with the narrowing. Where a narrowing is 4.0m or greater consideration should be given to the use of a speed cushion or raised section within the narrowing.

On local residential streets, the width should be reduced to 3.0m, if wider (ie greater than 4.0m), cycle bypasses should be provided.

No vehicle priority system is required.

Both types of road narrowing will make drivers slow down for oncoming traffic. It is necessary however, that the flows in each direction are similar to prevent a continuing stream of traffic from either direction and abuse of priorities.

In the vicinity of the build-out no direct access to dwellings is permitted onto the road until the normal road width is resumed.

Narrowing of the carriageway should be undertaken near the beginning of the roads where there are larger flows of traffic. However, the vehicle priority system needs to ensure that queuing into adjacent junctions does not occur. Beyond half way along the road, alternative features should be incorporated.

See 'Typical Layouts for Road Narrowings' in Part 6.

Chicanes

Their effectiveness depends on the spacing of the build-outs and the path angle through the chicane (the angle through which the traffic lane is displaced. A recommended path angle of 15° or greater is likely to reduce speeds to 20mph or less. If the build - outs are too close together, larger vehicles have difficulty passing, but if they are too far apart, their effectiveness is reduced as vehicles are able to take a racing line through the middle. (see LTN 1/07 published by Department for Transport) Chicanes are not to be used on roads with high traffic flows.

No direct access to dwellings is permitted onto the road until the normal road width is resumed.

The design of the chicane should take into account the safe passage of cyclists. Cycle bypasses should be provided where it can prevent cyclists from having to deviate from their desired course, and reduce the risk of cyclists being squeezed

Central Refuge (both pedestrian and traffic)

Although central refuges can help to maintain reduced speeds, they primarily prevent overtaking manoeuvres and narrow the road width. Pedestrian refuges provide safe haven for pedestrians crossing the road, making it safer as they only have to cross one stream of traffic at a time.

Central refuges should not be used where the road is narrow so are best located on collector roads or roads of a higher category. They should however, not be located near to any accesses onto the road and should not restrict turning movements in any way.

Most central refuges are raised and kerbed with a hatched area of carriageway leading to either side. If they are to be used as a pedestrian crossing point, two smaller islands separated by an at-grade gap should be provided. Appropriate tactile paving should be incorporated at the refuges. The dropped kerb should be painted with white thermoplastic paint.

A central refuge to help a cyclist to cross the road should be a minimum of 2.0m wide.

Gateways

A gateway at the entrance to a reduced speed zone gives a visual indication to drivers to slow down. They should not be sited so that drivers encounter them suddenly.

A gateway can be achieved in a number of ways. The most common methods use pinch points at buildings, walls, pillars or build-outs of the kerb line. Also effective is a variation in road surface colour and/or texture such as a transition strip consisting of a series of concrete blocks laid flush with the road surface. Other materials that could be used are granite setts or coloured surfacing. Where a change of texture or colour is used the feature should be at least 5m long. If a ramp is to be incorporated, its height should not be greater than 25mm and any vertical faces should not exceed 6mm. Suitable signing and road markings are always required.

If a physical structure is incorporated in the gateway careful consideration needs to be given to the effect if impacted by a vehicle.

As the effect of gateways decreases over time, it is not sufficient for one to be used as a traffic calming feature alone. It must be followed by other measures to maintain the slower speed of vehicles.

Speed Control Bends

The inclusion of speed control bends on access roads is effective in reducing the speed of vehicles along roads and provides opportunity for design variety. They should only be used on access roads where speeds have already been reduced.

Speed control bends must be clearly visible as being different from a normal bend. There should be a vertical feature or building behind the bend highlighting the bend to approaching drivers.

Speed control bends should have a deflection of between 80° and 100°. The full forward visibility for the appropriate design speed should still be provided.

It is necessary to incorporate a mountable over - run to permit the overriding by service vehicles. It must be demonstrated that a designated vehicle (eg fire appliance and/or refuse vehicle) can utilize the street. There should be a difference in level and preferably contrasting colour between the mountable over - run area and the adjacent footway in order to discourage over running of the footway by vehicles.

Along access roads, speed control bends may be constructed in block paving to add to the street scene and to reinforce the traffic calming feature.

Speed Control Islands

Any traffic island is effective at reducing the speed of vehicles but on an otherwise straight section of road, a “false island” can be used. This does not incorporate a junction but merely provides some lateral deflection in order to slow the traffic.

This form of speed reduction measure may only be used on minor access roads.

The central island is non - mountable by light vehicles and provides a displacement of 2m while the mountable shoulders allow for the passage of service vehicles. There should be a clearly defined kerb up-stand between the mountable over - run areas and the adjacent footway to deter over running by vehicles.

The maximum deflection for a speed control island is 10°.

Accesses to premises are not permissible at speed control islands.

Road Humps

Road humps are widely considered as the most effective way of reducing traffic speeds but are not encouraged and horizontal measures should be implemented. Round topped humps, which are more comfortable for cyclists to pass over, should be considered in the first instance.

For 20mph zones road humps should be 75mm high and at spacing not greater than 60m along the road. The first hump in a series should be within 40m of the entrance to the zone. The “on-off” slopes should have a gradient of no more than 1/15 and for round topped humps the longitudinal length should be 3.7m.

Laterally, the speed humps should be tapered at the sides with a gap of 200-300mm to the kerb line to allow for drainage. This gap may be sufficient to allow cyclists to bypass the hump, and should be provided where appropriate. Humps can stretch the full width of the road with drains to prevent water collection behind the hump.

Road humps can be constructed with either bituminous material (preferable), pavements, pre-cast units or of molded rubber.

Road humps will not normally be permitted on roads used by public transport vehicles and on major routes used by emergency vehicles and other measures must be considered.

Relevant signing should be provided which complies with the Traffic Signs regulations and General Directions 2016.

Speed Cushions

Speed cushions have the same effect as road humps. They slow the traffic and are mainly used on higher category roads with bus routes and large HGV flows. They are designed so the wheels of larger vehicles pass either side of the cushions causing minimal disturbance to any passengers, while cars and smaller vehicles must slow to go over the main body of the cushion.

They are usually constructed in pairs as illustrated below but three cushions are acceptable on wider roads. They can be, moulded rubber cushions, pre cast units or bituminous material (preferable).

The distance between cushions and between cushions and kerbs needs consideration to avoid cars swerving around the cushions which can cause problems with oncoming traffic.

Cycle bypasses are provided at speed cushions by a minimum gap of 0.75m between the base of the cushion and the kerb. Speed cushions therefore inconvenience cyclists less than other traffic calming measures.

Relevant signing should be provided which complies with the Traffic Signs Regulations and General Directions 2016.

Speed Tables (Plateau) or Junction Speed tables

These are extended road humps with a large plateau set at 75mm above the road surface. They seem more acceptable to drivers than standard humps and can be effective in reducing speeds.

Along a straight section of road the speed table should measure a maximum of 7m from one end of the plateau to the other.

The preferred material for these features is concrete blocks set out in a herring bone pattern, although an alternative option can be considered.

Table junctions are used where the potential for traffic conflict is the greatest and accidents are common. Table junctions should extend into the adjoining side street by 5m both for the benefit of pedestrians crossing and to provide a flat surface for cars to wait at the Give Way line and to reduce the hazard for turning two-wheeled vehicles. The footway width adjacent to the table should be a minimum of 2.4m and if necessary bollards installed to protect pedestrians and prevent parking on the footway.

The recommended distance between successive tables is between 40m and 100m and there should be not more than 40m to the nearest

bend or the end of a cul-de-sac. Within 20mph zones features should be no further apart than 60m.

It is important that there is a distinction between the raised plateau and the footway in order to safeguard visually impaired and partially sighted people.

To ensure cyclists comfort, the edges of ramps up to speed tables must be carefully constructed to provide a flush transition.

Ramps

Ramps are used at entrances to mews style developments and shared surfaces. They are intended to reduce the speed of vehicles to as low as 10mph by acting as a visual and physical boundary, and also make drivers aware that they are entering an area which is designed to cater for the needs of pedestrians more than the needs of vehicles.

The top of the ramp is typically set 75mm above the surrounding road surface and can be reached in one stage, rising 75mm in a distance of 1200, or in two stages separated by a plateau, with each ramp rising 35mm in 600mm.

To ensure cyclist safety and comfort the edges of the ramps should be flush with the road surface.

Complementary Measures

The immediate surroundings of a street can also discourage high speeds and should be used in conjunction with other measures as described previously.

The layout of buildings along a street can clearly indicate a change in direction by forming an endstop, or can be used to narrow the road at a pinch point. Both of these examples urge drivers to take extra care and reduce their speed.

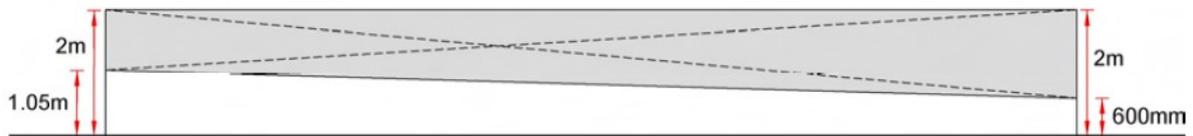
Bollards can be used to highlight the presence of a speed reducing measure such as a road narrowing or a chicane. Where a mountable shoulder is to be incorporated, bollards should also be used to separate this from the adjoining footway and prevent over running by vehicles.

The careful location of suitable varieties of tree along the street emphasizes the presence of speed reducing measures such as bends, and are considered both aesthetically and environmentally acceptable.

Visibility

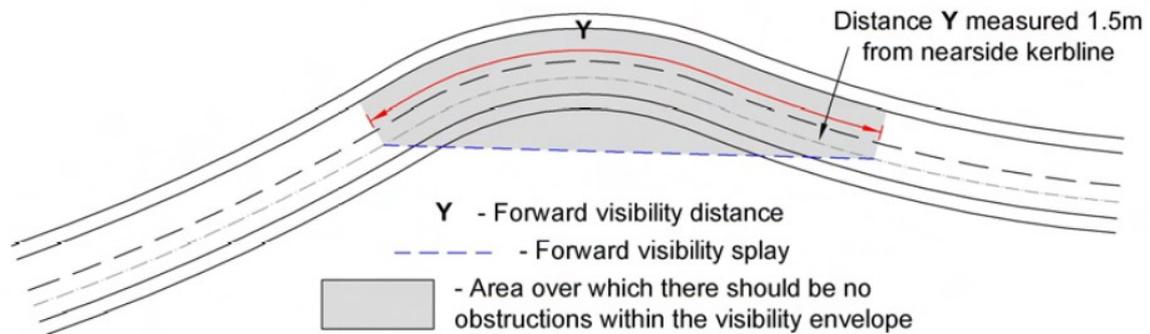
Visibility splays are required for the safety of all users of the highway. The extent of visibility required is dependant upon the design speed. Clear visibility is necessary for drivers to be able to see a potential hazard in time to take appropriate action and be able to stop in time. In order to maintain clearance within vision splays, they will be adopted as part of the public highway. Where visibility splays cross soft landscaped areas they should be delineated. The maximum height of plants within visibility splays shall not exceed 300mm above ground level or a top vertical sightline of 600mm. All planting within visibility splays requires approval.

Vertical visibility envelope



The vertical visibility envelope should be measured from a driver's eye height between 1.05m and 2m to an object height between 2m and 600mm. For pedestrian safety, a clear vision splay of 600mm above the ground is required in order for drivers to be able to see small children. There should be no obstructions within the vertical visibility envelope. Signposts and lighting columns are permitted within visibility splays. Signs should be mounted so that the bottom edge of the sign is outside the vertical visibility envelope.

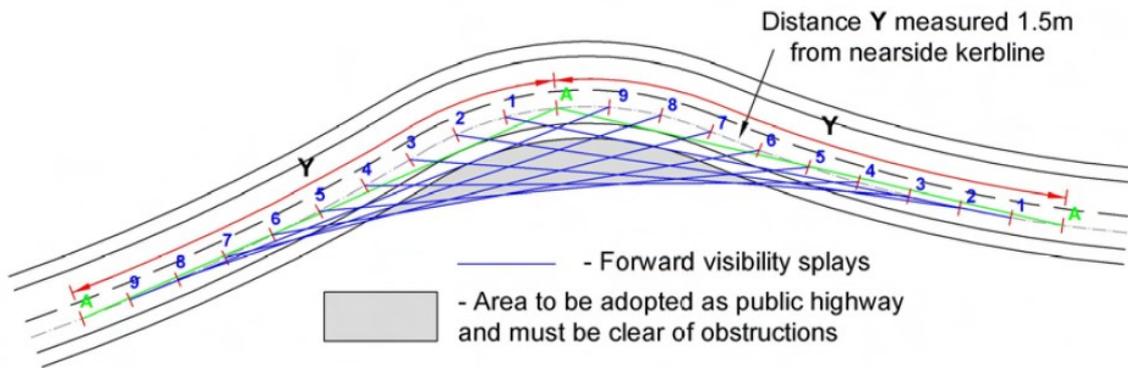
Forward visibility



The above diagram demonstrates the method for constructing a single forward visibility splay. The forward visibility distance, Y, is determined by the category and design speed of the road. The minimum forward visibility values set out in the table below should be used:

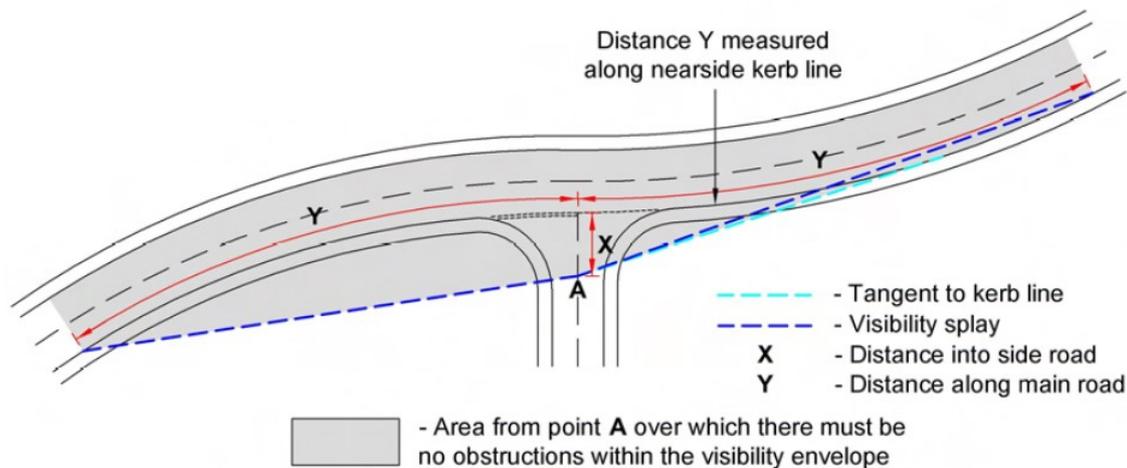
Road category	Design speed	Minimum forward visibility (Y)
<i>Local distributor road</i>	<i>30mph</i>	<i>45m</i>
<i>Connecting street</i>	<i>25mph</i>	<i>33m</i>
<i>Local residential street</i>	<i>20mph</i>	<i>25m</i>
<i>Shared use street</i>	<i>15mph</i>	<i>20m</i>
<i>Non-residential access road</i>	<i>30mph</i>	<i>45m</i>

The method for constructing a single forward visibility splay should be repeated several times to assess the forward visibility around a bend, as per the following diagram:



- Draw the first forward visibility splay A-A which should be located on the approach to the bend but should not cross the nearside kerbline.
 - Draw the forward visibility splays at regular intervals. Dividing the forward visibility distance into 10 segments should be adequate in most circumstances.
 - Continue drawing the forward visibility splays until they no longer cross the nearside kerbline. In this example the last visibility splay would be A-A.
 - There should be no obstructions within the arc created by the forward visibility splays.
- Note that it is not necessary to check the vertical visibility envelope for each forward visibility splay around a bend. In the above example, checking the vertical visibility envelope for splays 2-2, 4-4, 6-6 and 8-8 should be sufficient.
- Forward visibility should also be checked on approach to pedestrian crossings.
The full width of the crossing should be visible at a distance Y back from the crossing.

Junction visibility



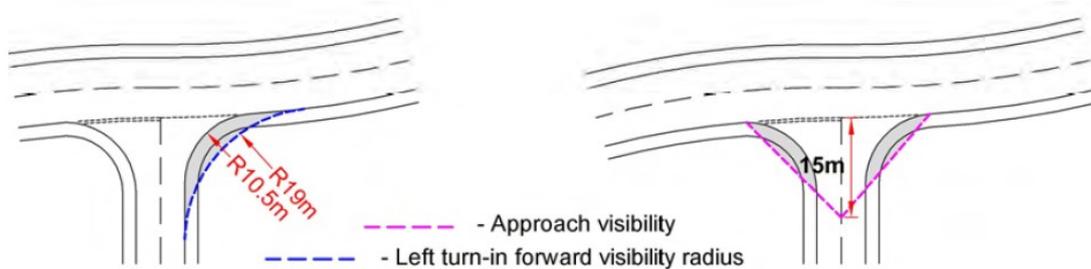
Visibility splays must be checked at every junction. The visibility splay requirements vary depending on the category and design speed of the **main** road.

The values set out in the table below should be used for **X** and **Y**:

85% speed of Major Road MPH (kph)	X Distance (m)	Y distance (m)
30(50)	2.4m	70
40(60)	4.5m	90
50(85)	4.5m	160
60(100)	4.5m	215

The distance **X** is measured back from the give way line along the centreline of the side road. The distance **Y** is measured along the nearside kerblines of the main road from the centreline of the side road. Point **A** is at a distance **X** back from the give way line. Where the side road joins the main road on a bend an additional line should be drawn from point **A** at a tangent to the nearside kerblines of the main road. This ensures that there are no blind spots within the visibility splays.

The following additional visibility checks at junctions are required:



The approach visibility should be checked for local distributor and non-residential roads and connecting streets. It is measured 15m back from the give way line along the centreline of the side road. Drivers should be able to clearly see the layout of the junction on approach to the main road. The left turn-in forward visibility radius should be checked at every junction. The radius should be drawn tangential to the side road and main road kerblines.

Junction radius	Left turn-in forward visibility radius
12.0m	20m
10.5m	19m
6.0m	10m
4.5m	9m

There should be no obstructions within any of these visibility splays. The verges or footways may be widened or realigned to match the visibility splays although it is not necessary. The decision should be based on desire lines and aesthetics. Junctions linking local distributors to primary, secondary and district distributors should be in accordance with the visibility requirements set out in *TD 42 DMRB 6.2.6*.

Roundabouts and signal controlled junctions

Roundabouts, mini-roundabouts and signal controlled junctions should be designed in accordance with the visibility requirements within the 'Design Manual for Roads and Bridges' *TD 16 DMRB 6.2.3*, *TD 54 DMRB 6.2.2* and *TD 50 DMRB 6.2.3* respectively. The stopping sight distances in *TD 9 DMRB 6.1.1* should be used.

Private drives and accesses

Private drives should be footway crossovers and not bellmouths, if 50 vehicle movements or less a week are envisaged.

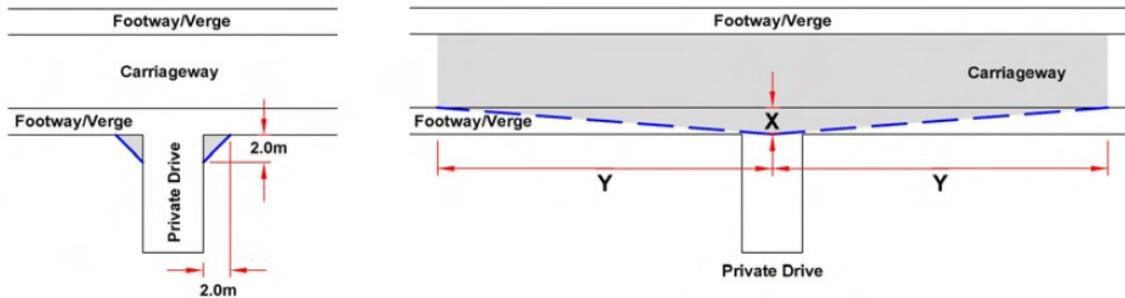
Visibility splays from business premises and industrial accesses will need to be provided and identified as part of a planning permission. They will not be adopted as part of the public highway but will need to be maintained to ensure the safety of vehicles in exiting premises.

The visibility splay requirement is 4.5m x 45m for private accesses of this type.

In addition to adopted visibility splays, the following splays will need to be provided and identified as part of a planning permission:

- private drives adjoining roads;
- pedestrian visibility splays where private drives cross the back of footway.

Although these areas will not be adopted, they will have the same limitations with regard to planting as an adopted splay.



The **X** distance should be 2.0m for private drives and 2.4m for shared drives.

The **Y** distance is the minimum forward visibility distance of the main road.

Pedestrian visibility to back of footway to be 2.0m x 2.0m on both sides.

Turning Areas

Residential cul-de-sac accessed off a connecting street or local distributor road always require a turning area. Residential cul-de-sac accessed off a local residential street or shared use street require a turning area where the cul-de-sac is greater than 25m in length. Turning areas in residential streets should be designed to allow for refuse vehicles.

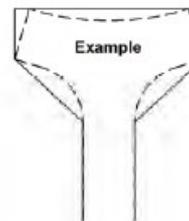
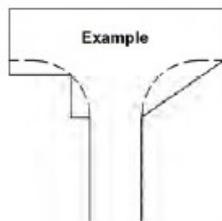
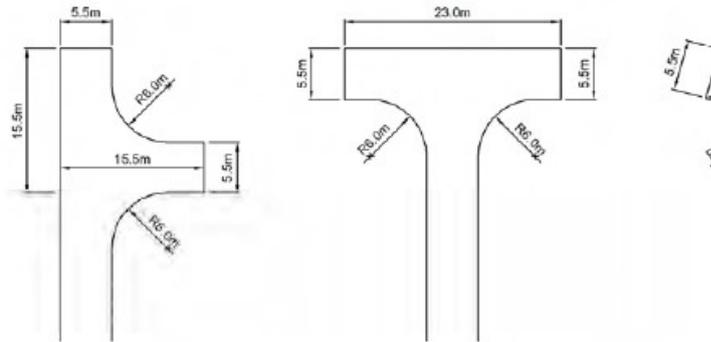
Turning areas are required for all non-residential access roads ending in a cul-de sac.

In industrial and retail developments, turning areas should allow for articulated vehicles. Office developments may have a smaller size of turning area based on a pantechicon vehicle. Business developments are used by drivers not used to the road layout and turning facilities should be provided at a maximum spacing of 360m.

The diagrams below give the minimum dimensions required for turning areas so that the design vehicle can carry out a three-point turn. These diagrams are for guidance only and the actual layout of the turning area should relate to its environment (see Manual for Streets para. 7.10.2). In exceptional circumstances, a five-point turn may be considered if the existing available space is restricted and parking is not feasible within the turning area.

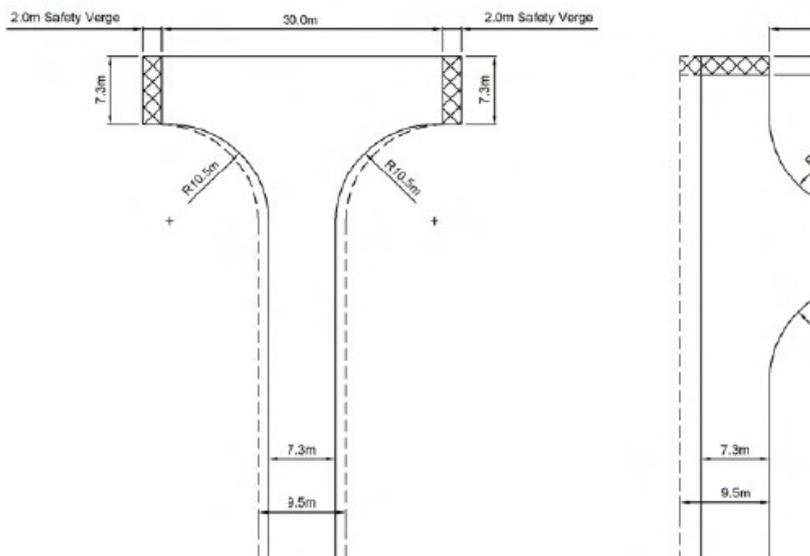
RESIDENTIAL DEVELOPMENT

(Large 3-Axle Refuse Vehicle)

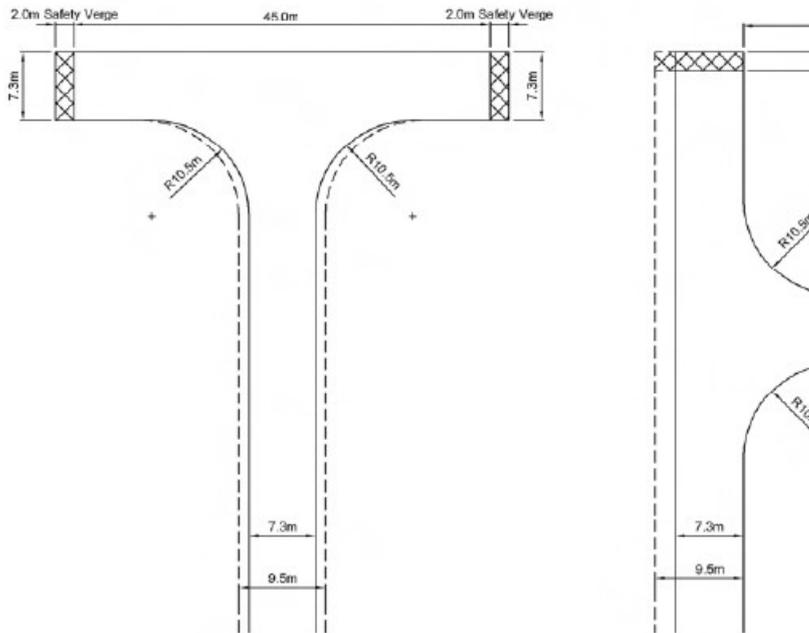


OFFICE DEVELOPMENT

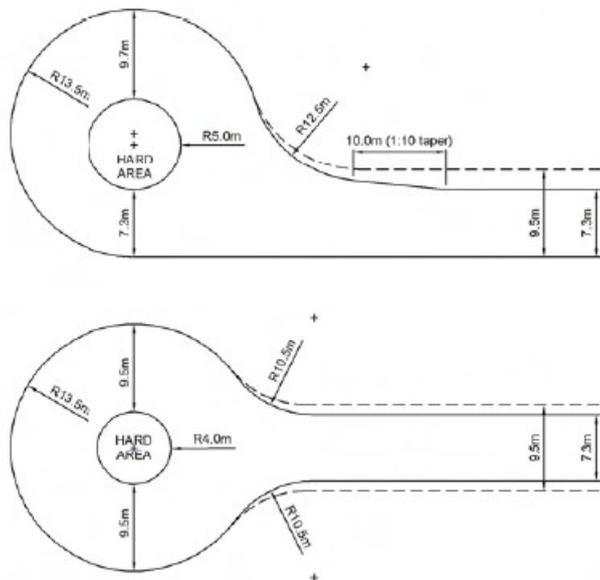
(Pantechicon)



INDUSTRIAL DEVELOPMENT
(15.5m Articulated Vehicle with Single Axle Trailer)



**NON-RESIDENTIAL DEVELOPMENT
TURNING CIRCLES**
(15.5m Articulated Vehicle with Single Axle Trailer)



Emergency Access

A vital requirement of all services is that the layout of an estate should be easily understood and that clear signing of streets and numbering of properties is achieved. It has generally been found that the fire service requirements cover the requirement of the police and ambulance authorities. The width of any road, drive or path should not be less than 3.7m. Restrictions to 3.1m may be permitted over short lengths subject to agreement with the fire service. Culs-de-sac should not exceed a length of

180m in order to provide satisfactory access for emergency services. If the development site does not permit a layout to comply with this requirement, an emergency vehicle access route should be provided. The highway authority will maintain such emergency vehicle accesses, provided the developer conveys the land to the highway authority and at no cost to the authority or it will be adopted under Section 38 of the Highways Act.

Emergency access routes should be as straight and as short as possible.

The minimum centreline radius shall be 10m.

The minimum headroom clearance shall be 3.756m.

Serious consideration should be given to the combined provision of a footpath and a cycle link where emergency accesses are required. It will not be permissible to install services within the above dedicated widths. The ends of the emergency access shall be secured by removable bollards to prohibit the use of unauthorized users.

It is accepted that in exceptional circumstances it may not be possible to construct an emergency access. In these locations, the carriageway width at the start of the cul-de-sac may be increased in width with the agreement of the fire service. (A copy of this agreement should be submitted to the highway authority as part of any approval procedure.) For residential developments the width of the carriageway shall be 7.3m. For other types of development, the width shall be 9.0m. The widening shall be provided along the road to the extent that the road exceeds 180m in length. The reduction in the carriageway width should occur thereafter at a road junction. On residential developments it may be necessary to provide speed restraint measures as the increase in road width may encourage excessive vehicle speeds.

It will not be permissible to install services within the adopted emergency accesses.

Private Drives

Any development serving more than 10 houses should be designed to adoptable standards and offered for adoption. The highway authority will not normally adopt developments of 10 dwellings or less of any type.

Private drives are designed to serve up to 10 dwellings and should have a very low design speed and should take note of the following design guidance.

1. Drives serving flats will not normally be adopted as a private management company will maintain the drive. However, roadways which serve mixed developments of houses and flats will be considered for adoption providing there are more than 10 dwellings..
2. On all layouts where the road/drive will remain private, careful consideration must be given to how refuse is to be collected. Layouts should be provided which do not require refuse vehicles to reverse, whilst refuse vehicles should be able to get to within 25m of the storage point. Residents should not be required to carry waste more than 30m.
3. Restricted access off roads serving greater than 300 houses.
4. Restricted access near junctions.
5. No drives within bellmouths.
6. Only one access to the highway will be allowed for a single dwelling.
7. All gates should be placed 5m back off the Highway.

8. Width of a single dwelling drive to be 2.75m. For shared drives, the width shall be 4.5m minimum for a distance of 10m from the carriageway.
9. Single parking spaces to be 5.5m minimum length abutting a Highway.
10. Not more than 4 parking spaces in a row abutting a highway. Where practical any adjacent rows should be separated by at least 1 full face kerb. Long drives may require private lighting.
11. Maximum gradient 1 in 10 off an unclassified road and 1 in 15 off a classified road.
12. Junction with road at restricted locations to be 90 degrees. At unrestricted locations, drives can join the road at an angle between 70 and 110 degrees.
13. Private drive visibility to carriageway 2.0m x "Y"m for a single access and 2.4m x "Y"m for shared drives. "Y" relates to the design speed of the main road.
14. Pedestrian visibility to back of footway to be 2.0m x 2.0m.
15. The bin storage area should not be located more than 25m from the collection point otherwise a turning facility should be provided within the site.
16. Surfacing to drives must be of a suitable material to avoid spillage onto the highway. These may include permeable surfacings which incorporate a SUDs solution to surface water drainage.
17. Private drives must not drain onto a Highway.

Verges

The resources of local authorities for maintenance are limited and the maintenance of any landscaping will be more successfully carried out when related to adjacent dwellings. This higher standard of maintenance may be achieved in residential areas by making verges/service strips contiguous with private gardens. The limits of Highway verges must be clearly demarcated with continuous line of edgings and developers must ensure that purchasers are aware of the different status of the verge and that the rights of the highway authority and statutory undertakers are understood. Purchasers must be aware of the prohibition of building walls or fences and the planting of hedges, large shrubs and trees. They should also understand that undertakers may excavate in the landscaped areas at any time.

For areas of substantial landscaping in industrial and commercial developments, it may be desirable for developers to undertake the maintenance of the areas. Where these areas are to be the responsibility of others, the developers should contact the highway authority and have a Section 142 Agreement under the Highways Act 1980 prepared to ensure maintenance responsibilities are agreed.

Where areas will not be the responsibility of others and the area is not required for the installation of underground services, the highway authority may request the planting of low maintenance low growth shrubs.

The maximum height of plants within visibility splays shall not exceed 300mm above ground level or a top vertical sightline of 600mm.

Below a 1.0m width, verges should be paved unless they abut an open garden or public open space.

Trees

The provision of trees have significant benefits to the environment and tree planting within highway contribute to absorption of dust and noise, reduce the visual impact of the highway and help to make the street more attractive for its users. The retention of existing trees and the provision of new trees within the highway must be approved by the highway authority.

The highway authority may wish the developer to remove diseased or unsuitable trees and to undertake the pollarding of large trees. Existing trees should have a form compatible with vehicular and pedestrian traffic within its influence.

Trees should have a clear height of 5.5m between the road surface and the lowest branch. A 2.6m unrestricted clearance should be available over footway areas and 3.0m over cycleways. Trees should preferably be positioned with a minimum of 3.0m from the edge of a carriageway. This clearance distance will be dependent upon location and tree type. The type and position of new trees will be agreed before the commencement of planting and will form any approval under a Section 38 Agreement of the Highways Act 1980. The position of all trees must be considered carefully as they can be restrictions in lines of vision and form formidable obstructions to highway users. Trees must not obstruct illumination from street lighting.

Trees will not generally be allowed within vision splays but consideration may be given to isolated thin trunked trees. Trees along footpath routes must be sited with safety and security considerations so as not to form any dark concealed areas.

Planting of trees must avoid future encroachment of root systems along service routes. The Council will require the developer to provide adequate commuted sums for the future maintenance of trees and landscaping and for any specially paved areas in which trees might be set within publicly maintained highways.

Services

General

Early in the planning process consideration should be given to the location and installation of utility apparatus and in the consideration of any development the needs of the statutory undertaker must be taken into account. Therefore it is essential that they be consulted at an early stage by the developer. Apparatus needs to be considered both above and below the ground, particularly where surface areas are shared. The layout must ensure that footway widths are not compromised and the location chosen should not have a detrimental effect on an otherwise attractive street scene.

A dilapidation survey of all the existing carriageways and footways within the vicinity of the development will be undertaken prior to any works starting. If more than one utility service trench is laid for the development to the detriment of the footway or carriageway it will then be necessary for the full width of affected carriageway (Kerb to Kerb) to be resurfaced at the developers expense.

It is therefore advisable that the Developer co-ordinates all the utility works required so that minimal disruption and excavations are undertaken to avoid having to carry out the additional surfacing works.

Location of Equipment

In order to afford ease of future maintenance, mains will normally be laid in public footways, service strips, under verges or pedestrian routes, or other public land. If no other route is possible then mains may be sited in the carriageway in which case the installation arrangement (laying zone, duct/jointing pit facilities) must be agreed with the highway authority.

However, the highway authority is not able to bear the cost of maintaining separate land not forming part of the adopted highway solely to provide a service track for public utilities and if the adopted highway or public land is insufficient for statutory undertakers needs then developers must provide service routes with secure easements for the statutory undertaker concerned.

The layout of all service plant must be coordinated to avoid conflict between undertakers.

Ducts laid across carriageways shall be laid at locations specified by the undertakers. All utility excavations should be backfilled with suitable material to the underside of the road construction. All undertakers are required to comply with the requirements of the New Roads and Streets Works Act 1991.

In shared surface streets where there are not any dedicated footways, service strips shall be clearly demarcated. There shall be a minimum remaining paved area width of 3.0m alongside any service strip.

Where mains are to be laid in a highway verge service strip which adjoins a private garden, the developer must make the purchaser fully aware that:

1. No planting, (except grass or low ground cover shrubs of weak root growth), or any obstruction shall be placed within the verge.
2. The highway authority and statutory undertakers have unencumbered rights of access to the verge.

This document should be read in conjunction with the series of documents produced by the National Joint Utilities Group (N.J.U.G.) which offers advice with respect to activities associated with existing and new mains and services. Developers shall follow these recommendations which aim to improve the efficiency of the installation process through better liaison and communication with the utilities.

Covers

The siting of service covers within footways should be carefully considered and must avoid areas of tactile paving. Whilst this may be seen as detail, numerous covers, located apparently at random and of contrasting colour to the carriageway or footway surfacing, can significantly detract from the overall appearance.

In areas of block paving the use of recessed covers should be considered provided that these are laid to Solihull's standard details and that they can be laid to the correct specification and do not become a maintenance issue for the Council once the road has been adopted. Manhole and inspection chamber covers to private drains will not be permitted within the highway.

General Issues

Any separate service margin should be at least 2m wide, in line with NJUG 7. Any utility equipment that is above ground, for example, cabinets, boxes, pillars and pedestals should be sited so that it:

- does not constitute a danger to the public or to staff working on it;
- does not obstruct driver's view, for example, by sitting it in visibility splays;
- does not obstruct pedestrians, wheelchairs, prams, pushchairs, etc. At least 1.2 clearance; increased to 2m in areas of high pedestrian flows (500 pedestrians an hour), shall be provided;
- is not located within 5m of any other street furniture that would create a double obstruction to pedestrians;
- does not enable illegal access to adjacent premises or property (e.g. locating cabinets adjacent to high boundary walls, where the apparatus could be used to climb over the wall);
- does not restrict the outlook from the window of a house, intrude into areas of open-plan front gardens or disrupt the line of low boundary walls;
- does not spoil the view of a listed building;
- does not result in 'visual clutter' by being in an inappropriate place; and
- does not indiscriminately create wide sterile easements within verges or public greenspace (i.e. grassed areas maintained by the Council).

All apparatus above the ground should:

- be positioned so there is enough access for the equipment and the surrounding highway to be maintained and cleaned;
- not be located within any tactile paving (in the case of surface covers);
- allow space for associated jointing chambers;
- allow for future surfacing work, for example by allowing for spare cable if the boxes are raised in future;
- meet the license requirements for listed buildings and conservation areas. Special consideration to cabinet design in conservation areas is required; and
- incorporate anti-graffiti coating measures.

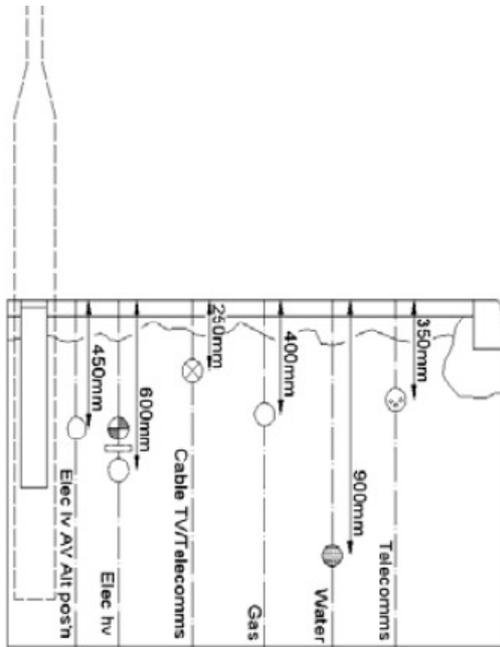
Where equipment is to be located within the highway, cabinets and other apparatus shall be located in the verge with a hard margin where surrounded by grass. Cabinets shall be located with at least 1.5 m clearance between the cabinet and the edge of the carriageway. Access doors should always open to the footway. If there is no verge, cabinets and other apparatus shall be located at the back of footway.

Consideration may be given to adopting any additional small areas outside the normal highway boundary so that above-ground apparatus can be located in accordance with the above requirements. If, however, the above requirements cannot be met within a clearly defined adoptable area, the apparatus should be located outside the adoptable highway, which may necessitate an easement to allow utility providers access for future maintenance.

Utility apparatus below ground shall, be positioned in accordance with the requirements of NJUG7.

This should avoid impact on tree root zones by their judicious location and by special methods of working where this is unavoidable, in accordance with NJUG10 and B.S.5837 (2005) "Trees in Relation to Construction Recommendations".

A recommended apparatus layout within the footway is set out in the drawing below:



4. Construction Manual

This manual shall apply to all works, which are intended to become highway maintainable at public expense, including works within the existing highway relating to new development within the Borough of Solihull.

Adherence to this manual will normally ensure that residential estate roads, industrial estate roads and associated works which are designed in accordance with Solihull Council's documents, guidelines and drawings will be acceptable to the Highway Authority for adoption.

Where highway works are proposed, it is advisable that discussions are held with Solihull MBC Highway Services prior to the submission of a planning application and as early in the process as possible.

It is the designers' responsibility to ensure the most up to date standards, specifications, codes of practice, legislation, guidance notes etc. are used when designing the works. Should there be a significant time lapse between design and commencement of work on site then Solihull Metropolitan Borough Council reserve the right to insist the design is revisited and amended if necessary to comply with the latest relevant details.

Whilst this document is accurate at the time of publication, an up to date version can be found on the Solihull Council website

The Council reserve the right to modify, alter and amend the agreed specifications should policies and technical advice change or special circumstances arise.

An Inspection and test plan must be made available to the SMBC officer.

All materials and workmanship shall be the best of their respective kinds and comply with the appropriate British Standard(s), the Code of Practice (where applicable), this manual and be to the SMBC Project Engineer's approval. Unless stated to the contrary the thickness of the material described shall mean the finished or compacted thickness.

All materials brought to the site for use in the works shall be deposited and stored so as to secure them from damage and from contact from harmful material until they are required for use. Materials shall not be deposited within the existing public highway or in such a way as to inconvenience and endanger the public or within the spread line of trees to be retained.

If any sheds or storage buildings are erected on the site such buildings shall be sited so as not to obstruct access to any property and the reasonable free passage of pedestrians and/or vehicles. Upon completion of the works the buildings shall be removed from the site and the area left tidy. No buildings shall be positioned within the existing public highway.

5. Preliminary Agreement Requirements

Pre–construction requirements for a Section 38/278 agreement

When technical approval has been granted the Developer must notify the Highway Authority with 14 days' notice of the intention to start works.

No inspection will be undertaken until the following is in place:

- The Section 38/278 legal agreement has been signed,
- Commuted sum should be paid
- Pre-construction Health and safety Plan
- The Supervision fee has been paid.
- The SMBC Project Engineer has been advised of the Principal Contractor.
- The SMBC Project Engineer has reviewed & given approval to the submitted programme of construction works.
- Emergency contacts have been provided.
- Relevant notices have been served in accordance with NRSWA if any works are on the existing public highway.

*If works within a Development site have begun before signing of a Section 38 / 278 Agreement then NO inspections of the site will be made and it also will be made clear that without a signed Agreement and / or Technical Approval any works carried out are at the Developers risk. The Development will be deemed not to be constructed to an adoptable standard and any future request to adopt the highway works will not be accepted.

The Officer who will be carrying out the inspection of the works on behalf of the Highway Authority will notify the Developer of the site inspection procedures required throughout the duration of the works. It is the Developer's duty to fully comply with these procedures and to liaise with the Clerk of Works and/or appropriate office of Solihull MBC.

Pre–construction requirements for a 278 or works permit agreement

When technical approval has been granted the Developer must apply using the form contained in the legal agreement to the Highway Authority for the issue of a Works Permit/Licence, an application form can be requested from the Highways Permits Team at Solihull MBC.

The Works Permit will not be issued until the following are in place:

- All legal agreements have been signed.
- All bonds, Legal and Inspection fees, deposits, etc. have been paid.
- The SMBC Project Engineer has seen written proof that the Developer has notified the Health and Safety Executive (Form F10 – Notification of Construction Project) that they

will be acting as the Client for the works for the purposes of the Construction (Design & Management) Regulations 2015*

- The SMBC Project Engineer has been advised of the Principal Contractor.
- Evidence that the Principal Contractor has public liability insurance to a value of at least £10 million.
- A programme of construction works has been provided and approved by the SMBC Project Engineer.
- A construction phase plan, Method Statement and Risk assessments including emergency contacts have been provided.
- Evidence of a programme of consultation.
- Relevant notices served in accordance with NRSWA.
- Traffic Management Plans, for the approval of the SMBC Project Engineer.
- Pre-construction Health and Safety Plan in place

*One or more of the Clients may agree in writing to be treated for the purposes of these Regulations as the only Client or Clients (Regulation 4(8) (a))

The SMBC Officer who will be carrying out the inspection of the works on behalf of the Highway Authority will notify the Developer of the site inspection procedures required throughout the duration of the works. It is the Developer's duty to fully comply with these procedures and to liaise with the SMBC Officer. The Developer is required to advise the SMBC Officer of the start of works 14 days prior to commencement on site.

Other pre-construction requirements relevant to all types of agreements

This section gives guidance on the requirements of the Highway Authority prior to commencing works and during the construction and maintenance phases.

The Developer shall be required to arrange both a pre-construction meeting and site safety induction for the Highway Authority representatives before commencing the works.

The Developer is required to give at least two weeks notice in writing to the occupiers of all premises directly affected by the works and those whom in the opinion of the Highway Authority may be affected by the works. This includes the emergency services.

The level of notification of the scheme will vary depending on the duration and degree of disturbance to the highway. The consultation may include such items as leaflet drops, newspaper advertisements, temporary advanced signing (2 weeks notification required) and meetings with local Town and Parish Councils. The SMBC Officer must be notified and given the opportunity to review any correspondence before it is sent out to the public.

The Developer is required to nominate a member of the site management team as an emergency contact point and details shall be displayed on site. In addition to this the Highway Authority requires a 24 hour contact number for the site.

Processes

Protection of the Public At all times, the Developer is responsible for ensuring the safety of all users of the Highway from the commencement of the works until the issue of the Completion Certificate.

The Developer must ensure that at all times the site is adequately protected, road works signage is provided in accordance with Chapter 8 of the Traffic Signs Manual, all areas open to the public are kept free of mud or other hazardous substances and minimise any nuisance from noise or dust.

A record of all complaints received from the public and actions taken must be maintained on site. This record must be available for inspection by the Highway Authority.

Construction (Design and Management) Regulations 2015 (CDM 2015)

The Developer shall work in accordance with the Construction (Design and Management) Regulations 2015 at all times. A Health and Safety file must be instigated in accordance with the CDM Regulations 2015. This is a record of information for the client/end user, which tells those who will be responsible for the development in future of the risks that have to be managed during maintenance, repair, renovation or demolition. This file shall be updated as the development progresses and given to the Highway Authority upon completion of the works. The Developer acting as “Client” shall also confirm whether the development is “notifiable” and, if it is, produce written proof that the Health & Safety Executive have been informed.

The Principal Designer shall ensure that a Health & Safety File is prepared and ensure co-operation between all parties involved in the project.

Where design input is made by the Highway Authority, it is the responsibility of the Developer acting as Client and their Principal Designer to develop and assess the implications of the design input under the CDM Regulations.

New Roads and Street Works Act 1991 (NRSWA)

Under the terms of the Act the Developer shall contact the SMBC officer and agree the timing of their works.

Testing

Before work commences, the Developer shall make all necessary arrangements for the testing of materials used in connection with the carrying out and completion of the works, by an independent UKAS accredited testing facility, as required by the SMBC Officer or their representative, and shall bear the full cost of any such testing and provide the Council with copies of all material testing certificates.

Tests applied to particular materials will be those specified in the appropriate MCHW covering such materials. Refer to SMBC Project Engineer for the details of materials testing and the frequency of sampling required.

During the execution of the works, materials for test will be selected from batches or consignments on the site, and any materials which fail to pass the relevant test shall be removed from the site of the works. The Developer shall comply with the frequency of sampling and testing of concrete which is covered in Appendix 1/5, Table 1/1, Series 100, MCHW.

If any part of a defective batch or consignment shall have already been embodied in the works, the section affected shall be removed and replaced by material which complies with the specification.

The Developer shall be required to provide assistance, instruments, labour and materials for other tests identified by the SMBC Project Engineer/Clerk of Works and deemed to be necessary and shall be responsible for taking and transporting of all samples at own expense to the laboratory.

Tests for structures

The design of a structure shall require the determination of the appropriate soil parameters in accordance with the relevant British Standard. It is likely that other testing methods shall be required

Statutory undertakers covers and frames

All statutory undertakers' covers and frames for clear openings 450 x 450mm or smaller shall conform to the requirements of BS 5834-2:2011, 'Surface boxes, guards and underground chambers for the purpose of utilities. Specification for surface boxes' and not to be located within vehicle crossings. If this is unavoidable, covers shall be heavy duty type and fit for purpose.

Covers and frames within footway areas shall be installed to the rear of the footway as far from the carriageway kerb edge as possible.

All access covers should be metal.

Supervision Responsibilities

The responsibility for day to day supervision of the construction works for Section 38, Section 278 and Works Permits rests with the Developer and their Contractors. Solihull Highways Officers role is to inspect the works to ensure that they are being constructed in accordance with the approved specification and other development specific requirements. The Officers will not issue instructions to the Developers Contractor, rather advice concerning compliance with the approved specification. Amendments to the design/material specification must be submitted by the designer and approved by the SMBC Project Engineer. The Developer must ensure that the designer coordinates any design change with the SMBC Project Engineer

The site presence of a Solihull MBC representative does not absolve the Client or Principal Contractor from supervising the works and ensuring that the works are constructed in accordance with the technical approved drawings, specification and are carried out in a safe and proper manner.

Road Safety Audits

Road Safety Audits are required by the SMBC Project Engineer and will be carried out as follows:

- Formal Stage 1 Safety Audit – undertaken on completion of outline design and submitted by the Developer with the planning application.
- Formal Stage 2 Safety Audit – on completion of detailed design but prior to technical approval. Note. If the design changes significantly a further Stage 2 Safety Audit will be required.
- Formal Stage 3 Safety Audit – towards scheme completion prior to issue of completion certificate
- Formal Stage 4 Safety Audit – from scheme becoming operational and before the Maintenance/Final Certificate expires (usually 12 months) and only at the discretion of the SMBC Project Engineer.

Any issues arising from the safety audit reports are to be dealt with and paid for by the Developer.

Note: Auditors shall be independent from the design team and ROSPA trained. A draft report shall be sent to the SMBC Project Engineer. The Designer/SMBC Officer is required to respond for the report to be final. The report shall be signed off as final within 3 weeks after draft submitted. See DMRB Vol5 section2 GG119

Project engineering drawings

All works shall be executed in accordance with the technically approved drawings, specification and other required details and no alterations shall be made without prior approval of the SMBC Project Engineer

All site investigations and other relevant information must be made available to the SMBC Project Engineer at the design stages e.g. California Bearing Ratio (CBR), frost susceptibility results and material types within trial holes and boreholes. CBR test results of less than 2% will require special consideration with respect to the specification for construction and must be agreed with the SMBC Project Engineer prior to works progressing.

Commencement and programme of the works

No work shall commence until the working drawings, specifications, structural and drainage calculations have been submitted to and given technical approval in writing by the SMBC Project Engineer.

Furthermore, no works within the public highway shall be commenced until written confirmation of any diversionary works in respect of undertakers' apparatus has been supplied and/or details of any works related thereto have been approved by the undertaker concerned.

The Developer shall provide the SMBC Project Engineer with a programme of works prior to commencement on site.

The programme shall include an outline of the order and method of working including temporary traffic management together with an indication of materials, suppliers and sub- contractors. If the works, having been started, are discontinued for a period longer than 14 days, three days notice shall be given to the SMBC Project Engineer before work is recommenced.

No work shall commence before a S278/38 agreement is in place.

Setting out

The line and level of the formation, side slopes, drains, carriageways and footways, etc. shall be carefully set out in accordance with the planning consent, to an approved method and frequently checked by the Developer to ensure that the gradients and cross sections are in accordance with this manual and the approved drawings.

The Developer shall provide for the use of the SMBC Project Engineer all instruments and/or equipment and labour to assist them with any levelling, measuring, checking or inspection as deemed necessary. The checking of any setting out of line or level by the SMBC Project Engineer shall not in any way relieve the Developer of his responsibility for the correctness thereof.

Cold weather working

No material in a frozen condition shall be incorporated in the works and material for use in road pavements shall not be laid on any surface which is covered with ice or snow.

Laying of bituminous materials in adverse conditions shall be in accordance with BS EN13108:2006 and PD6691:2010 – Guidance on the use of Bituminous Mixtures.

The laying of pavement materials containing cement shall cease when descending air temperature in the shade falls below 3C and shall not be resumed until the ascending air temperature in the shade reaches 4C. Proper protection from frost shall be afforded to all newly laid cement bound materials.

Additionally, the temperature of the fresh concrete at the time of delivery into the construction shall not be less than 5C.

Routing of construction vehicles

Before the commencement of the works, the Developer shall provide the SMBC Project Engineer details of all routes and the location and details of temporary road signs to be used for construction vehicles gaining access to the site. In some cases, the route(s) will be controlled by a planning condition.

If the development involve adoptable works, the routes and signage shall be agreed by the SMBC Project Engineer prior to commencement of work and the routes or any agreed variation shall be inspected by the Developer and SMBC Project Engineer to establish the existing condition of the roads prior to use by the construction traffic.

The Developer will then be required to remedy any damage caused or increased by the construction traffic.

Keeping highways clean

It is an offence under the Highways Act 1980 to deposit mud etc on a public highway. Prior to commencement of the works, the Developer shall, where required by a planning condition / the SMBC Officer, provide within their site boundaries, vehicle and wheel cleaning apparatus to ensure that public highways affected by the site are kept clean. The Developer shall ensure that the facility is maintained in good and useable condition and that it is used by all vehicles before they leave the site.

Any detritus that is deposited on the public highway that has emanated from the Development shall be removed at the earliest opportunity.

Parking for site staff

Prior to the commencement of the works, the Developer shall provide adequate parking facilities within the site boundaries for all site personnel vehicles. The Developer shall ensure that all site personnel use the parking facility and that they do not park on the public highway when attending the site.

Inspection

At least two weeks prior to the commencement of site works, the Developer shall convene a site meeting with the SMBC Project Engineer and nominated Clerk of Works to discuss the works programme and the effect of the development on existing highways and statutory undertaker's apparatus.

Prior to works commencing on site the Developer should give the SMBC Project Engineer /Clerk of Works 5 days notice and in the case of the construction of foul or surface water sewers intended for adoption by the Water Authority located under proposed public highway, appropriate notice shall also be given to that authority.

Notice for required inspections once works have started shall be at least 5 days and should be given to the relevant Clerk of Works.

All reasonable facilities shall be given to the SMBC Project Engineer/Clerk of Works for the inspection of the various elements of the works whilst in progress, including highway drainage.

Inspections required by SMBC are:

1. Drainage inspection. (Backfill, Laterals, Gullies),
2. Inspection of formation, (witness proof rolling)
3. CBR Tests and Approve capping layer
4. Sub-base inspection
5. Kerb line inspection,
6. Base Course inspection – Nuclear Density Testing (NDT), Air voids
7. Binder Course inspection – NDT Testing, Air voids
8. Surface Course inspection and texture depth for large areas – NDT Testing when requested
9. Inspection of street light positions prior to installation
10. Air test on manholes and gullies connections
11. CCTV on carrier drains

Note. Other inspections may be deemed necessary by the SMBC Officer due to the specific nature of the works being undertaken e.g. embankment stability/protection measures.

Inspection of the works will be carried out by the Highway Authority. The level of inspection will be determined by the SMBC Officer and Clerk of works and will normally be on a visitation basis. Larger sites may have resident staff.

The Developer is required to give the SMBC Project Engineer, Clerk of Works and any other duly authorised person free access to the site to enable the works and materials to be inspected. This includes access to any premises where materials are stored or being prepared or manufactured.

Inspection hours will generally be within normal working hours Monday to Friday excluding Bank Holidays. Details of any works to be carried out outside of these times should be given to the SMBC Officer with adequate notice, so a decision can be made if attendance is required.

Inspection Notification:

- 14 working days – before commencement of the works on site
- 3 working days – before commencement of any road construction
- 2 working days – response to design changes
- 24 hours – any other inspections, including the covering up of works

The SMBC Officer may request the Developer to carry out any tests deemed necessary and to be tested by a (UKAS NAMAS) accredited laboratory. Any material deemed unsuitable will be rejected. All costs of testing and replacement of materials to be borne by the Developer. Any rejected materials must be removed from site or stored separately.

Working adjacent to existing highways

The Developer shall at all times take such precautions and adopt such measures as are necessary to ensure the safety and convenience of the public and owners/ occupiers of affected property. Interference with the use of the highway access to private property should also be minimised. The safe passage of vehicles and pedestrians shall at all times be maintained throughout the construction period unless the highway is closed with the agreement of the SMBC Officer and by due statutory process.

No work within the existing highway shall take place without the written consent of the SMBC Officer and the entering into of the appropriate agreement and issuing of a Works Licence or Permit to Work. A Road Opening Notice that complies with the NRSWA Act 1991 is also required.

Control of noise

The Developer shall comply with the general recommendations set out in BS 5228-1:2009 and BS 5228-2 :2009 – “A Code of Practice for Noise and Vibration Control on Construction and Open Sites” when working within or adjacent to the public highway.

1. The Contractor shall employ the best practicable means to reduce to a minimum the noise produced by his operations and shall comply with the general recommendations in BS 5228: 2009 ‘Noise Control on Construction and Open Sites’.
2. Without prejudice to the generality of the Contractor’s obligations imposed by the above statement:
 - (i) All vehicles, mechanical plant and machinery used for the purpose of the works associated with the Contract shall be fitted with proper and effective silencers and shall be maintained in good and efficient working order;
 - (ii) All compressors shall be ‘noise reduced’ models fitted with properly lined and sealed acoustic covers which shall be kept closed whenever the machines are in use and all ancillary pneumatic percussion tools shall be fitted with mufflers or silencers of the type recommended by the manufacturers;

- (iii) Wherever possible only electrically-powered plant and equipment shall be used;
- (iv) Acoustic screens shall be used to protect any noise sensitive development where deemed necessary by the Chief Environmental Health Officer or his representative;
- (v) All plant and machinery in intermittent use shall be shut down in the intervening periods between work;
- (vi) The Contractor shall comply with the permissible noise levels specified in the following table. The noise level as measured 1 m from the facade of any residential building subjected to noise produced by any Contract plant or operations shall not exceed:

Period	Hours	Façade noise Levels [dB(A)]	
		Leq (1hr)	Peak Noise (L max)*
Monday to Friday	08:00 – 18:00	72	85
	18:00 – 20:00	60	70
Saturday	08:00 – 13:00	72	85
Any other time	-	40	50

* L max shall be measured using FAST or IMPULSE response as appropriate. Noise Levels shall be monitored by the methods set out in Appendix G of BS 5228-1 2009

- (vii) Pile Driving or Blasting shall not be undertaken without the prior consent of the Chief Environmental Health Officer of SMBC and shall, in any event, be restricted to the hours of 09:00 – 16:00 Mondays to Fridays only; and
- (viii) Any emergency deviations from these conditions shall require the prior approval of SMBC project Engineer.

Vibration

1. There are no special requirements for the control of vibration.

Openings in publically maintainable highways

The Developer shall obtain from SMBC Street Works Co-ordinator the appropriate 'Road Opening Notice' in respect of openings in publically maintainable highways, and shall comply with the New Roads and Street Works Act 1991 (NRSWA).

Hours of Working

Normal working hours within the SMBC area are stated below, any working activities outside those working hours, the developer should obtain the SMBC project engineer consent in advance.

Normal working hours;

8:00 – 18:00 (Monday – Friday)

8:00 – 13:00 Saturday

No Working Activities Sunday.

Provisions for Resident Engineers

Where the SMBC Project Engineer has determined that there shall be resident staff or the level of attendance is 50% or greater then the Developer must provide separate accommodation and facilities for the staff specified by the SMBC Officer. Typical provision may include accommodation, office furniture and equipment, separate toilet facilities, provision of telephone, Internet access, provision of all consumables, provision of all relevant documents, regular cleaning, payment of all costs incurred etc. Details of the site accommodation should be provided by the SMBC Project Engineer during the pre-start meeting.

On all sites a copy of the approved drawings and documents should be available for the use of the SMBC Project Engineer and Clerk of works.

Design Changes

The Developer is responsible for submitting proposed changes to the design that may be required that result from unexpected features on site or to Address/mitigate issues with defects in the design, for the approval of the SMBC Officer. Any Change to the design will need to be re-approved.

Traffic Signals

The Developer is responsible for informing the SMBC Officer regarding all matters concerning the installation, testing and commissioning of traffic signal equipment.

Utilities

The Developer is responsible for obtaining all notices to the Utility companies and arranging any required diversions. All costs are the responsibility of the Developer. Unless otherwise agreed, the Developer shall ensure that all services and drains are laid under carriageways and footways, or ducts provided for them before the base is laid.

All trenches within the existing highway should be reinstated in accordance with the NRSWA Specification for the Reinstatement of Openings in the Highway. If trenches are within new

highway constructed as part of a Section 38/278 Agreement then the depth of construction and type of material should adhere to the original designed specification. Reinstatement is to be carried out according to the SMBC Standard Detail.

Post construction

When the Developer is confident that all works have been completed a Stage 3 Road Safety Audit should be commissioned and a copy of the Audit Report and Designer's Responses

forwarded to the SMBC Project Engineer and they should then apply in writing to the SMBC Project Engineer, requesting the issue of a Completion Certificate (S106/278 Agreement)

For S278 schemes on the existing public highway routine maintenance such as winter service, weed spraying, grass cutting, vandalism and repairs as the result of road traffic accidents will be undertaken before the issue of the Substantial or final Completion Certificate.

Final Certificate (for both 278 and 38 works)

Following the issue of the substantial Completion Certificate, a maintenance period (normally of twelve months duration or according to the legal agreement) will commence. During this period the Developer is responsible for the repair of defects and amendments to the design that the SMBC Officer considers to be necessary.

At the end of the maintenance period the Developer should apply in writing to the SMBC Officer to request the issue of the Final Certificate. If this does not occur, the Highway Authority will contact the Developer to pursue remedial measures prior to the issue of the certificate.

On receipt of a request from the Developer for the issue of a Maintenance Certificate (S278) / Final Certificate (S38) the SMBC Officer will arrange for an end of maintenance inspection and a Stage 4 Road Safety Audit (if applicable).

When all the matters raised in the Road Safety Audit and maintenance inspection have been addressed by the Developer to the satisfaction of the SMBC Officer a Maintenance Certificate will be issued.

A Maintenance (S278) / Final Certificate (S38) will not be issued until the following have been satisfactorily completed:

- Maintenance inspection and all remedials completed.
- Stage 4 Road Safety Audit (if applicable)
- Street Lighting inspection (if applicable)
- Traffic Signals inspection (if applicable)
- Structural Inspection (if applicable)

Upon issue of the certificate, the SMBC Officer will arrange for the works deposit to be released as per the terms within the Legal Agreement.

Design

These notes are not exhaustive and in cases of doubt the SMBC Officer should be consulted. The notes refer particularly to residential estates and although they are also generally applicable to industrial estates it is particularly important that the SMBC Officer is consulted at an early stage when such adoptable roads are under consideration.

The drawings required in most cases are:

- Layout Plan
- Longitudinal sections of road and independent footways
- Longitudinal sections of surface water drains
- Typical cross sections of roads
- Constructional details

Additional drawings, including some detailed cross sections may be required by the SMBC Officer.

All levels must be related to Ordnance Datum (Newlyn).

Layout plan

Scale must be 1:500 or 1:200 (where applicable)

Information to be shown:

- Layout of roads, footways and verges.
- Layout of sight lines.
- Layout of houses, garages, hardstandings and vehicle crossings.
- Layout of concrete bays and flexible bellmouths.
- Locations of gullies and lines of gully connections.
- Lines of surface water sewers and/or drains and locations of surface water manholes.
- Lines of foul sewers and locations of foul sewer manholes.

Layout of carriageways, footways and verges

The layout of carriageways shall generally comply with the current SMBC policy, unless otherwise agreed by the SMBC Officer.

The layout of roads, paths and verges shall be shown and the information shown shall include centre line chainages, the widths of carriageways (including widening on bends where applicable), the widths of footways and verges, the tangent points and centres of curves, the radii of curves, the kerb radii at junctions, the dimensions of turning bays, of acceleration and deceleration splays, and of laybys and sight lines.

Chainages shall be shown at intervals of not more than 20 metres. High points and low points shall be marked.

The widths of the carriageways, footways and verges together with the sight line requirements shall comply with the widths determined and approved when the scheme was submitted for Planning Approval, or to the subsequent requirements of SMBC Highway Services and shall include for widening on curves and clearly indicated on the plans.

If widening of carriageways on bends is required, details shall be made available.

Tangent points shall be marked on all kerb lines where there is a change of radius or where a curve meets a straight.

Where independent footpaths are proposed for adoption, full construction details are required including long sections, drainage, street lighting, barriers etc.

No windows or doors should open outwards, or overflow pipes etc. project over the adoptable area of the highway, or over other areas where the public have access. This point should not be overlooked in the design process.

In the case of cul-de-sac layouts a turning space is required.

At the junctions of new adoptable roads with existing public roads acceleration and deceleration splays may be required.

Where the construction of a layby is required, the type of construction, position and dimensions shall be approved by the SMBC Officer.

Details of road markings at junctions shall be required. See the TSRGD 2016 and any succeeding regulations.

Layout of sight lines

Sight lines shall be shown at all junctions and on such bends as the SMBC Officer may require. The land in front of such lines shall form part of the adopted highway and the lines shall be defined on the site by lengths of footway edging set along the sight line at each property boundary, with not more than 10 metres between the edgings – known as `hit and miss` edgings. If fences or walls are to be erected then the sight line can be defined by the front face of such fences or walls.

The following note should be marked on the drawing for each sight line:

- On open plan layouts where no walls or fences are provided, note to read, "Sight lines defined by line of footway edging, the land in front to form part of the highway".
- Where fences or walls are to be provided, note to read, "Sight lines with walls or fences erected thereon, the land in front to form part of the highway".

The sight line dimensions at junctions shall be decided by the SMBC Officer in each case including vehicle/pedestrian sight splays at the junction of private drives with adoptable highways.

On curves and bends a minimum forward visibility shall be provided on the centre of the inside lane (normally taken as 1.5 metres from the inside kerb line), in accordance with Planning Approval.

Where a new estate road joins the existing wider highway network, or within an industrial estate visibility will be required to be in accordance with TD41/95 and TD42/95 and any succeeding technical directives.

Visibility on curves, at summits and at junctions shall be provided between points 1.05 metres above the carriageway and 2.0m and must be ensured to remain within highway authority land.

Where it can't remain within Highway authority land, the adoption agreement should allow for adopting of these areas.

Layout of houses, garages and hardstandings

The layout of houses, garages and hardstandings is intimately related to the layout of the roads, footpaths and vehicle crossings and to the detailed positioning of gullies, carriageway expansion joints etc. It follows that no changes shall be made in the layout of houses, garages or hardstandings without the need for corresponding changes in the road layout and detailing being investigated and agreed with the SMBC Officer.

The layout of houses, garages and hardstandings in respect of which planning consent has been given shall be shown on the plan so that the positions of the vehicle crossings can be determined.

Hardstandings and driveways (which must be shown from the garages to the back of the footway) shall be so aligned that they meet the back of the footway at right angles. This condition may be relaxed within turning bays and the SMBC Officer shall be consulted. The minimum size of a hardstanding is 5.5 metres x 2.5 metres per vehicle unless located in front of a garage where the length shall be increased to 6 metres to enable the garage doors to be opened while the hardstanding is in use.

The position of vehicle crossings of the footway shall be shown by parallel lines 0.914 metres apart at each end of the crossings to indicate the ramped sections of footway. Vehicle crossings should not cross radius kerbs at junctions or turning bays. Back to back ramped kerbs will not be permitted. A minimum of 300mm of kerb unit should be allowed between ramped kerbs.

A minimum of 3 flat kerb units i.e. 5.5 metres overall including ramps shall be provided for a single crossing (a maximum of 5 dropped kerb units is allowable) and a minimum of 10 flat kerbs i.e. 9.1 metres overall for a double crossing.

In certain cases where a house has two garages (or a carport and a garage) it may be possible to provide only a single crossing. In developments of this type the SMBC Officer shall be consulted.

Footways incorporating mountable kerbs should be a minimum of 2 metres in width.

Pram/wheelchair crossings are required at all junctions and other locations to be determined by the SMBC Officer.

Locations of gullies and lines of gully connections

Where gullies are used on the highway their location shall be shown. Gullies are to be spaced so that of the carriageway and footway are drained effectively and with a minimal number of road crossings as possible All features should be positioned so as to allow the safe and efficient maintenance of the drainage network in the future.

At junctions with existing roads, existing gullies shall be shown.

Lines of foul and surface water drains, sewers and manhole locations

The lines of foul and surface water drains and sewers and the locations of all manholes shall be shown on the plan. Foul and surface water drains and sewers should ideally be located under the footways or verges, and not in the roads. Pipes crossing the road shall be minimised as much as possible.

Roof water drainage connections to surface water sewers shall be shown. No portion of a soakaway shall lie within the highway boundaries.

Manholes ideally shall not be located off junctions. Each manhole must be numbered. The numbers of surface water manholes shall be prefixed with the letter "S" and the numbers of foul manholes by the letter "F".

Pipes and manholes to be adopted by the Highway Authority shall lie within the highway boundary. In the case of outfall pipes, when this is not possible, a deed of grant may be required.

A plan to a scale of at least 1:500 will be required of any off-site outfall surface water drains or sewers.

Road longitudinal sections

Preferred Scales - Horizontal 1: 200, Vertical 1: 20

The sections shall show the existing ground as a dotted line, the proposed road channels as solid lines and the proposed road centre line as a broken line.

Information to be shown on the section:

- Centre line chainages
- Existing ground levels
- Proposed levels on centre line and channels
- Horizontal alignment on centre line and channels
- Vertical alignment
- Adjoining road widths
- Additional details of levels and gradients may be required at bellmouths and turning heads.

Road cross sections

The sections shall show the existing ground as a dotted line, the proposed road profile as a solid line and the proposed road centre line as a broken line.

Information to be shown on the section:

- Centre line chainages

- Existing ground levels
- Proposed levels on centre line and channels
- Channel offset distances from centre line
- Typical cross sections of each width and type of road showing full
- constructional details of footways and carriageways shall be shown.

Centre line chainages

Centre line chainage shall be related to that shown on the plans.

Existing ground levels

Existing ground levels shall be shown at least every 20 metres and at sudden changes of slope. Ground levels shall be extended for at least 30 metres beyond the end of every road.

Where a new road is an extension of an existing road the levels of the existing road shall be shown at 2.5 metres intervals for at least 30 metres.

Where the new road forms a junction with an existing road then existing channel levels shall be shown along the existing road at 2.5 metres centres, to a distance of 10 metre on either side of the tangent points. Levels of any existing gullies shall be shown.

Proposed levels

Proposed levels on the centre line and the channels shall be shown every 10 metres on straight gradients, at all changes of gradient, every 5 metres on vertical curves and at each end of vertical curves.

The intersection point level of vertical curves shall also be shown. Channel levels shall be shown at 5 metres intervals where there is transition between camber and crossfall.

Vertical alignment

Proposed centre line and channel gradients shall be stated as a percentage as well as a fraction. Points of change of gradient shall be shown together with the lengths of vertical curves.

Vertical curves are required at gradient intersections and shall be designed in accordance with the following requirements:

The length in metres of a vertical curve is calculated as approximately 10 times the algebraic gradient difference. The length so calculated shall be rounded up for crest vertical curves. Vertical curves 10 metres or less will not be required.

The minimum permitted channel gradients are 0.56% (1 in 180) for concrete construction, 0.59% (1 in 170) for flexible construction and 1% (1 in 100) for concrete block paving.

At road junctions the gradient of the side road at the point where it joins the channel of the main road shall fall back into the side road for a minimum distance of 10 metres from the channel of the main road.

The channel gradient shall be shown at all junctions to ensure that over the length of the 10 metre radius (approximate length is 16 metres) there is a channel gradient of at least 0.59% (1 in 170).

Horizontal alignment

The points of commencement and termination of horizontal curves shall be shown and the radius of the curves must be stated. Chainages shall be shown along the centreline of the new carriageway.

Transverse profile

The lengths of camber, crossfall and changeover shall be shown.

On straight lengths the carriageway profile is to be cambered (1 in 40). Crossfall may be required on certain bends, details of which need to be agreed with the SMBC Officer. The changeover from camber to crossfall is normally to be on the straight section of road. Channel gradients shall still be steeper than 0.59% (1 in 170).

Longitudinal sections of surface water drains and sewers

Preferred Scales – Horizontal as plan, usually 1: 200, Vertical 1: 20

The sections shall show existing ground as a dotted line. Final finished surface level and the invert and soffit of the surface water drains and sewers shall be shown as solid lines. The sections shall also show manhole numbers, manhole positions, cover levels, invert levels, gradients, pipe sizes and the distance between manholes. The relevant proposed finished surface levels with low points, gullies and road crossings shall also be shown.

Design details and calculations are required for any drainage proposals intended for adoption by the Highway Authority. This includes any soakaways if permitted.

Street lighting

If street lighting is provided and installed, a lighting layout shall be prepared by the Developer (including lit bollards and signs) for approval by the Highway Authority. The layout drawing should be accompanied by lighting calculations carried out in Lighting Reality.

Construction details

Individual details are required for the following (if applicable):

- A. Pram/wheelchair crossings
- B. Gullies – carriageway and footway
- C. Manholes
- D. Ramps/rumble strips
- E. Independent footpaths
- F. Footway/footpath barriers
- G. Soakaways
- H. Headwalls

- I. Expansion joints
- J. Tied joints
- K. Retaining wall details
- L. Bridge details
- M. Culvert details
- N. Signalled crossing
- O. Carriageway, footway and service strip construction
- P. Road signs and lines
- Q. Kerbing
- R. Verges
- S. Pedestrian refuges and Traffic Islands
- T. Laybys
- U. Bus laybys

Together with details of any special items, e.g. SuDS features

Submission of project engineering drawings and documents required prior to commencement of work

A copy of the outline, or combined outline and detailed planning consent and an exact copy of the accompanying plan, plus a copy of each subsequent formal approval of details and the accompanying plans.

Two complete sets of SMBC Officer drawings (hard copies) and one electronic copy (uncoloured) comprising of layout, longitudinal sections and construction details. House positions should be indicated on the layout with plot numbers.

Preparation of drawings for a section 38/278 agreement

Project engineering drawings

Upon granting technical approval for Section 38 and Section 278 schemes, the approved SMBC drawings and specifications as stamped by the SMBC Officer shall be issued accordingly.

- One set for the Developer
- One set for the Drawing File
- One set for the Clerk of Works

The colouring on one of the drawing sets should be as follows (the coloured plan)

Flexible carriageway (inc. mews courts and entrances)	blue
Flexible footways and cycle tracks	brown
Grassed or planted areas	green
Block paved areas (carriageway & footway)	orange

This drawing is held by the Clerk of Works for the works.

Pink plans

For inclusion in the Section 38 agreement, three copies of the pink plan are required. The pink plan should include the site boundary depicted in red and an inset location plan. If the land is in multiple ownership, then the second owner's boundary should be shown and shaded in blue. Separate location plans are no longer required.

Two copies of the plan should be retained by SMBC, one for the file and one should be given to the Clerk of Works. The remaining eight copies of the pink plan are sent to Solihull Legal Services.

Ensure that the colouring accurately ties in with any existing highway boundary (or previous Section 38 phase). The highway surface water system in respect of which the Council will become responsible for maintenance should be shown in blue ink.

If the Water Authority is to adopt the surface water sewers (roof water, private drainage, and highway water all draining into the same system) then these should be shown in black ink. Where sewers are highway drains (i.e. take carriageway and footway drainage only), then these should be coloured blue. The entire area coloured must be in the Developer's ownership.

For a Section 278 Legal Agreement, technical approval is not required before the legal agreement is signed so the above process for the pink plans is not required.

Additional information required for section 38 agreement when pink plans etc. are submitted

Confirmation of the reference number and date of issue of the original planning permission and whether this was outline or a combined outline and detailed approval and the reference numbers and dates of all subsequent formal notices of approval details.

- The name and full registered address of the Developer.
- The name and full address of solicitors acting for the Developer.
- The name and branch address of the surety acting for the Developer
- Advice of any intention to install an oil pipeline system for the supply of heating fuel oil to the various properties.

Maintainability audits

The future maintenance requirements of new S38 / S278 works intended for adoption presents a significant liability on the financial and operational resources of the Highway Authority.

The Highways Act 1980 entitles us to seek expenses for maintenance and this mechanism is called 'commuted sums.' This allows greater flexibility to adopt various layouts and materials without placing additional pressure on our maintenance budgets.

It is the responsibility of the designer to carefully consider future maintenance and maintainability requirements and factor these into the design at an early stage and throughout the design process.

Considerations

1. The elements of layout design and the use of materials to maximise whole life expectancies should be considered at an early stage in the design in order to ensure the ease and cost effectiveness of their future maintenance and to meet the obligations of the CDM Regulations. The frequency of maintenance that will be required should also be

considered. It is important that early and ongoing consultation takes place with the Highway Authority.

2. It is not intended to stifle creativity in the design of schemes or the selection of materials. Designers are encouraged to seek out and propose new materials, products and design/construction techniques, however full consideration and evaluation of their future maintenance implications must be evidenced. Also, materials and design features should be chosen to complement and enhance the local character of the existing area.
3. An important aspect of designing for maintainability is the placement and co-ordination of underground services. Maintenance and replacement implications should be assessed and considered in the design of such services, with Statutory Undertakers being consulted early on in the design process to ensure future maintenance is fully taken into account.

Sampling and testing requirements for adoptable roads

1. All testing to be undertaken shall be at the expense of the Developer.
2. Testing of materials shall be by an independent UKAS accredited laboratory.

Testing requirements and frequency are as follows:

Sampling to be carried out by trained experienced persons to the requirements of the relevant British Standards.

Completed sampling certificates to be supplied with all samples and made available to the SMBC Officer.

All bituminous material shall be temperature checked with appropriate thermometers on delivery, laying and rolling to comply with the relevant British Standard.

Materials complying with Clause 942, MCHW (thin surface course systems) shall be laid and tested in accordance with the said clause and Interim Advice Note 157/11.

Sampling rates as set out below are for routine testing only. Additional sampling may be required to the approval of the SMBC Officer.

Adoptable housing estate roads

a) Bituminous Material Analysis

Surface course	1 sample per 75 tonnes
Binder Course	1 sample per 100 tonnes
Base Course	1 sample per 100 tonnes
Pre coated Chippings	1 sample per days delivery

b) Other Bituminous Tests.

- Texture depth - to be tested daily during surface course laying.
- Rolling straight edge testing - to be tested daily during binder and surface course laying.

The compaction of base and binder course macadam shall be assessed by measurement of:

1. Insitu and refusal air void contents of cores subjected to the Percentage Refusal Density (PRD)

And

2. PRD test procedure carried out in accordance with the Clause 929, MCHW; and insitu density using an indirect density gauge.

c) Other Material Tests

All materials shall be compliant with the appropriate requirements described in the MCHW.

Sub-base, capping, aggregates, pipe bedding etc. all materials tested for grading and moisture content at 1 sample per 200 tonnes per source with a minimum of 1 sample per day whilst being delivered.

Where recycled coarse aggregate or recycled concrete aggregate is used in unbound mixtures in accordance with Clauses 802 to 807 as appropriate, it shall have been tested in accordance with Clause 710.

Other permitted material contents of recycled coarse aggregate and recycled concrete aggregate shall be determined in accordance with Clause 710 and shall comply with Table 8/3, MCHW.

d) Concrete

Concrete for ancillary purposes - testing is not normally required, however, if required Series 2600, MCHW shall be appropriate and a testing regime agreed with the SMBC Officer.

Each load delivered to have 4 cubes made and tested for slump and where appropriate air content.

Pavement quality and Structural concrete shall be tested in accordance with series 1000 and 1700, MCHW.

e) Concrete Products

- 1 set of samples to comply with BS EN1339 for paving flags
- 1 set of samples to comply with BS EN1340 for kerb units
- 1 set of samples to comply with BS EN 1338 for paving blocks

Note. Where clay or natural stone products are to be used they should be tested in accordance with the appropriate standards.

3. EARTHWORKS

Subject to the extent of earthworks, testing shall be carried out in accordance with an agreed earthworks method statement and testing regime which shall generally accord with Series 600, MCHW.

Payment of costs

The following should be taken into consideration when works are being costed.

Works Cost

The full cost of the highway construction/alterations including structures, accommodation works, landscaping, drainage works, any alterations to plant required by statutory undertakers, alteration to traffic signing, street lighting, provision of traffic signals (if applicable), any temporary works, remedial/strengthening works to the existing highway.

Maintainability audits requirements

In order to limit the Highway Authority's future maintenance liability for materials, construction etc., new adoptable roads should meet the following requirements:

1. All adoptable areas should be accessible, easy to maintain and in all cases comply with the Construction (Design and Management) Regulations 2015.
2. Materials and products should be durable, safe, and appropriate for the purpose and comply with the relevant specifications and British Standard(s). Consideration must be given to the whole life cost of both the products being used and their design / installation.
3. Where possible, materials should be locally sourced, recyclable and sustainable in their production and use.
4. Where special materials or products with shorter life expectancies are used, or high-maintenance designs are utilised that will necessitate increased levels of maintenance (e.g. enhanced lighting columns/lanterns, soakaways, trees and landscaping etc.), appropriate commuted sum payments will be required by the Highway Authority to cover the additional costs of such future maintenance.

General Maintenance

Maintenance covers a wide range of possibilities ranging from a minimum intervention of 'patch and make do' to a significant structural overlay, or, on rare occasions, total reconstruction. Different treatments have different properties and the choice will depend on the required final outcome. Availability of finance should not be part of the initial decision making process. If insufficient funds are available and a lower level of maintenance is carried out than is justified technically then the fact should be recorded and the site monitored to determine, for future use, the cost effectiveness of the reduced maintenance. A summary of the options is given in table 9.1 together with a summary of their properties. More information is given in HD31 for flexible roads and HD 32 for rigid ones.

Each option should be considered on a cost benefit analysis. An assessment should be made of the street scene amenity value so that it can be included in the analysis.

The optimum treatment will depend on what the need is. For example if the need is simply to restore skidding resistance then surface dressing is likely to have the highest benefit to cost ratio. Another example would be if the structure had failed then either an overlay or a recycling treatment could well be optimum. Experience and good historical records will reduce the need for numerical calculations.

Solihull MBC Developers Design and Adoption Guide



Good records are also required to provide the knowledge of how long different treatments last in different situations. The Table below gives some general guidance on the durability of treatments and also what they can and cannot do.

Treatment	Thickness range	Increase pavement strength?	Texture depth	Improve Skid resistance	Reduce permeability of pavement	Improve ride quality	Initial cost	Speed of construction	Re-profile	Noise reduction	Expected life	Level of sustainability
	mm	Yes/no	Mm								years	Range -- 5 to + 5
Patch (with no other treatment)	Any	No	No	No	No	No	Very high	Slow	No	No	0-3	-- 2 to -- 4
Retexturing	0	No	1.5	Yes in medium term	No	No	Low	Fast	No	No	3 then re-do	+ 3 to + 4
Surface dressing	6-14	No	1-3	Yes	Yes (best)	No	Low	Fast	No	No	10-15*	+ 4
Slurry surfacing	6-15	No	0.5-1.5	Yes	A bit	Can do	Moderately low	Fairly fast	Yes	No	5	+ 2
SMA surfacing	30-70	Yes	0.5-2	Yes	Usually	Yes	Medium to high	Moderate to fast	Yes	Yes	15+ at 4% void, 8 at 8%	+ 2
55% hot rolled asphalt	30-70	Yes	0.3-1	Yes	Yes	Yes	Medium	Moderate	Yes	Yes	10-15	+ 2
30% hot rolled asphalt	40-50	Yes	0.5-1.5	Yes	Yes	Yes	Medium to high	Moderate	Yes	No	12-16	+3
High friction systems	3-5	No	0.5-1	Yes (best)	A bit	No	Very high	Slow	No	No	3-10	-- 5
Structural overlay	80+	Yes	Depends on surfacing	Yes	Yes	Yes	High	Slow (to moderate)	Yes	Depends on surfacing	20+ for structure	+ 4
Haunching/strip widening	80+	Yes, locally	Depends on surfacing	Depends on surfacing	Yes	Yes	Medium to high	Slow (to moderate)	Yes	Depends on surfacing	20+ for structure	--2 to + 2
Retread with 2 surface dressings	75-100	Yes	About 1	Yes	Yes	Yes	High	Fairly fast	Yes	No	10+ (as structure)	+ 3
Deep recycling with foamed bitumen	150-250	Yes	Depends on surfacing	Depends on surfacing	Yes	Yes	Very high	Moderate	Yes	Depends on surfacing	20+ for structure	+ 4

Designers Maintenance checklist

The following table is a suggested checklist for assisting designers when considering the maintainability of their schemes. The list is not exhaustive and should be used for guidance purposes only when carrying out a full maintenance audit of the design and materials proposed in the delivery of the scheme.

CONSIDERATION	COMMENT
Scope & Scale	
Is there compatibility with existing infrastructure? – rural/urban conservation area, extension to existing	

**Solihull MBC Developers
Design and Adoption Guide**



development.	
What is the expected traffic use? – through route, bus route, commercial/HGV use, deliveries, emergency access, extraordinary traffic such as combine harvesters, nearby boatyard.	
Is there compatibility with existing infrastructure? – rural/urban conservation area, extension to existing development. Is the scheme a “unique”, high profile, prestigious project? Special design and material requirements, planning conditions.	
Design Aspects	
Does the design allow for all areas that are being adopted easy access for maintenance?	
Are footways, verges etc. likely to be overridden by HGV's, refuse vehicles or other heavy vehicles. Is the area likely to have vehicles parked on it? – modify design, widen, and reinforce construction.	
Are grassed/planted areas of a size and position to be effectively maintained?	
Have trees/planting been selected and positioned to avoid future problems with roots, obstruction, leaf-fall, street light interference?	
Do traffic signs need to be illuminated or can they be reflectorised?	
What additional assets will be installed (i.e. number of gullies, signs, bollards, fences/barriers, bus stops/shelters etc)? Are they required - try to minimise street furniture wherever possible.	
Are design features sustainable? – e.g. sustainable urban drainage systems (SUDS)	
Does the design meet the requirements of the Equality Act 2010 (EA)	
Materials & Products	
What is the expected design life of the materials/products? Evidence should be provided based on available technical data and experience.	
Are materials of standard or specialist nature? – British and European Standards, or proprietary products operating under HAPAS schemes, durable, safe, fit for purpose, specification compliant.	
Are materials/products manufactured from recycled material? recyclable? locally sourced, with replacement available? sustainable? e.g. permeable paving.	
Are more economical, easily maintainable alternatives available which could be used instead?	

**Solihull MBC Developers
Design and Adoption Guide**



Can materials be lifted and satisfactorily re-laid if required?	
Maintenance Operations	
Does the scheme (or any element of it) require specialist maintenance /cleansing regime or equipment?	
Will maintenance require special traffic management?	
Can maintenance physically be carried out in accordance with health and safety requirements? (inc. CDM regulations)	
Is there sufficient safe and convenient access available for maintenance plant and personnel?	

Reinstatement after remedial works.

Footpath minimum full width x 10 meters, with a gap of 10 meters between patches.
 Carriageway minimum 1 lane width x 15 meters with a 15m gap between patches.

5. Site Clearance

In carrying out earthworks, the Developer shall take care not to disturb unnecessarily the site or allow materials to be deposited on adjacent highways.

In the case of buildings, all foundations, drains, wells and inspection chambers shall be excavated, taken up and the holes backfilled with approved materials and compacted. Should any of the above elements require excavations deeper than 5m then immediate notification shall be given to the SMBC Officer to enable an inspection to take place. In exceptional circumstances a representative from the Environment Agency may also be required to inspect the element of the works e.g. where an underground spring is present. The Developer shall seal drain connections where required and shall give notice to statutory authorities to adjust all gas, water, telecoms and electric as necessary.

The Developer shall carry out the works in such a manner as to cause as little inconvenience as possible to the public and will be wholly responsible for the safety and protection of any other buildings, structures and environment adjacent to the site.

7.Drainage

The Drainage and Flood Risk Management Team at Solihull Council act as the Local Highway Drainage Authority as well as the Lead Local Flood Authority.

A Developer Guide to SuDS and Drainage in Solihull can be found at <https://www.solihull.gov.uk/Portals/0/CrimeAndEmergencies/SMBC SuDS Design Guide.pdf>

The relevant version of Sewers for Adoption should be followed and highway drainage should be designed to BS EN 752 for estate roads and HA 102 for main roads.

Testing

Where the Highway Authority will be adopting the drainage system:

1. Pressure tests shall be carried out on completion of every drainage run between manholes on pipes up to 750mm diameter and witnessed by the Clerk of Works.
2. CCTV surveys may be undertaken upon request by the SMBC Officer prior to Part 2 completion certificate being signed off and issued. The SMBC Officer may require tests they deem necessary to be carried out before any concrete haunch or surround is placed and before any backfilling is commenced.

Completion of drainage

On completion of all new drains, manholes, etc. the whole drainage network affected by the works shall be flushed through from end to end with water and left clean, free from obstructions and a method of protection should be arranged to stop contamination from any continuing construction.

8. Earthworks and Investigation Works

Where required by the SMBC Officer, the Developer shall provide details of the method, phasing and timing of any earthworks that are required within the site.

Bulk excavation and filling

Excavation and filling shall be carried out in accordance with the approved drawings or as otherwise directed by the SMBC Officer.

Where the following materials are present under the proposed adoptable works they shall be excavated and disposed of to a licensed tip by a licensed haulier.

- Peat material from swamps, marshes and bogs
- Logs, stumps and perishable material
- Materials susceptible to spontaneous combustion
- Frozen materials
- Material which by its moisture content is unsuitable to form stable and effective works
- Material having hazardous chemical or physical properties which require special measures for excavation, handling, storing, transportation, deposition and disposal
- Any other material not acceptable to the SMBC Officer.

Materials intended for infilling shall be kept separate from other materials and shall be protected from becoming unsuitable by contamination, weathering or by an increase or decrease in the moisture content.

The Developer shall be required to submit details of his proposals for filling the areas in question for written approval by the SMBC Officer who may require the appropriate tests.

The material and compaction shall generally comply with the requirements of Table 6/1 of Clause 601, MCHW.

Where unsuitable material has been exposed beneath, adjacent to or in a location likely to affect the adoptable works, such material shall be excavated.

Any resulting depressions shall be filled with approved materials and in such a manner agreed with the SMBC Officer.

All topsoil shall be removed from the area to be occupied by the carriageways and footways. The general excavation to the level from which final preparation of the formation is made shall then be carried out and the excavated material removed. Where the material at formation level is unsatisfactory as a foundation for the carriageway or footway pavement, the Developer shall excavate to such extra depth as the inspection may direct. In excavating to formation the Developer shall take care not to remove material below that level. If material is to be removed the Developer shall make up the required level with approved material.

As far as practicable, the excavation work shall be carried out immediately prior to the laying of any part of the carriageway pavement. If for any reason the sub-grade is disturbed or its natural moisture content changed so as to reduce the bearing capacity, additional excavation shall be carried out.

Any excavation to within less than 75mm of the formation level shall be considered as exposure of the formation and shall be carried out only so far ahead of the laying of the carriageway or footway pavement as the SMBC Officer may agree. No traffic other than that used for the excavation and disposal of spoil shall be permitted on the sub-grade once the surface soil has been stripped. No traffic shall be allowed on the prepared formation. Trimming and shaping shall be carried out by hand, or by mechanical means to the approval of the SMBC Officer.

All filling materials used within the works shall be to the approval of the SMBC Officer. The maximum permissible moisture content for well graded granular material and uniformly graded granular material shall not exceed the optimum moisture content by more than 1.5% as determined from BS 1377 - 4:1990 using the 2.5 kg rammer method or vibrating hammer method as appropriate for the type of the fill material used.

Acceptability criteria for the use of cohesive and chalk materials shall be agreed with the SMBC Officer prior to commencement of the works.

All services within the highway limits shall be laid and the trenches properly backfilled with approved material and compacted before any S278 works are commenced.

The formation shall be properly cleaned free from mud and slurry and properly shaped and compacted by rolling to the satisfaction of the SMBC officer.

If required and where directed by the SMBC officer a 'sacrificial' granular layer 75mm thick shall be provided in addition to the sub-base for any vehicles using the way as a route across/through the site.

Any soft or unstable areas in the formation shall be tested in accordance with the requirements of BS 1377. Any material failing the tests shall be excavated and replaced with approved material and compacted in accordance with Clause 802, MCHW. All excavated material shall be disposed off site and not reused.

Where any carriageway, footway, turfed, soiled or planted area of any kind has been disturbed or removed, it shall be fully reinstated with similar materials and, except in the case of turfed areas, in such additional thicknesses as the SMBC Officer may direct.

Bulk density and air void determination of bituminous materials

Where it is required to determine of air void content or the Percentage Refusal Density (PRD), 150mm diameter cores shall be drilled in accordance with the relevant part of BS EN 12697. Where access or limited layer thickness prevents the drilling of cores, cut-out samples of area not less than 150 x 150mm shall be taken.

The number and spacing of the cores shall be determined by the SMBC Officer but shall be sufficient so as to provide a realistic value for the overall level of compaction for the area under test.

The determination of air voids and PRD shall be in accordance with the relevant part of BS EN 12697. The total air voids for each core shall be derived from the differences between the theoretical mean dry density of the material calculated from the specific gravities of the constituents of the mix and the directly measured density.

Determination of layer thickness and bond

Where it is required to confirm that the specified layer thickness has been laid or that a bond has developed between layers, 150mm minimum cores shall be drilled vertically through the construction at locations to be agreed by the SMBC Officer.

Where limited access prevents coring then cut-outs of area not less than 150 x 150mm shall be taken.

Should any doubt exist concerning any requirement of this section the SMBC Officer shall be consulted prior to proceeding.

As a result, the thickness of any additional sub-base/capping layer material or geotechnical treatment must be agreed with the SMBC Officer.

Treatment of side slopes

The sloping sides of all cuttings shall be carefully and evenly trimmed and cleared of all rock fragments which move when prised with a crowbar and are therefore liable to cause injury or damage through falling.

Where in the sloping sides of cuttings layers of rock and softer materials alternate, or where the SMBC Officer considers that the materials after dressing and exposure will not permanently withstand the effect of weather, such insecure materials shall be excavated to an approved depth and the resulting spaces built up with concrete so as to ensure a solid face.

Maximum moisture content

Work on the compaction of excavated materials shall proceed as soon as practicable after excavation so that the moisture content does not exceed the following values:

- Cohesive soils – 1.2 x plastic limit to BS 1377 1990 Part 2.
- Non-cohesive soils – optimum moisture content + 1½% to BS 1377 1990 Part 4 (2.5kg rammer or vibrating hammer as appropriate)
- Upper and middle chalk – 30% (saturation moisture content not greater than 20%)
- Lower chalk – 18

Chalk shall not be excavated, placed as fill or compacted during the period 31 October to 31 March unless permitted by the SMBC Officer.

Preparation of formation

Preparation of the formation shall be carried out only after completion of the subgrade drainage and immediately prior to the laying of the sub-base or base course. All surfaces below carriageways, laybys and footways shall be cleaned and free from mud and slurry. The surface shall then be compacted if necessary, to satisfy the density requirements in BS 1377.

Soft Spots

Any soft or unstable places in the formation shall be excavated and replaced with approved material which shall then be compacted in accordance with the requirements of BS 1377.

Filling materials – backfilling of trenches

The backfill material must be Type 1 granular material unless it is shown that the material is compliant with class 1A, 1B, 6F1 and 6F4 of Table 6/1 of series 600 earthworks from MCHW.

It should be borne in mind that the storage and use of 6F1 and 6F4 in inclement weather is likely to result in defective works.

Backfill material as approved by the SMBC Officer shall be placed in layers not exceeding 225mm in thickness and thoroughly compacted in compliance with Clause 612, MCHW.

Timber and other framing shall be withdrawn ahead of the layer to be compacted, care being taken to keep the sides of the trench solid and to fill all the spaces left by the withdrawn timber.

Granolithic facings

Where any benching, inverts or other profiles are to be formed with granolithic rendering they shall be made from 50kg cement, 0.035 cubic metres dry sand: 0.07 cubic metres coarse aggregate of 10mm maximum size. The water/cement ratio shall be as low as possible compatible with workability. The screed shall be adequately protected and maintained dampened for seven days by suitably covering and water spraying.

9. Road Construction

Adoptable roads

The majority of these are for residential development. In previous editions of this document the various types of road eg type 4 collector roads were described in the estate road design guide and the structural design was given for each. The current planning guidance has done away with these classifications and this document follows the current planning guidance in giving different designs depending on the width of carriageway and the use to which the road is put. All designs are, as recommended by the CSS in ENG6/94 [1994], for a structural life of 60 years; maintenance of the surfacing being carried out as required during that lifetime. Achieving this structural life requires the provision of adequate thickness of structure and good workmanship when constructing the road, in particular proper compaction. The intention behind this long life requirement is that existing council tax payers should be in no worse position than they would have been had the development not taken place. As part of this it is essential that the design, execution and workmanship are checked and tested before committing SMBC to adopting the road or footway for maintenance.

The construction thicknesses given below relate to the 'optimum' widths given in the 'Transport and Roads for Developments: Roads for the same class built narrower than optimum shall be constructed to the same thickness as it can be expected that the traffic carried will not be less.

All drainage works, statutory undertaker's cabling/pipes and utilities ducts shall be installed before the carriageway construction is commenced. All trenches and pits shall be backfilled in accordance with this manual.

The Highway Authority will not accept any trench working into the base course layer or above. The Developer should consider using a reduced base layer thickness as a 'sacrificial' running surface before completion of the final construction layers.

Road Construction (flexible)

Thin Surface Course Systems shall fully comply with Clause NG 942, Clause 942 MCHW and Interim Advice Note 157/11. The Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) must be specified in the design and shall comply with the requirements of the DMRB, Volume 7, Section 5, Part 1 HD36/06.

Where a new surface course is being laid, our preference will be for a high PSV surface of 68 rather than the use of high friction surfacing.

The surface on which material is to be laid shall be clean and free from mud, slurry, ice, standing water and any other harmful material. Laying shall be suspended during periods of continuous heavy rain or when pools of water are becoming evident. Any previous layer shall be compacted using a roller exerting at least as great a load per unit width of roll as that to be used for rolling the bituminous material. Wherever practical materials shall be spread, levelled and tamped by an approved self propelled laying machine. As soon as possible after arrival on site the mixed material shall be supplied to the paver and laid without delay. The rate of delivery of the material to the paver shall be so regulated as to enable the paver to be operated continuously and it shall

be so operated whenever practicable. The rate of travel of the paver and its method of operation shall be adjusted to ensure an even and uniform flow of material across the full laying width, freedom from dragging or tearing and without segregation of the material. The material shall be laid in compliance with the requirements and recommendations for laying in the appropriate British Standard.

Hand laying of bituminous material shall be avoided wherever possible and only undertaken with the prior approval of the SMBC Officer.

COMPACTION OF BITUMINOUS MATERIALS

Bituminous material shall be laid and compacted in layer thicknesses which enable surface level and regularity requirements to be met and adequate compaction to be achieved. The maximum thickness of material laid in one pass of the paver shall be limited (150mm) so as to ensure adequate compaction and surface regularity.

Material shall be rolled uniformly as soon as rolling can be effected without causing undue displacement of the mixed material and shall be substantially completed whilst the temperature of the mixed material is greater than the minimum rolling temperature stated in the appropriate British Standard.

Rolling shall continue until all surface roller marks have been removed.

Compaction shall be carried out using 8-10 tonnes deadweight smooth wheeled rollers having a width of roll of not less than 450mm, or by multi-wheeled pneumatic tyred rollers of equivalent mass, or by vibratory rollers or a combination of these. Surface course and binder course materials shall always be surface finished with a smooth wheeled roller which may be a dead weight roller or alternatively a vibratory roller in non-vibrating mode. Vibratory rollers shall not be used on bridge decks.

The material shall be rolled in a longitudinal direction with the driven rolls nearest the power. The roller should first compact the material adjacent to any joints and then work from the lower to the upper side of the layer overlapping on successive passes by at least half the width of the rear roll or in the case of a pneumatic tyred roller, at least the normal width of one tyre.

Where requested by the SMBC Officer the level of compaction shall be determined by drilling and testing core samples. The mean bulk density and the total air voids shall be determined in accordance with Clause 929, MCHW and the efficiency of compaction shall be such that the mean total air voids for any consecutive six cores shall not exceed 7% in the case of coated macadam and 5% in the case of hot rolled asphalt.

Additionally, the air voids in any individual core shall not exceed 10% for coated macadam and 8% for hot rolled asphalt.

The areas represented by these high individual results shall be fully investigated in order to identify their extent.

As an alternative to assessing the efficiency of compaction by determining air voids, the SMBC Officer may allow Percentage Refusal Density Tests (PRD) on coated macadam.

This test may be appropriate where:

- The suspect area is small
- The suspect area was hand laid
- The material was supplied by a number of plants with varying types of aggregate
- The results are needed urgently

- There is no available information on the source and physical properties of the aggregates.

If (PRD) is used as a basis for assessing compaction the refusal density of the material under test shall not be less than 95% of the theoretical mix density.

For assessing compaction of large areas the SMBC Officer may permit the use of a suitably calibrated indirect density gauge. In cases of dispute however precedence shall be given to the densities obtained from core samples. The Developer shall paint the walls and base of all holes, from which cores have been cut, with hot penetration bitumen and fill with material approved by

THE HAUC SPECIFICATION													
COMPACTION REQUIREMENTS TABLES A8.1, A8.2 and A8.3	COHESIVE MATERIALS (less than 20% granular content)			GRANULAR MATERIALS (20% or more granular content*)			BITUMINOUS MATERIALS				CHALK MATERIAL		
BOMAG COMPACTION PLANT	COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO			COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO			COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO				COMPACTION PASSES REQUIRED/ LAYERS OF COMPACTED THICKNESS UP TO		
	100 mm	150 mm	200 mm	100 mm	150 mm	200 mm	40 mm	60 mm	80 mm	100 mm	100 mm	150 mm	200 mm
VIBROTAMPER 50 kg minimum BT60/4 BT65/4 BT80D	4	8	NP	4	8	NP	5	7	NR	NR	3	6	NP
VIBRATING ROLLER – SINGLE DRUM 600 – 1000 kg/m BW71E-2 BW71EHB-2	NP	NP	NP	12	NP	NP	10	12	NR	NR	12	NP	NP
VIBRATING ROLLER – TWIN DRUM 600 – 1000 kg/m BW75S-2 BW75H BW80AD-2 BW90AD-2 BW100ADM-2 BW80AD-5 BW90AD-5 BW100ADM-5 BMP851 BMP8500 (Not Bituminous Materials)	NP	NP	NP	6	NP	NP	5	7	NR	NR	6	8	NP
VIBRATING ROLLER – TWIN DRUM 1000 – 2000 kg/m BW80ADH-2 BW100AD-4 BW120AD-4 BW125AD-4 BW135AD BW138AD BW100D5 BW120D5 BW135D5 BW138D5	4	8	NP	3	6	NP	4	5	6	8	2	4	6
VIBRATING PLATE 1400 – 1800 kg/m ² BPR35/42D BPR45/55D BPR55/65D BPR70/70D	NP	NP	NP	5	NP	NP	6	NR	NR	NR	6	8	NP
Over 1800 kg/m ² BPH80/65S BPR100/80D	3	6	9	3	5	7	3	5	6	8	NP	6	8

the SMBC Officer.

* including cement bound material, NP = Not permitted, NR = Not recommended

BOND BETWEEN BITUMINOUS LAYERS

Bond coats shall be applied between bound layers of bituminous materials by metered mechanical spraying equipment, spray tanker or spraying device integral with the paving machine. Bond coats shall have a BBA certification and comply with Clause 920, Volume 1, MCHW.

There shall be sufficient adhesion between successive layers of bituminous materials to form a bond between layers.

The presence and strength of a bond can be determined by coring. Successive layers of bituminous materials should not shear off when drilling a 150mm core vertically through the

construction. If this occurs it could be indicative of insufficient bonding and the area shall be investigated further. The interface between layers should also be dry and free from dirt mud and other harmful materials.

The application of a bond coat on a clean dry surface together with the materials being at the right temperature will promote adhesion between successive layers, provided that the bond coat is given time to break.

Preformed joint filler shall be of the thickness described on the agreed SMBC Officering drawings within tolerance of +1.5mm and shall comply with Clause 1015 MCHW and in suitable lengths, each no less than 1.2 metres. Holes to accommodate dowel bars shall be accurately bored or punched out to be a sliding fit on the dowel bars.

The material comprising joint filler shall be of such quality that it can be satisfactorily installed in position at the joint.

Certificates that the material has complied with the tests described in Clause 1015 MCHW shall be supplied by the Developer.

Joint sealants and seals shall consist of hot poured compounds and shall comply with BS 2499-2:1992 - Hot Applied Joint Sealants for Concrete Pavements - A Code of Practice for the Application and Use of Joint Sealants.

Sub-base

Where the laying of the sub-base does not immediately follow the preparation of the formation, the formation shall be prepared again by removing any water, dust, loose or deteriorated material, regrading with granular fill material approved by the SMBC Officer and compacting by rolling.

Granular sub-base material Type 1 shall comply with Clause 803, MCHW – Type 1 Unbound Mixtures. The mixture shall comply with BS EN 13285 and the requirements from table 8/1 with grading requirements to table 8/5 and can be used in conjunction with a geotextile / geogrid membrane to the approval of the SMBC Officer.

All recycled materials proposed within the works shall be tested by a UKAS accredited laboratory and have the relevant certification endorsements and they should be visually inspected by the SMBC Officer before they used on site.

Testing frequency should not exceed 200 tonne on any one test certificate and must be visually inspected prior to use by the SMBC officer.

Geotextiles, geogrids, geomembranes etc. to BS EN 13249:2014 'Geotextiles and geotextile-related products.

Characteristics required for use in the construction of roads and other trafficked areas' shall be permitted for use within the works to the approval of the SMBC Officer.

The sub-base material shall be spread evenly to the required profile and total thickness shown on the drawings.

The sub-base material shall be compacted in layer thicknesses suitable for the type of compaction machinery to be employed.

For light hand held machinery the layer thickness shall not exceed 100mm after compaction.

For heavy machinery the layer thickness shall not exceed 150mm after compaction. Should segregation take place during spreading causing areas of coarse stone, these shall be blinded with stone fines during compaction.

During compaction the surface profile shall be corrected by hand and trimmed so that when finished, it is within a tolerance of plus 10mm to minus 30mm of the proper surface profile.

All asphalt concrete shall be obtained from an approved supplier and shall conform in all respects to BS EN 13108 – 1 Asphalt Concrete (Bitumen Macadam).

All hot rolled asphalt shall be obtained from an approved supplier and shall conform in all respects with BS EN 13108 – 4 Hot Rolled Asphalt.

Hot rolled asphalt surface course design mixes shall have a minimum stability of 5kN and a maximum flow of 5mm. Full design details shall be submitted to the SMBC Officer for approval.

The minimum polished stone value (PSV) of the course aggregate shall be 55 unless specified otherwise. For non-chipped (55/10) high stone content HRA the Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) must be specified in the design and shall comply with the requirements of the DMRB, Volume 7, Section 5, Part 1 - HD36/06 and Interim Advice Note 156/16 Rev1 – Revision of Aggregate

Permeable sub-bases have significant advantages when it is proposed to use recycled materials:

- They are stable in all moisture conditions including full saturation (the normal state on clay subgrades after a number of years when no drainage maintenance is carried out)
- No frost heave testing is needed for either the open graded material or for the thin layer of regulating material used on top as there is no capillary path for water to migrate to form ice-lenses. This is a great advantage when using recycled type 1 for regulating as otherwise a frost test (very expensive) would be needed for each source which might consist of relatively small quantities.
- They do not require much compaction which minimises breakdown of materials that may be relatively soft.
- The actual grading is not critical provided the fines content is very low and the materials are very permeable. The maximum size should be compatible with the size of the equipment used to place the material.
- Solihull sub-bases have traditionally been thinner than the foundations for Highways England (because they are stronger than 6F1 and 6F2 capping materials and are much less sensitive to waterlogging).

The specification for SMBC sub-bases, W150 and W75 is given in part 3 of this document. It has been written in terms of minimum permeability with a 'deemed to comply' grading limit, which limits the amount of fines in the product. This enables easy use of recycled materials particularly those of SMBC's own production. Within the overall thickness the maximum thickness of the 'W' materials shall be used with a minimum thickness of type 1 or type 3 from SHW which is used as a regulating layer to give an even surface to the sub-base on which to lay the bituminous base layer. Type 2 may be used but only those containing at least 80% of bituminous planings. W75 is normally used only where space is limited such as in strip widening and where significant proportion of the material has to be manhandled. W150 is preferred where machine placing is used such as half lane widths or more.

Designs for use with 6F2 will not be considered. Use is to be avoided, the materials are far less tolerant of water-logging than SMBC sub-bases and need far more attention to drainage over the long term (life of road). The design is also thicker and hence needs more earthworks.

Figure 1 shows the design process for sub-base thickness. The process used depends on whether or not a site investigation has been carried out.

The sub-base is classified as a class 2 foundation in HD26/05. Table 2.1 gives the relevant thicknesses using default values of CBR. Table 2.2 gives the CBR for common sub-grade materials, which should be used in the design in most cases.

The substitution of Types 1, 2 or 3 sub-base (in SHW these are called 'unbound mixtures') for W150 or W75 must not be permitted as none of them are sufficiently permeable. Table 2.2 is extracted from HD25/94 to cover the soil types found in Solihull and simplifies it to summer or winter construction. If the CBR measured at the time of construction is lower than that given in the table then the lower figure shall be used for design. A measured CBR higher than that indicated by the table must be ignored. All the caveats and warnings in IAN73 regarding CBRs must be noted and considered.

The sub-base should be laid in layers with a thickness not exceeding 4 times the nominal size of the material (this is called 'D' in European Standards)

Note 1: bituminous planings are now included in type 2 unbound mixtures

Note 2: for the background on W150 and W75 see supporting papers (held by Network Management)

A soil survey shall be carried out at an early stage and must include tests sufficient to establish the Californian Bearing Ratio (CBR) value and frost susceptibility of each sub-soil type encountered - refer to Interim Advice Note (IAN) 73/06 Revision 1 (2009) 'Design Guidance for Road Pavement Foundations' for Class 2 restricted design published by the DfT.

The location of the test areas shall be agreed with the Clerk of Works and the subsequent results and interpretation of the soils surveyed made available to the Clerk of Works. A representative from SMBC must also be present for all testing and adequate notice given (5 days) prior to undertaking the tests.

Project engineering drawings submitted for approval must include a ground investigation report incorporating soil classification and in-situ moisture contents, frost susceptibility as well as results of CBR tests in order to determine the bearing capacity of the formation along the line of the proposed road.

Type 1 unbound mixture shall be placed at a moisture content between optimum and optimum-2% measured using the vibrating hammer test in BS 5835 part 1 :1980.

Note: this is considerably wetter than is usually the case

Table 2.1 CBR sub-base Thicknesses

CBR	Total sub-base thickness (nominal)	W sub-base	Type 1 or 3 Sub-base or bituminous road planings (type 2)
%	mm	mm (minimum)	mm (maximum)
<2.5 (Lias clay)	Designer to submit reinforcement design for foundation layer.		
2.5-5 (Keuper Marl)	500	350	150
5-15 (non-plastic sands)	300	150	150
>15 (non-plastic gravels)	200	0	200

The thickness of the 'W' sub-bases should be maximised within each category with types 1 - 3 reduced to the role of a regulating layer.

Designer Must use the lowest CBR value for the length of the road

Table 2.2 Typical Design CBR Values

Soil type	PI	Construction period	
		Winter	Summer
	%		
Heavy Clay (typically Lias)	70	1.5	2
	60	1.5	2
	50	1.5	2
(typically Mercia mudstone (marl))	40	2	2.5
Silty Clay	30	2.5	3
Sandy Clay	20	2.5	4
	10	1.5	3
Silt		1	1
Non-plastic Sands		10	20
Sandy Gravels		20	40

PI is plasticity index - see BS 1377:1990

890AR SMBC sub-bases

- 1 The lower sub-base is designated W150 or W75 as appropriate depending on the maximum size of the aggregate permitted
- 2 The lower sub-base shall consist of crushed rock, crushed slag, crushed concrete or crushed recycled aggregates. The permeability coefficient shall be not less than 10^{-1} m/s for $D = 150$ mm and not less than 10^{-2} m/s for $D = 80$ mm. Materials complying with the grading limits given in Table 890/1 are deemed to comply with this requirement.
- 3 Gradings outside the limits given in the table may be used provided that the permeability complies with the requirements of this clause as demonstrated using the test method for permeability in HA 41/90 A Permeameter for road drainage layers.

- 4 The material passing the 425 um BS sieve, when tested in accordance with BS 1377 shall be non-plastic.
- 5 The aggregates used shall conform to clause 801 of the Specification for Highway Works for Type 1 unbound mixtures except that proven materials, eg ironstone, are acceptable as are crushed and screened recycled materials. If crushed concrete or crushed recycled aggregates are to be used, screening shall ensure that:
 - i. the maximum content of other materials (Class X - including wood, plastic and metal) is 1% by mass;
 - ii. and 100% of other materials (Class X - including wood, plastic and metal) passes through the 31.5mm sieve.
- 6 The material shall be laid and compacted in accordance with clause 802 of the Specification for Highway Works with the following exceptions:
 - i. Layer thickness may be up to 4 times the upper aggregate size (D) – ie 300 mm for W75 and 600 mm for W150. The minimum layer thickness shall be 150 mm and 300 mm respectively.
 - ii. Where the materials comply with the limits given in Table 1 compaction by means of the placing and spreading plant is usually sufficient particularly when using ironstone or Cotswold stone which are prone to breakdown.
 - iii. Segregation shall be kept to a minimum.

Table 890/1 Sub-base

	W75	W150
Sieve size	% passing	% passing
300 mm		100
125 mm	100	60-85 [D]
75 mm	0-100 [D]	
37.5 mm	0-50	0-25
10mm	0-20	0-8
0.6 mm	0-5	
0.063 mm	0-2	0-1

Overlay / Surface Course

Overlay options for roads carrying less than 100 cv//d and all roads with speed limit 40 mph or below

The Compaction Assessment shall be as specified in Clause 973AR (Air Voids Test). Note that the equivalence requirements of sub-Clause 903.17 do not apply.

Thickness (mm) and type			
Overlay total	55/10F HRA or equivalent	Binder course	Base
40-70	Single layer	0	0
80	40	40 of AC 20 dense bin to clause 906	
90	40	50 of AC 20 dense bin to clause 906	

**Solihull MBC Developers
Design and Adoption Guide**



100	40	60 of AC 20 dense bin to clause 906	
110	40	70 of AC 20 dense bin to clause 906	
120	40	80 of AC 20 dense bin to clause 906	
130	40	90 of AC 20 dense bin to clause 906	
140	40	100 of AC 20 dense bin to clause 906	
150	40	110 of AC 20 dense bin to clause 906	
160	40	60 of AC 20 dense bin to clause 906	60 of AC 32 dense base to clause 906
170	40	60 of AC 20 dense bin to clause 906	70 of AC 32 dense base to clause 906
180	40	60 of AC 20 dense bin to clause 906	80 of AC 32 dense base to clause 906
190	40	60 of AC 20 dense bin to clause 906	90 of AC 32 dense base to clause 906
200	40	60 of AC 20 dense bin to clause 906	100 of AC 32 dense base to clause 906

HAPAS surface course systems: information to be provided by the contractor

Note to contractor: complete one sheet per system of variant of system as examples of systems that will be used.

The Contractor shall provide the following information with his tender:

1. When a HAPAS surface course is proposed a copy of the HAPAS Roads and Bridges Certificate or Certificates for the thin surface course system or systems that are proposed for use in the works, together with a copy of the Installation Method Statement associated with each Certificate].
2. For any Certificate that covers several variants of one thin surface course system, the proposed variant or variants of the system to be used in the Works [variants of a system occur from any option that results in different values being reported on the Certificate for one or more properties, and could involve changes in nominal maximum aggregate size, aggregate type, aggregate grading, binder type, binder content, fibres or other additives, type and rate of spread of bond coat].
3. Prior to first use the proposed component materials to be used in the thin surface course system and their proportions for each proposed system.
4. Prior to first use the source or sources of coarse aggregate together with statement of properties including polished stone value, ten per cent fines value, aggregate abrasion value and flakiness index.
5. Only HAPAS materials that meet 973AR compaction requirements and 975AR for bond strength are permitted.

972AR 55% Stone Content Hot Rolled Asphalt Surface Course (for machine laying)

1. 55% stone content hot rolled asphalt surface course shall comply with sub-Clauses 2, 3, 4 and 5 of this Clause, and the requirements of Appendix 7/1 or 11/1 as appropriate.
2. Materials of designation 55/10F surf and 55/14F surf shall comply with PD 6691 Table C2A columns 6 and 12 respectively. 55/6F surf shall comply with the target grading and binder content in the table below.

BS Test Sieve	Target % by mass of total aggregate passing BS test sieve
Designation	55/6F
10mm	100
6.3mm	90-100
2mm	41
0.5mm	29-43
0.25mm	9-31
0.063mm	6
Minimum target binder content % by mass	5.5

3. In carriageways, the coarse aggregate shall be crushed rock with a minimum polished stone value of 55, unless otherwise stated in Appendix 7/1.
4. In cycleways, the coarse aggregate shall be crushed rock with a minimum polished stone value of 50, unless otherwise stated in Appendix 11/1. WCC Specifies sand fine
5. The binder shall be 100/150 grade bitumen.
6. Alternative gradings may be used for 55/10F provided it appears visually similar and subject to a site laying trial demonstrating that the appearance, compaction level and typical surface texture are similar to a normal 55/10F from the same source. A slightly lower binder content may be needed.
7. Compaction shall comply with clause 973AR.
8. Bond strength shall comply with clause 975AR

970AR 45% Stone Content Hot Rolled Asphalt Surface Course (for hand laying)

1. 45% stone content hot rolled asphalt surface course shall comply with sub-Clauses 2, 3, 4, 5 and 6 of this Clause, and the requirements of Appendix 7/1 or Appendix 11/1 as appropriate. It shall also comply with 973AR for compaction.
2. Materials shall comply with BS EN 13108-4, shall have the following target gradings and binder content, and shall be recipe type F.

BS Test Sieve	Target % by mass of total aggregate passing BS test sieve		
Designation (See Appendix 7/1 or	45/6F	45/10F	45/14F

Appendix 11/1			
20mm	-	-	100
14mm	-	100	95-100
10mm	100	95-100	52-72
6.3mm	90-100	-	-
2mm	51	51	51
0.5mm	37-53	37-53	37-53
0.25mm	13-38	13-38	13-38
0.063mm	7	7	7
Minimum target binder content % by mass	6.3	6.3	6.3

3. In carriageways the coarse aggregate shall be crushed rock with a minimum polished stone value of 55 unless otherwise stated in Appendix 7/1.
4. In cycleways, the coarse aggregate shall be crushed rock with a minimum polished stone value of 50, unless otherwise stated in Appendix 11/1.
5. In footways, the coarse aggregate shall be crushed rock with a minimum polished stone value of 50, unless otherwise stated in Appendix 11/1.
6. The binder shall be 160/220 grade bitumen and the temperature shall not exceed 160°C at any time.

Minimum Polished Stone Value of Chippings

The minimum polished stone values given in the table are for 10 mm aggregate in surface dressing, thin surfacing and, where the speed limit is 30 mph or less for 55/10F asphalt.

The minimum PSVs given in the table shall be **increased by 5** where 14 mm or 20 mm aggregate is used in any surfacing and where 55/10F asphalt is used on roads with 40 mph or higher speed limits.

NOTE: 65 will be increased to 68+

The minimum PSVs given in the table shall be **decreased by 5** where 6 mm aggregate is used in the any surfacing. (For this purpose only 68+ is assumed to be 70)

Site group	Site Description	Minimum PSV required for given IL, traffic level and type of site							
		Risk rating	IL	Traffic (cv/lane/day) at design life					
				0-20	21-100	101-250	251-500	501-750	751-1000
1	Dual carriageways (risk rating 2) and single carriageways (risk rating 3) where traffic is generally free-flowing on a relatively straight line.	2	0.35	50	50	50	50	50	55
		3	0.40	50	50	50	50	50	55
		4	0.45	55	55	55	55	55	60
3	Approaches to major and minor junctions or other hazards on all-purpose dual carriageways and single carriageways where frequent or sudden braking occurs but in a generally straight line, including pedestrian crossings and mini-roundabouts	4	0.45	55	55	55	60	60	65
		5	0.50	55	55	60	65	65	68+(70)
		6	0.55	50	60	65	68+(70)	68+(70)	68+(70)
4	Gradients (>5%) longer than 50 m	4	0.45	55	55	55	55	55	60
		5	0.50	55	55	60	65	65	68+(70)
		6	0.55	60	60	65	68+(70)	68+(70)	68+(70)
5	Bends on all types of road (<500 m radius ^{note 1}); roundabout circulation areas except mini roundabouts; approaches to hazards that require combined braking and cornering.	4	0.45	55	60	60	60	65	65
		5	0.50	60	60	65	65	68+(70)	68+(70)
		6	0.55	65	65	68+(70)	68+(70)	HFS(75)	HFS(75)

Notes:

1. Shaded lines are the default risk rating/Investigatory levels for that group **except** that for bends with a radius between 250 and 500 m when the default risk rating is 4 and the required PSV is in highlighted text
2. Where '68+' material is listed in this Table, none of the three most recent results from consecutive tests relating to the aggregate to be supplied shall fall below 68.
3. HFS means that high friction surfacings complying with MCHW 1 Clause 924 will be required.
4. Investigatory Level (IL) is defined in Chapter 3 of HD 28 (DMRB 7.3.1)

Carriageway construction (Rigid)

The sub-base layer for rigid carriageway construction shall be granular sub-base material Type 1 in accordance with Section 4 Clause 4.6.3.

An underlay as specified in Clause 1007, MCHW shall be used to provide a waterproof membrane between the concrete slab and the sub-base Waterproof membranes shall consist of impermeable plastic sheeting not less than 125 microns thick. Where an overlap of the underlay material is necessary the overlap shall be at least 300mm. Water shall not be allowed to pond on the membrane which shall be completely waterproof when the concrete is laid.

Formwork shall include temporary or permanent forms required for forming the concrete together with all temporary construction required for their support. All formwork shall be so constructed that there shall be no loss of material from the concrete. The formwork shall be of a quality to ensure that the finished concrete is as described on the drawings. Where no edge restraint is provided before laying of concrete roads, steel side forms shall be set to line and level supported throughout their entire length. The forms shall be straight with a tolerance of 3mm per 3m length.

They shall be secured in position so as to be sufficiently rigid to obviate any movement during the process of laying and compacting the concrete on a bed of low moisture content cement

Solihull MBC Developers Design and Adoption Guide



mortar or grade ST1 concrete. The bedding shall not extend under the slab and the surface levels shall accord with the approved SMBC Officering drawings with a tolerance of +3mm including steps between adjacent forms.

The horizontal alignment shall similarly be to a tolerance of +10mm. The mortar or concrete bedding to be broken out and removed on completion.

All mortar and harmful material shall be removed from steel forms which have been previously used and the forms shall be greased or oiled before fresh concrete is deposited against them.

Forms must not be removed until the expiration of at least 24 hours after the placing of concrete. In those cases where timber forms have been used, removal shall take place not sooner than 24 hours after placing the concrete but no later than 48 hours thereafter. Forms shall be drilled to accommodate tie bars.

Concrete may be mixed on or off site in accordance with the requirements of BS 8500:2006

Pavement quality concrete shall be a design type to Grade C32/40 air entrained in accordance with Clause 1002, MCHW.

The concrete design shall be submitted to the SMBC Officer prior to work commencing and trial types may be required to substantiate the design data. If ready mixed concrete is used, evidence of the sufficiency of the design shall be obtained from the suppliers. Similar information shall be required in respect of site mixed concrete. The mass of cement incorporated in each cubic metre of fully compacted concrete shall not be less than 320 kg.

The pavement quality concrete used shall contain an air-entraining agent in sufficient quantity for the total entrained air content of the concrete.

The weighing and water dispensing equipment shall be maintained in good order. Their accuracy shall be maintained within the tolerances described in BS 1305 or tested in accordance with BS

3963 and shall have a mixing performance within Table 6 of BS 1305. Where appropriate, the batch capacity method of loading, mixing time and drum speed shall confirm to the details furnished in accordance with the requirements of BS 3963 for the mix proportions being used.

The mixing blades of pan mixers shall be maintained to the tolerances specified by the manufacturer of the mixer and the blades shall be replaced when it is no longer possible to maintain the tolerances by adjustment.

Mixers which have been out of use for more than 30 minutes shall be thoroughly cleaned before any concrete is mixed.

Concrete mixing shall not be carried out at temperatures below 1C on a rising thermometer or below 3C on a falling thermometer nor during any time that the ingredients or the base on which the concrete is to be placed are frozen.

Sufficient quantity of air entraining agent shall be added to the mix for the total air entrained air content of the concrete to comply with Clause 1001 and 1002, MCHW.

Ready mixed concrete shall be permitted for use if it conforms to the requirements as defined in BS 8500-1:2006.

The concrete shall be carried in purpose made agitators, operating continuously or in truck mixers. The time of such introduction of water to the mix shall be recorded on the delivery note together with weight of the constituents of each mix.

When truck mixed concrete is used, water shall be added under supervision, either at the site or at the central batching plant as agreed with the SMBC Officer, but under no circumstances shall water be added in transit.

Unless otherwise agreed with the SMBC Officer, truck mixer units, their mixings, discharge performance, the number and rate of revolutions for a specific concrete type shall comply with the requirements of BS 1305:1974.

Workability of concrete shall be determined by a slump test in accordance with BS 12350-2:2009 and carried out at the point of placing. The workability shall be maintained at the optimum within the limits specified in BS EN 206-1.

Concrete shall be transported and placed so that contamination, segregation or loss of constituent materials does not occur.

The concrete shall be spread in two layers, the first layer shall be spread to such a level that after subsequent compaction it will support the reinforcement at the required depth below the finished surface level when placed upon it. The layer of reinforcement shall then be immediately covered with concrete.

The placing, compacting and finishing of the concrete shall be carried out as rapidly as possible and the operations shall be so arranged that the time for completion of the mixing of the first

batch of concrete in any transverse vertical section of the spraying of the curing membrane on that section shall not exceed those given in the table below.

Temperature of concrete	Maximum time from mixing to finishing the concrete
Not more than 25C	3 hours
Between 25C and 30C	2 hours
Over 30C	No concreting

When the temperature of the concrete at the spreader or hopper box is over 30C concreting shall cease.

The carriageway slab concrete shall be grade C35/40 air entrained. The concrete of each course shall be spread with the surcharge necessary to produce, when thoroughly compacted, the overall thickness as specified.

The deposition of concrete shall be continuous between expansion joints and at no point shall the compacted concrete be of less thickness than specified. Compaction and finish shall be by a vibratory beam or mechanical tamper of an approved steel shod inset type which shall be capable of compacting the whole width of the bay for the full thickness of the slab. Where a self propelled vibrating machine is used it shall be fitted with a front screed for striking off the concrete at a sufficient height to allow for proper compaction. Additional vibration at the edges of the slab shall be carried out by a poker vibrator.

Expansion joints shall comprise of vertical preformed joint filler board, dowel bars and supporting cradles or assemblies. Joint assemblies and filler boards shall be within a tolerance of +10mm from the true line of the joint.

The joint filler shall comply with the requirements of Clause 1015, MCHW and be sufficiently rigid to enable it to be satisfactorily installed in the joint.

It shall resist deformation during the placing of the concrete and shall be installed with sufficient accuracy that its upper surface lies at such a depth below the surface as to allow the depth of the seal as given in Clause 1016, MCHW. Softwood expansion joint filler shall be immersed in water for 48 hours and kept damp until the concrete is placed around it. The joint filler together with the seal shall provide complete separation of the adjacent slabs and loose fitting holes around dowel bars and spaces between the sub-base and the filler board shall be packed with joint filler material after assembly of the joint.

Dowel bars shall be provided, within a tolerance of + 20mm at the mid depth of the slab. When supported in assemblies or cradles and positioned prior to concreting, the bars shall be parallel to the finished surface of the slab and to the centre line of the carriageway within the tolerance of + 3mm.

Dowel bars shall be equally positioned about the centre line of the joint within a tolerance of + 25mm.

Dowel bars shall be provided at one end with a closely fitting cap 100mm long consisting of waterproofed cardboard or an approved synthetic material. An expansion space equal in thickness to that of the joint filler or a pad of cotton waste. The cap shall be placed on the free half of each dowel which shall also be coated prior to concreting with bond breaking compound or sheath complying with Clause 1011, MCHW.

The assembly of joint filler, dowel bars and supporting cradles when fixed in position shall be entirely rigid.

Longitudinal joints incorporating tie bars shall be provided, as indicated on the approved SMBC Officer drawings and C8, Volume 3, section 1, MCHW. Generally tie bars placed at 0.6m spacings with each bar being 0.75m long (max).

The reinforcement shall be so placed that after compaction of the concrete, it is located within + 10mm of the level indicated on the SMBC Officer drawings and it terminates 125mm +25mm from the edges of the slab.

Reinforcement shall be positioned above the dowel bars and tie bars irrespective of the tolerances on position.

Where overlapping of reinforcement is necessary longitudinally, the overlap shall not be less than 35 times bar diameters (or 450mm whichever is greater) and transversely not less than 300mm. All overlaps shall be securely tied by steel wire.

The surface finish of the slab shall be achieved in accordance with Clause 1026, MCHW. The arises of joints shall be rounded with a nosing trowel to a 10mm radius. Channels shall be finished by floating with a steel trowel for a 300mm wide strip adjacent to the kerb.

All concrete shall be compacted to produce a dense homogeneous mass; it shall be compacted with the assistance of vibrators. Sufficient vibrators in serviceable condition shall be on site so that spare equipment is always available in the event of breakdown. Internal vibrators shall be capable of producing not less than 10,000 cycles per minute. Vibration shall not be applied by way of reinforcement. Where vibrators of the emersion type are used, contact with reinforcement and all inserts shall be avoided as far as is practicable. Concrete shall not be subject to vibration from adjoining works between 4 and 24 hours after compaction.

The density achieved shall be in accordance with Clause 1003, MCHW and strengths shall be tested in accordance with BS 8500:2006

Immediately after compaction and for seven days thereafter, concrete shall be protected against the harmful effect of weather, including rain, rapid temperature changes, frost, and from drying out as recommended in Clause 1027, MCHW.

Failure to do so and which results in defects of any description will mean the entire bay being broken out and replaced.

No tamping shall take place off the support of completed bays for at least seven days after placing and no traffic whatever shall be permitted on the completed bays for at least 14 days after completion.

A further delay of one day shall be added to the foregoing period of restriction for each night when the surface temperature of the layer falls to 0C or below.

The exposed surface of concrete pavement shall be cured immediately after finishing by treating with an approved aluminised curing compound. It shall be mechanically sprayed on at a rate of 0.22 – 0.27 litre/m² using a fine spray. When the site forms are removed within 24 hours and for small areas where a mechanical distributor cannot be used, the compound shall be sprayed by hand lance at the rate of 0.27 – 0.36 litre/m². The mechanical sprayer shall incorporate an efficient mechanical device for continuous agitation and mixing of the compound in its container during spraying. The curing time shall not include any period during which the temperature of the concrete falls below 0C. The method of curing used shall prevent the loss of moisture from the concrete.

At any transverse section of the carriageway the finished surface of the concrete shall not deviate from the design section by more than 3mm. The gap between the concrete surface and a 3 metre straight edge laid longitudinally along the road shall not exceed 3mm.

Any high spots of less than 6mm shall be ground down. Where the gap exceeds 6mm the slab shall be removed and recast. Any areas removed shall not be less than 3m in length or less than the full width of the slab involved. Adjacent surfaces at any joint shall not have a gap of more than 3mm wide under a straight edge 750mm long laid across the joint.

Joints in concrete slabs shall be sealed using one of the hot applied sealants not less than seven days prior to the use of the road by traffic in accordance with type suitable for its location as specified in BS 2499 and Clause 1017, MCHW.

An appropriate primer shall be applied from a thermostatically controlled and indirectly heated dispenser with a recirculating pump.

The sealant shall not be heated to a temperature higher than the safe heating period both as specified by the manufacturer. The dispenser shall be cleaned out at the end of each day.

1. Bond coats in accordance with Clause 920 shall be used beneath all bituminous layers where laid on any other bituminous material or concrete.

**Solihull MBC Developers
Design and Adoption Guide**



2. The Contractor shall provide the following information with his quotation, or prior to the commencement of the Works:
 - (i) the product or products he proposes to use together with their data sheets, product identification data, cohesivity data as specified;
 - (ii) for each product, a copy of the BS EN ISO 9001 certificate showing the name of the manufacturer, the name of the certification body and the reference number and date of the certificate;
 - (iii) the spraying equipment proposed, and a test certificate;
 - (iv) the source or sources of blinding material proposed;
 - (v) contingency plans in the event of any breakdown
 - (vi) the results of any other tests or other data the Contractor considers would assist the Overseeing Organisation in assessing the technical merit of the treatment such as
 - b. tackiness tests and/or traffickability time and methods of test or
 - c. breaking time test results for different weather conditions and substrates.

3. The rate of spread shall be 0.3 kg/m² residual binder where the substrate is new asphalt and 0.4 kg/m² when the substrate is old or has had sufficient traffic over it to have removed a significant proportion of the surface binder. The residual binder for various grades of emulsion is shown in table 7/4.

4. the bond coat shall be sprayed not more than 24 hours prior to commencing laying on D roads and immediately after lane is closed to traffic for A, B and C roads.

Table 7.4 Rate of spread of bond coat

Class of polymer modified bitumen emulsion	Residual binder 0.3 kg/m ²	Residual binder 0.4 kg/m ²
C50PB	0.6 l/m ²	0.8 l/m ²
C60PB	0.5 l/m ²	0.67 l/m ²
C65PB	0.46 l/m ²	0.62 l/m ²

The polymer modified bitumen emulsion shall have a minimum cohesion of 1.0 J/cm²

Binder Data Table

Binder Data Sheet		Bond Coats, Tack Coats and Other Bituminous Sprays			
Manufacturer of Binder:		Product Name:			
Binder Type:		Batch No:			
Binder Grade (highlight as required)					
Conventional	Intermediate	Premium	Super-premium	Non-tack	Other
Binder	Source ►	Recovered Binder	Recovered Binder After Ageing		

**Solihull MBC Developers
Design and Adoption Guide**



Test ▼	Test	
	Recovered in accordance with Clause 955	Aged in accordance with Clause 955
Penetration at 25°C 0,1 mm (100g and 5 secs)		
Penetration at 5°C 0,1 mm (200g and 60 secs)		
Vialit pendulum cohesion see Clause 957 maximum peak value J/cm ²	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 957	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 957
Product identification test. The provision of data for identification and ageing is optional for unmodified bituminous emulsions to BS EN 13808 and for bitumen to BS EN 12591 and cutback bitumen to BS EN 15322. Complex shear (stiffness) modulus (G*) and phase angle (δ) data. See Clause 956.	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 956	The Contractor shall attach a Report and graphical output to this schedule as specified in Clause 956
Other properties the Contractor considers useful: Minimum Binder Content Binder temperature range for spray application Emulsion Properties and Viscosity Break time Breaking Agent type Weather limits - information from binder manufacturer: road or air temperatures; humidity; wind chill adjustment; tolerance of surface dampness; etc. Temperature max: Temperature min: Other:		

973AR Compaction Requirements

1. The adequacy of compaction of bituminous materials used in the carriageway shall be determined by the Overseeing Organisation from the attained air void content of the laid material in the following way:
 - i. Compliance shall be judged from the determination of air voids for areas of 1000 m² or from the area laid in one day when this is less, or from multiple areas to the nearest 1000 m² on large sites. Three 100 mm nominal diameter cores pairs shall be taken from each area. At least two of the core pairs shall be from the wheel track zones of the completed carriageway. The wheel track zones are defined in BS 594987 Clause 9.5.1.3; and
 - ii. In situ air voids shall be determined in accordance with BS 594987 clause 9.5.1.3.
2. Where these requirements for the air voids are not met the Contractor shall determine the full extent of the area of the defective material to the satisfaction of the Overseeing Organisation. The full depth and width of the defective material, minimum 15 m long and the full width of the paver, shall be removed and replaced with fresh material laid and compacted to this Specification.
3. Additionally, every 500 lin metres of joint (or more frequently where there is doubt about compaction) a pair of 100 mm nominal diameter cores shall be taken each side of joint located in accordance with Clause 903.24.
4. An indirect density meter may be used, with the prior approval of Overseeing Organisation, to reduce the amount of coring required, provided that sufficient information is available to correlate the readings against core results. For proper correlation of the density meter, at least 18 No. cores shall be taken for each material/supplier combination from the specific site for which the correlation shall apply, having been tested prior to coring with the actual density meter for which the correlation data is required. In cases of disputes over compliance with compaction specifications, the core density method shall be used.
5. The Contractor shall achieve an air void content conforming with the limits set out in the table below.

Table 9/71 – Compaction Requirements (Air Voids)

Materials	Mean of 6 cores		Mean of any pair	
	Min %	Max %	Min %	Max %
Dense base and binder course mixtures to clause 906	2	6	1	8
All hot rolled asphalt materials except 45/10F to clause 970AR (any layer)	2	6	1	7
45/10F to clause 970AR	2	8	1	9
SMA binder/regulating course to Clause 937	In accordance with Clause 937			
All stone mastic asphalt	2	6	1	7

surface courses				
Bridge deck surfacing	In accordance with IAN 96/07			

Industrial estate roads

Although the general principles and advice given elsewhere in this manual apply equally to industrial estates, the layout of these roads has a different emphasis from that of residential roads.

In order to cater for the larger and heavier vehicles the roads need to be of greater width and strength. The necessary changes to the design standards to cater for this traffic are set out in this section.

Industrial estate roads have been categorised as follows:

- i. Major Industrial Roads
- ii. Minor Industrial Roads

In general only cul-de-sacs of less than 200 metres in length shall be considered as Minor Industrial Roads with all others being Major Industrial Roads. It is not necessary to use both categories in a development.

Details of design are summarised in the following notes;

- i. Forward visibility is measured on the centre line of the carriageway
- ii. On Major Industrial Roads where the gradient is greater than 6% (1 in 16.7) an increased carriageway width may be required.
- iii. Footways must be provided on both sides of the carriageway; the width of 2 metres may need to be increased in certain cases to cater for heavier pedestrian flows and shared cycle use.
- iv. Increased carriageway width may also be required on sharp bends to enable larger vehicles to pass each other

Cul-de-sacs over 180 metres in length are undesirable but will be considered in certain circumstances up to a maximum of 400 metres in length beyond which a second access to the existing highway network should be provided.

Where the 180 metres maximum length is exceeded intermediate turning facilities must be provided at a maximum spacing of 200 metres.

Where an Industrial Estate Road joins an existing Local Distributor Road, offside diverging (right turn) lanes may be required to be provided by the Developer, together with associated traffic signs, central refuges and road markings.

Under normal circumstances offside diverging lanes will be required at all junctions between Distributor Roads and Major Industrial Roads. Details of pedestrian facilities may also be

required to be agreed with the SMBC Officer. The use of roundabouts and mini-roundabout junctions will be considered where appropriate.

Turning Spaces

A turning space shall be provided at the end of each cul-de-sac.

The positioning of accesses to individual premises within turning spaces is recommended as this discourages casual parking which obstructs turning movements.

Gradients

The gradients used shall normally not exceed the following limits:

Maximum gradient 5.00% (1 in 20)
Minimum gradient 0.58% (1 in 170)

Where the channel is formed of precast concrete or other suitable channel blocks, the gradient shall not be less than 0.66% (1 in 150).

Service trenches

It is essential that the backfilling of service trenches is fully compacted and placed in layers of a thickness appropriate to the capability of the compaction plant being use.

Pavement construction

Construction requirements shall be as for new roads given in chapters 3 and 4 of this strategy but with increased thickness to allow for the longer design life. From the maintenance viewpoint the bituminous options given in tables 7.1 – 7.3 are preferred. Any other construction and surfacing (including coloured) shall be assessed for maintenance liability and in the probable event of it being higher an appropriate commuted sum will be charged; experience has shown that in virtually all cases the bituminous option gives the lowest long term maintenance costs. Bituminous surfacing shall be 55/10F surf with 100/150 pen binder.

Carriageway and footway construction thickness shall be in accordance with In Tables below

7.3 m and wider single residential carriageways

Layer	Thickness	Material
Surface Course	40 mm	Hot Rolled Asphalt 55/10F surf 100/150 to BS EN 13108-4 (PD 6691) with a PSV ₆₀ and AAV ₁₀ aggregate
Binder course	60 mm	AC 20 dense bin 100/150 recipe mixture to BS EN 13108-1 (PD 6691).
Base	200 mm	AC 32 dense base 100/150 recipe mixture to BS EN 13108-1 (PD 6691)

Where the traffic density is such that a dual carriageway is required then the construction shall be determined in consultation with SMBC but is likely to be thicker, in total, than that given above.

All residential Roads – Collector or Access Roads

Layer	Thickness	Material
Surface Course	40 mm	Hot Rolled Asphalt 55/10F surf 100/150 to BS EN 13108-4 (PD 6691) with a PSV ₆₀ and AAV ₁₀ aggregate
Binder course	60 mm	AC 20 dense bin 100/150 recipe mixture to BS EN 13108-1 (PD 6691).
Base	150 mm*	AC 32 dense base 100/150 recipe mixture to BS EN 13108-1 (PD 6691)

*If the developer wishes to lay the base in two layers then AC 20 dense bin 100/150 may be used in place of the AC 32 dense base 100/150.

Block Paving

Segmental paving may be permitted for these roads with the following provisos: only rectangular pavers 200 mm x 100 mm and 80 mm thick in accordance with BS EN 1338 or BS EN 1344 are permitted. The paving shall be carried out in accordance with BS 7533. Special shaped blocks may not be used as they are impossible to re-lay satisfactorily after they have been removed to gain access to underlying services. Pavers shall be laid in a 45° herringbone pattern as shown in the ADEPT guidance on surfacing. Great care must be taken that the bedding material (sand) is well and permanently drained as any water logging of the sand will ensure rapid failure as the sand can no longer support the traffic loads. The minimum requirement for draining the sand is to drill 25 mm holes through the asphalt layers at 1000 mm centres in each direction. These core holes shall be filled with 2.36/6 mm single size chippings and there must be a non woven geotextile laid over the filled holes to stop the bedding sand filling the gravel / blocking the hole prior to spreading the bedding sand. Other drainage systems may be employed but they must be demonstrated as having at least equivalent performance for the life of the pavement. An alternative is to lay them rigidly but this is not always straightforward and consideration should be given to the risk of failure and the necessary high cost of either relaying or replacing with a bituminous surface.

NOTE: although blocks normally have a long life as a block the surface in which they are used often does not unless the workmanship is of very high quality; this means they can be relaid but at high cost. However carefully this is done there is always some loss of block especially as cut blocks.

There is a serious safety problem using pavers to BS EN 1338 or BS EN 1344. There is no equivalent to the polished paver value (PPV) test (included in BS 6677 and BS 6717 which are now obsolete) which ensured that adequate skidding resistance was maintained during the life of the pavers. If a developer wants to use block paving on these roads then he must provide evidence in the form of a PPV test result for the paver in question before he is permitted to do so. The pavers shall have a minimum polished paver value (PPV) of 55. As an alternative, for concrete pavers only, all the constituents shall be from quarries having an aggregate with a polished stone value (PSV) of at least 55.

Block paving should be done on a case by case basis

NOTE 1: there have been occasions in the past when a PPV has not been specified and a high level of skidding crashes have ensued after a couple of years wear even where the initial skidding resistance was adequate.

NOTE 2: the advice given in HD 39 (DMRB volume 7), which is accepted as best practice, is that only standard rectangular pavers should be used. Although the durability of elements is not a problem, areas constructed with

them often have fairly short lives. Using other than standard blocks may commit the Authority to a higher than expected maintenance charge in the future if, in order to repair a failure, all the blocks in an area need to be replaced. The likelihood is that if the paving fails it will be taken out and replaced with bituminous materials.

NOTE 3: no local authority can require the use of any particular brand of paver as to do so would contravene the requirements of the public procurement directive, however it is permissible to require additional performance characteristics where they can be justified..

The construction shall be as shown below

Layer	Thickness	Material
Surface Course	110 mm	80 mm thick pavers on 30 mm sand bed
Binder course	160 mm	AC 20 dense bin 100/150 recipe mixture to BS EN 13108-1 (PD 6691) laid in two layers. Perforated as described in para 7.10.

This construction permits site traffic to use the top of the base/binder course layer during construction of the housing. The base binder course must be perforated prior to laying the block paving. The perforations shall consist of 25 mm diameter core holes through the whole of the asphalt layers. These core holes will be backfilled with 2.36/6 mm chippings, covered with a non-woven geotextile layer prior to spreading the sand. They must not be backfilled with the bedding sand.

Access Roads

The layout of Roads shall be such that all vehicles can leave and rejoin the public highway in a forward direction.

For access to premises, radius kerbs (not less than 6.0 metres) should be provided. The width of accesses to premises will depend on the size and the nature of the premises and should be determined at the planning stage. In addition an area of footway 2 metres long on each side of the access shall be constructed to carriageway standards to reduce the effects of vehicles mounting the kerb.

Parking

All necessary provision for vehicle parking including deliveries should be clear of the public highway. In general, parking to serve premises is not acceptable on the highway and the Developer will be expected to meet the full costs of Traffic Regulation Orders (TRO's), signs and road markings required to enable waiting restrictions to be implemented where appropriate.

The locations of bus stops/shelters should be indicated and agreed early on in the design process to ensure that any potential buyer is aware of where they are located.

If any existing bus stop needs to be temporarily suspended due to proposed highway works contact the SMBC Officer and they will refer you to the relevant bodies.

10. Kerbs

New Junctions / Bellmouths

All new junction or Bellmouth accesses must include for the resurfacing of the complete adjoining carriageway full width and from tie-in point to tie-in point of the new kerbs.

If the gradient of the adjoining carriageway is less than 1:120 then the new adjoin access should fall back into the development and its drainage area picked up within the new road access.

New Roads and Street Works Act 1991 (NRSWA) The Developer is responsible for ensuring that all relevant notices are served in accordance with NRSWA 1991. It is this process that books the road space for the Developer to enter the highway to carry out the approved works. However, no works will be permitted in the highway until the Works Licence/Works Permit has been issued.

Works Category (working days)	Notification Period (working days)
Minor works (up to 3 days duration)	5 days minimum
Standard works (from 4 to 10 days duration)	10 days minimum
Major works (11 days or greater)	3 months minimum plus confirmation notice 10 days before starting works

Note. Any works requiring traffic orders are deemed to be major works irrespective of the duration.

A form is available online. Once completed this is then returned via the email address

The team will be able to advise if your works conflict with any other works being carried out in the area

Penalties will be enforced as per NRSWA on all S278 Works

New Kerbing

All new kerbing should be checked for line and level so as to eliminate ponding occurring adjacent to them.

All reinstatements of the carriageway adjacent to the kerbs of longer than 10m in length should be taken to the centre line/ centre of the road of the existing surface as a minimum.

Any kerbs lengths less than 10m will require a reinstatement of 100mm in width in the carriageway adjacent to the kerbs.

Gaps between kerbs >2mm is not acceptable and must be adhered to.

Precast concrete kerbs channels edgings

Precast concrete kerbs, channels and edgings shall be hydraulically pressed and conform to BS EN 1340. The dimensions, type designations, performances and classes shall comply with the requirements of Clause 1101, MCHW.

Purpose made ramps and dropped kerbs shall be used at vehicle crossings.

Special kerbs, channel blocks and quadrants shall only be used when approved by the SMBC Officer. An alternative recycled/composite kerb with BBA certification with the approval of the SMBC Officer may be used.

Type HB2 kerbs shall generally be laid to provide a 120mm kerb upstand. If used to provide a dropped course at vehicle crossings, kerbs shall be type BN laid to provide an upstand of 15-25mm unless directed otherwise by the SMBC Officer.

Special ramped or taper kerbs shall be used to accommodate the difference in kerb face at crossings.

The correct radius kerbs shall be used for all radii that are 12m or less.

900mm internal radius kerbs shall be used where kerb lines would otherwise meet at right angles. Alternatively, internal or external angle kerbs and straight kerbs may be permitted with the approval of the SMBC Officer.

No kerbs shall be laid that are less than 300mm in length.

Combined kerb and drainage units (CKD)

Precast concrete combined kerb and drainage units shall conform to BS EN 1433:2002. An alternative recycled/composite kerb drain unit with BBA certification with the approval of the SMBC Officer may be used.

Kerb foundations

All kerbs shall be set on an cast in situ kerb race refer to standard detail.

Where the Developer does not wish to provide a permanent edge restraint before the laying of the carriageway or footway, an approved temporary form of edge restraint may be used.

Temporary edge restraints are to remain in position and shall be inspected before the permanent restraint is laid.

No traffic shall run on any section of road previously constructed until such time as an edge restraint has been provided.

Kerb lines

Kerb and channel lines shall be properly set out to the lines and levels given on the approved drawings. The kerbs and channels shall be laid accurately to these lines and any fine adjustments made so that a smooth flowing alignment is achieved free from sudden deviations in line and level.

Damage to kerbs

Should any damage be done to existing or new kerbing during the execution of the works, the whole length affected shall be taken out and made good to the satisfaction of the Project

Engineer. Any kerb unit deviating more than 3mm in 3 metres from line and level shall be made good by lifting and relaying.

Precast concrete edging

Edging to footways, footpaths, cycle tracks and service strips shall be provided in most cases. The edgings will normally form the boundary of the highway and shall be made continuous across private accesses. Where the footway, footpath, cycle track or service strips abuts directly against garden walls or similar structures, the edging need not be provided. The precast concrete edging shall be bedded on 150mm of concrete and haunched to within 50mm of the top whilst the concrete type is still plastic and workable. The concrete type shall be a standard type ST1 complying with BS 8500 - 1 and Clause 2602, MCHW.

In instances where a block paved surface abuts block paving within private areas it is acceptable to omit the edging in favour of a double row of stretcher course blocks; the centre joint being the limit of adoption/demarcation (where appropriate and within control of the Developer).

11. Footway and Cycleway Construction

Footways and cycle tracks

As part of any new development, Developers shall identify key pedestrian and cycling routes and destinations. Local Transport Note Policy LTN 1/04 'Planning and Design for Walking and Cycling' produced by DfT, sets out the policy context that supports the promotion of pedestrian and cycling facilities. It also describes common design principles for pedestrian and cycle provision.

Requirements for disabled needs shall be met accordingly. Tactile paving is only expected to be used on road types A – D.

The footway design should accord with Current guidance for the traffic level chosen. Light vehicle design will be the most common. Untrafficked design shall not be used when sweepers or other maintenance vehicles are used that are not pedestrian controlled. Footways combined with cycleways shall have the same construction as the cycleway.

NOTE: There should be no step between the cycleway and footway when they use the same route and are immediately adjacent to each other. Separation should be by means of a white line only. A longitudinal step of less than 25 mm can 'throw' a cyclist if it is crossed at a narrow angle, for example, to avoid pedestrians.

NOTE: the specification for 45% hot rolled asphalt, both 45/10F and 45/6F, are given in 970AR (in Part 3).

Hot rolled asphalt and chips

The specification to be used shall be: HRA 30/14F 40/60 (or 100/150) rec Schedule 1A as specified in BS PD 6691 Annex C. The chippings shall conform to BS PD 6691 table C5 20 mm nominal size and shall be spread at a rate of 70% shoulder to shoulder. Texture depth must not be specified. The normal binder would be 40/60 pen but for lighter trafficked roads where rutting is unlikely to be a problem 100/150pen may be used with particular advantage in cooler conditions.

The relevant information should be given on a site by site basis.

Flexible Construction – 55% Stone Content Hot Rolled Asphalt (Clause 972AR) or approved equivalent

1. Location: All Carriageways
2. Grid for checking surface levels of pavement courses (Clause 702.4):
 - (i) Open Carriageway-Longitudinal Dimension = 10m Transverse Dimension = 2m
 - (ii) Junctions Longitudinal Dimension = 5m Transverse Dimension = 2m
3. Surface regularity (Clause 702.7): Category A Roads
4. The Compaction Assessment shall be as specified in Clause 973AR (Air Voids Test). Note that the equivalence requirements of sub-Clause 903.17 do not apply.
5. Regulating courses (Clause 907) shall be in accordance with WCC HCD No B705.2.
6. Only materials which comprise at least 80% bituminous planings shall be permitted for use as upper sub-base under the Type 2 Unbound Mixtures category.

**Solihull MBC Developers
Design and Adoption Guide**



Pavement Layer	Clause	Material	Grade of Binder	Thickness (mm)	Special Requirements
Surface Course	972AR	55% Stone Content Hot Rolled Asphalt	100/150	40 (note 1)	Designation 55/10F surf PSV of coarse aggregate [xx]
Binder Course	906	Dense Asphalt Concrete	100/150	60 (note 2)	AC20 dense bin Coarse aggregate: crushed rock or slag
Base	906	Dense Asphalt Concrete	100/150	[xx]	AC32 dense base Coarse aggregate: crushed rock or slag
Upper Sub-base	803, 804 or 805	Type 1, Type 2 (see paragraph 6 above) or Type 3 (open graded) Unbound Mixtures	-	150	
Lower Sub-base	890AR	W150 or W75	-	[xx]	
TOTAL PAVEMENT THICKNESS				[xx]	

Note 1: 40 mm is the normal and preferred thickness; thicker layers may be more suitable where an overlay is being used of variable thickness. Insert alternatives as appropriate.

Note 2: 60 mm is the normal and preferred thickness; thicker layers may be more suitable where an overlay is being used of variable thickness. Insert alternatives as appropriate. If a thinner layer is necessary then an alternative regulating material should be specified.

CYCLEWAYS

Cycle Lanes included as part of the carriageway shall have the same construction as the carriageway.

Cycle Lanes are normally maintained using ride on vehicles and therefore they shall always be constructed using the light vehicle design, or any of the heavier options. The preferred option shall be bituminous construction as the ride quality is always better than segmental paving. Concrete shall never be used. The bituminous material shall always be machine laid as the ride quality of hand laid material is usually very poor and is never comfortable.

On high plasticity clay subgrades – typically Lias – shrinkage cracking frequently occurs. There is no known prevention for this without extremely high construction thicknesses (750 mm or more) which are obviously uneconomic. It might be useful to carry out a trial incorporating a glass fibre grid (eg Geogrid) within the construction, either at the bottom of the sub-base, within the sub-base or at the base of the bituminous layers. (to change)

When a cycleway crosses a kerb line the kerb must be flush.

Visibility

Normal design speed – 30 kilometres per hour (20 mph)
Minimum Visibility – 30 metres

Minimum design speed – 10 kilometres per hour (6 mph)
Minimum Visibility – 10 metres

Radius of Curvature

Normal design speed – 30 kilometres per hour (20 miles ph)
Preferred minimum radii – 25 metres

Minimum design speed – 10 kilometres per hour (6 miles ph)
Preferred minimum radii – 4 metres

Gradients

Length unrestricted - 3% (1/33) maximum
Up to 100 metres - 5% (1/20) maximum
Up to 30 metres - 7% (1/14) maximum
Gradients above 7% are not recommended except for very short lengths.
Gradients within 10m of any junction or crossing shall be no more than 2.5% (1/40).

Crossfall

Crossfalls of 2.5% (1/40) are desirable generally but may be more, for instance, when super-elevation is required at tight bends. Widening on tight bends should be considered.

Traffic Calming

The Developer shall consider measures that allow the safe and smooth passage for cyclists through any traffic calming measures.

Surface Finish

A smooth non-skid surface course is essential. On carriageways particular attention should be paid to the condition of the surface adjacent to the kerb which is where cyclists usually ride.

Types of Construction

The construction for residential areas assumes light vehicle use and occasional overrun by goods vehicles and is therefore suitable for drive accesses. The construction for non-residential roads assumes occasional overrun by HGVs. Where higher traffic levels are anticipated, eg crossings into large distribution warehouses, then a full highway pavement design appropriate to the anticipated traffic will be needed. Sub-bases shall be type 1, type 3 or planings with above 80% asphalt content.

Particular care should be given to evenness of the final surface for both footways and cycleways as many vehicles, for example child's buggies, wheel chairs and bicycles that use these surfaces do not have suspension. Machine laying is preferred for the binder course as overall quality is usually better and it also minimises thickness variations in the surfacing. Where vehicles cross the footway or cycleway the blocks shall be laid in a 45° herringbone pattern as recommended in ADEPT guidance.

For safety reasons only pavers which have been demonstrated to have adequate long term skidding resistance either by means of a PPV test or by using aggregate with a PSV in excess of 50 (concrete pavers only) shall be used.

Table 7 – Granular Bedding and Fill

Subbase Layer Only		Subbase & Capping Layer			
CBR	Type 1 mm	CBR	Type 1 mm	Capping mm	Total
2.5%	450-500	<2.5%	Requires Ground Stabilisation		
3%	420-450	3%	320-360	240-250	560-600
4%	360	4%	265	225	490
5%	320	5%	240	210	450
6%	310	6%	220	200	420
7%	290	7%	210	195	405
8%	270	8%	200	185	385
9%	260	9%	190	180	370
10%	245	10%	180	175	355
11%	235	11%	170	170	340
12%	225	12%	165	160	325
13%	215	13%	160	155	315
14%	210	14%	155	150	305
15%	200	15%	150	150	300

Notes: If CBR is less than 2.5% then Ground Stabilisation is required.

Note:

1. Type 'A' granular material for pipe bedding and pipe surround to Clause 503.3(i) MCHW and graded in accordance with Table 6 above.

Fill material (includes for land drains and temporary drains) shall consist of free draining, hard, clean, chemically stable gravel, crushed stone or crushed slag not greater than 40mm diameter and in accordance with Clause 505.2, MCHW.

2. Type 'B' selected filter material to Clause 505.3, MCHW and graded in accordance with Table 6 above shall consist of uniform, readily compactable materials free from tree roots, vegetable matter, building rubbish and frozen soil, and excluding clay lumps retained on a 75mm sieve and stones larger than 35mm.

Sub-base for footways, footpaths, cycle tracks and service strips shall consist of granular material Type 1 to Clause 803, MCHW. The material shall be laid and compacted in accordance with Clause 802, MCHW. Material laid in extremely restrictive areas shall be compacted with a suitable vibrating plate compactor.

Surfacing for footways and paved areas shall be laid true to levels, crossfalls and thickness as described on the drawings.

Pram / wheelchair crossings shall be provided where indicated on the drawings or as directed by the SMBC Officer and shall consist of a minimum of two type BN kerbs (kerb upstand 0 - 6mm) with two ramped kerbs to BS EN 1340 types DL1/DR1.

The rear edging of the footway shall be ramped and dropped correspondingly with the road kerb if the permitted footway gradients cannot be achieved.

Strengthened footways, footpaths, cycle tracks and service strips will be required where motorised vehicles will be expected to park or pass (e.g. vehicle crossings, vulnerable footways / paths requiring the passage of maintenance and / or emergency vehicles).

Vehicle crossings shall be formed of the width and in the positions indicated on the drawings. Single crossings shall consist of a minimum of three type BN kerbs – maximum of four type BN kerbs (kerb upstand 15-25mm) with two ramped kerbs to BS EN 1340 types DL1/DR1; shared crossings should have a maximum of ten type BN dropped kerbs (kerb upstand 15- 25mm) with two ramped kerbs to BS EN 1340 types DL1/DR1.

The rear edging of the footway shall be ramped and dropped correspondingly with the road kerb if the permitted footway gradients cannot be achieved.

Where possible no utility covers / boxes shall be installed within a vehicle crossing area, however, if this unavoidable suitable heavy duty covers shall be used. No gullies shall be constructed adjacent to crossings.

In some circumstances, where overrunning of grass verges by vehicles, or where other problems are anticipated, verges of an agreed hard construction may be required by the Project Engineer.

Precast concrete flags for tactile paving shall be hydraulically pressed and comply with the requirements of BS EN 1339. The flags shall be appropriately coloured Red, buff or grey and be 400mm square x 65mm thick. Choice of paving size to suit site requirements in order to reduce amount of cuts.

Guidance on the use of the of tactile paving surfaces” published by DfT.

The slabs shall be laid on maximum 30mm thick clean sharp sand bed and the adjacent surfacing materials shall be dressed flush with the top flat surface of the slabs. In areas of likely wheel loading, reinforced paving slabs laid on a mortar bed should be used. Base materials beneath paving to be in bituminous in accordance with Table 5. The locations, size, colour and patterns shall be as detailed on the approved drawings.

The alignment of the tactile paving slabs at crossings is critical and the Developer must inform the Clerk of Works when they are being installed so they can inspect during construction.

Tactile paving slabs shall be provided and be installed in accordance with “Guidance on the use

Any area with a potential vehicle run-over should have tactile blocks 200 X 100 X 80 used, in place of tactile Paving slabs.

No cut should be less than 1/3 of either the block or the tactile paviour

Precast concrete flag paving in accordance with BS EN 1339:2003. Generally installed in modules 900 x 600mm or 600 x 600mm and 50mm thick. Laid as CI 4.4.10

Granite setts shall generally have a 100mm x 100mm cross section and be fair face on any exposed surface; rectangular in shape and shall comply with the requirements of BS EN 1342 2012.

Note; the minimum use of one tactile paving slab should be not less than one third of the full size slab.

Specification for Pavement Surfacing

Pre-coated chippings shall be either 14 or 20mm nominal size complying with the relevant requirements of BS EN13108. The Polished Stone Value (PSV) and Aggregate Abrasion Value (AAV) must be specified in the design and shall comply with the requirements of the DMRB, Volume 7, Section 5, Part 1 HD 36/06.

For 55/10 HRA the minimum average texture depth following the wearing off of the surface binder and exposure of the surface aggregates should be 0.5mm.

For chipped HRA, the rate of spread for applied chippings shall be uniform throughout the site and shall be sufficient to achieve a texture depth as detailed in MCHW, Series 900 Table 9/3 'Requirements for Initial Texture Depth for Trunk Roads including Motorways'. Texture depth shall be determined by the volumetric patch method complying with BS EN 13036-1:2010 using the procedures outlined in BS 594987 Clause 8.2.

Concrete blocks and clay pavers shall comply with the requirements of BS 7533. Concrete blocks shall be a minimum 80mm thick in all applications.

The skid resistance of concrete blocks shall be determined by the polished stone value (PSV) test and determined by the polished paver value (PPV) for clay pavers.

The minimum polished stone value (PSV) of any product shall be 55 unless specified otherwise. Block surfacing shall be laid in a 45 or 90 herringbone pattern (Unless otherwise agreed by the PSMBC Officer) with two stretcher courses adjacent to kerbs and a single stretcher course around ironwork unless directed otherwise by the SMBC Officer.

The laying course material shall comply with the requirements of BS 7533 and detailed in MCHW, Volume 7, part 5 HD39/01.

The laying course shall be within + 1% of its optimum moisture content determined in accordance with test 12 of BS 1377. The laying course shall be such that after compaction it forms a uniform layer 30mm thick below the blocks.

The laying course shall be screeded to produce a uniform surface to correct design profiles and falls at a uniform degree of compaction.

Compaction shall follow block laying as soon as possible but shall not be carried out within one metre of the laying face. Apart from this edge strip no area of paving shall be left uncompacted at the completion of the days work.

Concrete blocks and clay Pavers for Paving

The surface course shall be compacted by use of appropriate equipment in order to ensure the filling of the lower portion of the block to block joint by the laying course material. Two or three passes of the compacting equipment will normally be required to achieve this condition.

Immediately after the finishing pass of the plate compactor, traffic may be permitted to use the pavement. If, during the early trafficking period, any movement of the surface course occurs the units shall be removed, the cause established and the area re-laid immediately.

After compaction of the surface course, dry silver sand shall be spread over the surface and brushed into the joints.

The blocked surface shall then be vibrated as before in order to encourage the filling of the upper part of the block to block joint by the surface applied sand.

Top filling and final compaction shall be completed as soon as practicable after laying and in any case prior to the termination of work on that day.

Areas to have block seal applied.

The blocks shall be laid hand tight in the design pattern, working from an existing laying face edge or edge restraint wherever possible. Mechanical force should not be used to obtain tight joints.

Block surfacing is designed to function with sand filled joints which will normally lie in the range of 2 – 5mm when placed hand tight and may be influenced by block shape or laying pattern. The exclusion of mechanical tightening shall not be understood to preclude minor adjustments to maintain laying patterns. Full blocks shall be laid first; closure units should then be laid. The area to be laid shall be completed as far as possible in entire block units.

Wherever possible, infilling to boundaries and obstructions shall proceed as the laying of the surface course proceeds and in any case, infilling shall be completed before compaction commences.

In certain circumstances closure units are not suitable. Either dry packed sand – cement mortar or concrete (with a maximum aggregate size of 10mm) having a 28 day cube compressive strength of 40 N/mm² may be used as an alternative if approved by the SMBC Officer.

Where it is not possible to fit blocks neatly around an obstruction, the obstruction shall be surrounded with concrete of similar colour and adequate strength to form a more regular shape. Blocks shall then be cut and neatly trimmed to abut the concrete collar using a diamond edge cutter.

The minimum size cut for a 200 x 100mm block shall be 50mm x 100mm (quarter block).

Concrete General

Cement bound material

Cement bound material shall comply with Clause 1001, Table 10/1, MCHW and shall be laid, transported, compacted and cured in accordance with Clause 1030, MCHW.

Cement

Ordinary Portland Cement and rapid hardening Portland Cement shall comply with the requirements of BS 12 (no longer current but cited by Building Regulations) "Specification for Ordinary and Rapid-Hardening Portland Cement". Sulphate resisting cement shall comply with the physical requirements of BS 4027:1996 "Specification for Sulphate Resisting Portland Cement".

White or coloured cement shall be of approved quality and chemical composition, and shall comply with the physical requirements of BS EN197 – 1:2000 Cement. Composition, specifications and conformity criteria for common cements (AMD 15209) BS 12 (no longer current but cited by Building Regulations).

Cement shall be stored in a dry weather proof shed with a raised wooden floor, or in a silo and shall be delivered in quantities sufficient to ensure that there is no suspension or interruption of the work of concreting at any time and if in sheds each consignment shall be kept separate and distinct.

Any cement which shall have become injuriously affected by damp or other causes shall at once be removed from the site.

The Developer shall furnish as directed by the SMBC Officer test certificates relating to the cement to be used on the works. Each certificate shall indicate that the sample has been tested and analysed by an approved firm and that it complies in all respects with the requirements of the appropriate BS for the particular type of cement.

Aggregates for concrete

Aggregates for concrete shall consist of naturally occurring materials complying with the requirements of:

BS EN12620: 2002 - Aggregates for concrete (AMD Corrigendum 15333)
BS 882:1992 - Specification for Aggregates from Natural Sources for Concrete (no longer current but cited by Building Regulations) and PD6682/1:2009 – Guidance on the use of BS EN 12620 - Aggregates for Concrete.

A certificate of compliance with the relevant BS shall be provided by the Developer.

All aggregates brought onto the site shall be kept free from harmful matter and aggregates of different sizes shall be stored in separate stacks.

Coarse aggregate for concrete shall be clean gravel or other hard stone graded 40mm to 5mm or 20mm to 5mm complying with BS EN12620: 2002 Aggregates for concrete (AMD Corrigendum 15333).

Fine aggregate for concrete shall be gravel, sand or natural sand conforming to BS EN12620: 2002 Aggregates for concrete (AMD Corrigendum 15333).

“All in” aggregate for concrete shall be a combination of fine and coarse aggregates conforming to BS EN12620: 2002 Aggregates for concrete (AMD Corrigendum 15333)

Coarse aggregate for granolithic concrete shall be crushed granite as specified in BS EN12620: 2002 Aggregates for concrete (AMD Corrigendum 15333) (maximum size 10mm).

Water

Water for making concrete or mortar shall be obtained from the public mains with the approval of the appropriate supplying authority.

Concrete strengths

Where specified for use all ready mixed concrete mixes shall comply with Concrete - Complementary British Standard to BS 8500-1:2006 - Method of specifying and guidance for the specifier.

Ready mixed concrete production plants shall operate under the “Quality Scheme for Ready Mixed Concrete” or similar quality assurance scheme. The expected characteristic compressive

strength of cubes manufactured from various BS EN206 mixes when tested at 28 days in accordance with BS 1881 can be found in BS 8500 - 1:2002.

Typical uses for concrete for ancillary purposes are defined in Table 8.

Water cement ratio

The water/cement ratio shall be as low as possible consistent with a workable concrete and shall not exceed 0.55 taking into account any free surface water in the aggregates.

Higher strength concrete

If the concrete is required for structural work which necessitates a greater cube characteristic strength than 25.0 N/mm² then the mix shall be designed in accordance with BS EN 206-1:2000.

If directed by the SMBC Officer the Developer shall carry out trial mixes with the proposed materials.

Workability of Concrete

The concrete shall be of suitable workability for full compaction to be achieved with the equipment used and without undue flow.

Admixtures other than air entraining agents

The use of plasticisers or water reducing agents or other admixtures shall not be permitted without the written consent of the SMBC Officer. If used they shall conform to BS EN 480. Accelerating admixtures and those containing calcium chloride shall not be used

Dowel bars

Dowel bars shall be grade B500B steel complying with BS EN 13877 - 3:2004 and shall be free from oil, dirt, loose rust or scale. They shall be straight, free of burrs or other irregularities and cropped cleanly with no protrusions outside the normal diameter of the bar. For expansion joints, dowel bars shall be 25mm diameter and for contraction joints the dowel bars shall be 20mm diameter for slabs up to 239mm thick. Their length shall be 600mm long @ 300mm spacing for expansion joints and 400mm long @ 300mm spacing for contraction joints.

Tie bars

Tie bars shall be Grade B500B steel or Grade B500C to BS 4449 and shall be free from oil, dirt, loose rust or scale. Tie bars needing to be cranked for subsequent straightening shall be mild steel. Tie bar dimensions shall be as stated in Clause 1012, Table 10/5, MCHW.

Steel reinforcement

Steel reinforcement shall comply with any of the following standards and be in prefabricated sheets or bars assembled on site and shall be free from oil, dirt, loose rust or scale.

- Steel fabric in flat bars BS 4483
- Hot rolled steel bars Grade B500B BS 4449
- Hot rolled steel bars Grade 460 BS 4449
- Cold worked steel bars BS 4449

When deformed bars are used they shall conform to type 2 bond classification of BS 4449.

Curing compounds

Immediately after completion of the surface treatment, the surface, exposed edges and surface slabs shall be cured by the application of an approved resin based aluminised curing compound, polythene sheeting or an approved sprayed plastic film which hardens into a peelable plastic sheet that is removed before road markings and open to traffic.

Resin based aluminised curing compound shall contain sufficient flake aluminium in finely divided dispersion to produce a complete coverage of the sprayed surface with a metallic finish. The compound shall become stable and impervious to evaporation of water from the concrete surface within 60 minutes of application and shall have an efficiency index of 90%.

The curing compound shall not react chemically with the concrete to be cured and shall not crack, peel or disintegrate within a period of three weeks after application.

Traffic Regulation Orders (TROs)

Some functions on the Highway need restrictions to ensure safety, accessibility and minimum disruption to local life.

Parking restrictions may be necessary in certain locations such as at road junctions, town centre developments or areas where commuter/school parking may be an issue. This will require a Traffic Regulation Order (TRO). Prospective property purchasers should be made aware of any potential TRO's at an early stage.

As well as parking restrictions, other TRO's may be required including:

- Speed zones/limits
- One way orders
- Weight, height and width restrictions
- Certain road humps on the public highway
- No entry

All controlled pedestrian crossings also require formal advertising before works can commence.

TRO's will be arranged by the SMBC with the associated costs met by the Developer. The Developer shall liaise with the SMBC Officer to ensure timely delivery of the orders.

TRO's involve a statutory process where the outcome is not guaranteed due to the public's right to object. It is advised that any sensitive TRO is processed before planning permission is granted to ensure that the planning permission can be delivered.

All TRO's processed will be subject to a maximum two year period from the date of formal advertising of the restrictions in which the Developer must ensure the TRO becomes operational. It is strongly advised that developers use this window to process applications before the houses are occupied. All TRO's should be shown on all drawings.

Public Rights Of Way (PROW)

The design, specification and construction required for the PROW will be determined by the rating of the route in the network hierarchy.

The Developer shall ensure that any PROW shown on the Definitive Map and Statement are given due consideration in line with the following:-

- Make provision for existing PROW which will be affected by the Development.
- Make provision for any claimed or proposed PROW.
- Apply in good time (allow 9 months, although turnaround times differ in each Local Planning Authority responsible for processing the diversion), for diversion orders under the Town and Country Planning Act 1990 for any PROW which are affected by the Development.
- The processing of these orders will incur a fee.

If the PROW is not diverted under the above process and becomes obstructed then this causes significant legal problems as the Highways Act 1980 has to be used and can potentially lead to a negative outcome. The timescale for this process is 18 months and the standard fee is applicable (reviewed every 6 months) due to the involvement of the Magistrates Court.

12. Street Lighting and Street Furniture

Street Lighting shall be designed in accordance with current British Standards and SMBCs Specification for Street Lighting and Illuminated Street Furniture

The Developer shall supply to the SMBC Officer for approval, the locations of street lighting units and all relevant lighting calculations prior to commencement of the works.

An unmetered independent electricity supply connection is required for all street lighting furniture. Normally this is provided by the Local Distribution Network Operator (DNO). However this may now be provided by an Independent Distribution Network Operator (IDNO), especially on the larger housing estates.

If an IDNO is to be used then information needs to be provided that needs to include the name of the IDNO, Contact Details, a plan showing the extent of the IDNO supply and where it is connected to the DNO supply.

Lighting shall be planned as an integral part of an estate layout. Due consideration shall be given to such matters as shared surface roads, proximity of windows, junctions onto existing roads, shared driveways, footpaths, bus stops, amenity areas, parking areas, landscaping and trees including subsequent growth.

Prospective tenants shall be made aware of the location of lighting columns. The Developer shall include the approved locations on plans used for house sale purposes and install and make them operational before house occupation commences.

It should be noted that no land that is to be used to site a lamp column is to be conveyed to adjacent homeowners before the Substantial Completion Certificate of a S38 / S278 Agreement is issued.

Existing lighting columns should not be relocated, instead new lighting columns should be installed in the new location.

Passively safe signposts, lighting columns and traffic signal poles

Passively safe signposts, lighting columns and traffic signal poles shall conform to the requirements of BS EN12767:2007 and TD89/08 (update to latest), Volume 8, Section 2, MCHW.

At locations where safety barriers are not cost effective or appropriate e.g.

- Conflict with underground utilities apparatus.
- Roundabouts where space is limited.
- Nosing or splitter islands where safety barrier end ramps may be a hazard.
- Safety barriers may be visually intrusive.
- Safety barriers difficult to install.
- Speed limits are high.
- Street furniture where location of apparatus poses an increased risk of collision then the following rules should apply to determine if passively safe supports are required:
 - The speed limit is 80kph (50mph) or above on an A or B classified road and the sign would require at least one 89mm diameter post and greater than 3.2mm wall thickness as 89mm posts of greater wall thickness are a danger.

- The sign is part of accident remedial measures that have a history of street furniture collision accidents e.g. chevron signs at bends, chevron signs at roundabouts, repeated sign knock downs.

Guidance on the requirements for passively safe posts, columns and poles can be obtained from the Safety Engineer – contact via your SMBC Officer.

Traffic signs

All signs shall be approved traffic signs and manufactured from sheet aluminium to BS EN 485 with a minimum thickness of 11 swg or 3mm and complete with 76mm appropriate fixing clips. Circular signs over 600mm in diameter and triangular signs with a base width not exceeding 600mm must be stiffened and shall be capable of passing the tests described in BS 8442:2006.

All signs shall have retro-reflective surfaces complying with the requirements of BS EN 12899 - 1:2007 and reflectivity of signs to be in accordance with SMBC policy.

As a rule of thumb waiting restriction signs are non-reflective (NR), direction signs are Class RA1 (formerly “Class 2”) and all other signs are Class RA2 (formerly “Class 1”).

Posts

Steel posts, with a minimum 76mm outside diameter, shall comply, where applicable, with the requirements of BS 4 and BS 4848 and shall be manufactured from steel complying with the requirements of BS EN 10025 - 1:2004 as detailed in BS 8442:2006 and galvanised in accordance with the requirements of BS EN ISO 1461 “Hot Dip Galvanised Coatings on fabricated Iron and Steel Articles”.

Each post shall have a base plate and cap to prevent the ingress of water in accordance with the requirements of BS 8442:2006. All clips, screws, bolts, nuts and washers that come into contact with the sign shall be of stainless steel.

All Lamp columns and posts should be discussed with the SMBC officer to confirm colour.

Street nameplates

No street nameplates shall be displayed in a new street until the street has been named by the Council in accordance with appropriate statutory powers. Street nameplates and any supplementary plates considered necessary by the Council shall be provided and erected by the Developer.

The nameplates shall satisfy the DfT Circular Roads 3/93 and shall be to the approval of the Council. Prior to any property on the development being occupied all street nameplates shall be erected.

Whilst the street is under construction, temporary signs may be used, but permanent nameplates shall be fixed in position before the street works are complete. The Developer shall obtain any

necessary agreement before a nameplate is erected on private land (outside the limits of the highway to be adopted) or attached to any private boundary of any property.

At cul-de-sac, street nameplates shall be a combination street nameplate and No Through Road sign as approved by the relevant Authority or as shown in Diagram 816.1 of the Traffic Signs regulations and General Directions 2016, or any superseding legislation.

Fixing and erection

The fixing and erection of street nameplates shall be to the satisfaction of the SMBC officer.

Road Markings

Materials for road markings shall be selected from the following:

- Screed thermoplastic
- Sprayed thermoplastic

The above shall comply with the requirement of BS 3262 for “Superimposed Road Markings”. Statutory requirements controlling road marking are contained in the TSRGD 2016 and subsequent amending regulations. All road markings shall be in accordance with Clause 1212, MCHW.

Road studs

Statutory requirements controlling reflecting road studs are contained in the TSRGD 2016 and subsequent amending regulations.

All reflecting road studs shall comply with BS EN1463 - 1 and Clause 1213, MCHW

Street furniture and ancillary items

Existing street furniture and fittings

At the discretion of the SMBC Officer, any highway furniture or equipment arising from an existing road made surplus as a result of the works shall be delivered to a place within Solihull of our choosing at the Developer’s expense.

Gates and stiles

Stiles, bridle gates and kissing gates shall comply with BS 5709:2006 and Clause 304 and 311, MCHW. Concrete for post foundations shall comply with Clause 2602, MCHW. The location of the above shall be to the approval of the SMBC Officer.

Salt bins and gradients of the road

Salt bins are to be provided for all roads that have more than 25 properties where the gradient is steeper than 5% and the distance of the proposed highway is a minimum of 50 metres.

The proposed salt bin should be positioned within land outside of the adoptable highway. Confirmation will be required that a Management Company will be responsible for its ongoing maintenance. The actual position of the salt bin should be carefully assessed before it is placed to ensure it is in the best place for the majority of people to use on a self help basis.

Where there is no option but to have the bin positioned within the proposed adoptable highway a commuted sum will be required for both the bin and for the provision of the salt.

Solihull Borough Council will restock the salt bin in preparation for the start of the winter season. Beyond this, we cannot confirm how often we will be able to refill the bins during the winter season as our resources must be prioritised to secure the precautionary network.

Should a site within the adoptable highway prove problematic because of regular misuse of salt for the treatment of private driveways, or vandalism of a bin, the Council reserves the right to remove the bin.

Each bin whether it is within private land or the adoptable highway will need to be photographed to verify its condition and location. It should also be noted who is responsible for its ongoing maintenance. This is so there is an up to date inventory of all salt bins in the Council area. A sticker is to be added to the bin to confirm that the salt is for the use on the public highway only.

Bollards

Bollards are sometimes needed to prevent vehicular access into pedestrian areas, and can be used to define space and guide vehicles. However, they can be over used because they provide an easy design solution. In such cases they clutter the streetscape and can create a hazard for pedestrians.

They should only be used where absolutely necessary and there is no alternative means, such as using other items of essential street furniture, to keep vehicles off the footway. Better enforcement and strengthening footway verges is preferable to using bollards to stop vehicles damaging the footway. Where their use can be justified they must be carefully located so as not to present an obstruction to pedestrians or a trip hazard.

Bollards other than illuminated bollards shall be manufactured from either precast concrete, a synthetic material as approved by the SMBC Officer or fabricated from metal. Concrete bollards shall comply with the manufacturer's specification and performance. Metal bollards shall be designed to withstand a vehicle impact and the finish shall be similar to that specified for lighting columns unless periodic maintenance will not be required. Specific approval of the type of bollard to be used shall be obtained from the SMBC Officer.

Bollards should be located 450mm from the kerb face. Where used to prevent vehicular access they should be at 1.5m centres, where they are used to prevent vehicles mounting the edge of the footway they should be placed at 3.0m centres.

Road restraint systems and guardrail

The design of vehicle safety barriers and pedestrian guardrails shall comply with MCHW, Volume 1 series 400, conform to the requirements of BS EN 1317 and BS 7818 respectively and be to the approval of the SMBC Officer. All steel used shall be galvanised in accordance with the requirements of BS EN ISO 1461 "Hot Dip Galvanised Coatings on fabricated Iron and Steel Articles".

Guardrailing have been used in the past for a variety of reasons including preventing pedestrians spilling out onto the carriageway, stopping pedestrians crossing at unsafe locations, and guiding pedestrians to correct crossing points at signalised junctions.

Despite their prime safety function, standard highway style galvanised pedestrian barriers look cheap and ugly, and can create severance and visual degradation. The general principle should not to use them unless there is an essential road safety requirement. They reduce the amount of

footpath available to pedestrians, divert pedestrians away from their desire line even at times of low traffic flow, reduce intervisibility between wheel chair users and motorists, create a hostile caged environment and can encourage higher vehicle speeds. People may jump over them, or walk on the carriageway side rather than the footpath because it is more convenient.

Where guarding is unavoidable, it is not acceptable to use standard unfinished galvanised metal barriers. The general principle should be to use a contemporary design using stainless steel, or a stainless steel/galvanised combination. They should not be used in historic streets.

Where provided they should be set back 450mm from the kerb face, be at least 1.1m high and be designed to allow clear sight of people behind the railing when viewed from an acute angle.

13. Structures

A structure is defined as being over, under, adjacent or on to a highway and:

- Is a bridge (other than a footbridge), culvert, or tunnel that has a span greater than 1.2 metres.
- Is a footbridge with span greater than 8 metres on a public right of way.
- Is a retaining wall, or headwall, with a retained height from finished ground level in front of the wall of over 1.5 metres within 12 feet (3.05 metres) of the highway maintainable at public expense
- Is a noise attenuation barrier exceeding 1.8 metres high (standard Dft barriers would not require Technical Approval).
- Is a high mast for lightning, lighting systems and/or television cameras.
- Is a sign/signal gantry.
- Is a canopy or building overhanging the highway.
- Is a basement beneath or adjacent to the highway.
- Is designated by the Council to be a highway structure because of its particular construction, and status.
- Is a modification or addition to an existing structure as defined above.
- Is a buried, water attenuation structure within or adjacent to the highway that has a span greater than 1.2 metres.

All proposed structures require technical approval of the drawings and specifications (Approval in Principle) before any works can commence on site.

Furthermore a Section 177 licence will be required where any structure overhangs the highway. The legal costs associated with this process are required to be met by the Developer

Protection of existing structures, walls, fences, etc.

For all works within or adjacent to the public highway the Developer shall, during the progress of the works, make arrangements for the safety, protection and stability of all structures, walls, fences, hedges, trees, land drains, sewers and apparatus, and they shall also be responsible for rectifying or repairing at their own expense, any damage to private or public property that may have been caused by their operations.

It shall be the responsibility of the Developer to satisfy themselves as to the accuracy of any information which may be made available by the Highway/Drainage Authorities and Statutory Undertakers.

14.Landscaping

Soft Landscaping

Protection of existing trees and landscaping

The Developer shall take appropriate measures to ensure that all trees, hedgerows etc. required for retention are not to be removed or damaged by the works.

Where tree surgery is required, the services of a competent tree surgeon should be used using British Standard 3998:2010 as a minimum standard.

Existing trees and associated landscape works within or adjacent to the existing highway shall be discussed with the Highway Authority at all stages of the works.

The Developer's attention is drawn to document BS5837:2012 - Trees in Relation to Design, Demolition and Construction – Recommendations and NJUG Volume 4 - Guidelines for the Planning, Installation and Maintenance of Utility Apparatus in Proximity to Trees.

Standard landscaping – grass verges

Solihull Borough Council will adopt grass verges as part of the public highway but will attract a commuted sum payment. The grass and soil in the verges should be of an approved hardy variety that is slow growing. It should be of such a slow growing variety that only two grass cuts per year are required

Enhanced Landscape – trees and shrubs

All other forms of landscaping are considered to be an “enhancement” thus will attract a commuted sum (see Appendix E). Any proposed planting within highway verges shall be in accordance with the details of the planning consent and must first be approved by the SMBC Officer.

Trees and shrubs will be considered for adoption and will only be permitted to be planted in the highway on payment of an appropriate commuted sum.

Planting in the highway will only be acceptable provided that all safety issues are satisfactorily addressed. This includes the following criteria :-

- New trees not to be planted within any visibility splays (including at junctions and bends)
- Any landscaping (planting, shrubs etc) within visibility splays should not be expected to grow more than 600mm in height above the adjacent carriageway level.
- Planting shall not obstruct access to underground services.
- Trees shall be sited clear of overhead service lines as required by the relevant Statutory Undertakers.

Provision to be made for suitable root boxes / barriers to protect services and the highway from movement and damage. Advice and information regarding the appropriate design of root barriers is provided in BS5837:2012 : Trees in relation to design, demolition and construction.

Where highway verges were previously planted with bulbs, it will be expected that the new verge will be similarly planted, unless previously agreed with the SMBC Officer.

Further information on plant species and root barriers can be obtained from the Tree Officer at SMBC or refer to the SMBC Officer.

Planting of shrubs and trees in highway verges

Topsoil shall be spread to a 300mm depth over all shrub areas. Trees shall be planted in a pit backfilled with a mixture of two parts topsoil to one part peat free compost. Tree pits shall be 1000mm square by 600mm deep with the bottom of the pit broken up for a further depth of 150mm. Planting shall be carried out between November and February.

For further information regarding the design and construction of Tree Pits with associated root protection etc. please discuss with the relevant SMBC Officer.

Shrubs shall be planted in pits of a size to accommodate the roots without restriction; the pit shall be backfilled with topsoil and peat free compost at a ratio of 4 to 1.

Before planting containerised tree stock two stakes shall be driven into the bottom of the pit until firm at 400mm apart. The finished height of the stakes shall be 400mm above ground level and a wooden cross bar attached. The tree shall be secured to the cross bar with approved ties.

For bare root standard tree nursery stock a single stake is suitable.

In all cases soil should be properly firmed into the root system of the tree or shrub and the soil finished 20mm above the surrounding ground level. After planting, a mulch of bark or composted wood chippings 75mm thick shall be applied to the planted area. Planting shall be completed as early as possible.

Topsoil

Topsoil to be used in the works shall comply with the requirements of BS 3882:2007. It shall be a fertile medium loam free from any perennial weeds, weed seeds, contamination, rubble, subsoil and stones bigger than 50mm and a maximum stone content of 20%.

Minimum topsoil layer is 150mm.

Compost

Compost shall be a planting and mulching compost (peat free), bark or composted wood chippings.

Fertilisers

Areas where fertilisers shall be applied:

- Turfing – pre-seeding fertiliser (applied at a rate of 50g/m²)
- Tree pits – slow release tree fertiliser
- Trees/hedges/shrubs/bed planting – slow release fertiliser

All fertilisers shall be applied to the manufacturer's recommendations and rates. The Developer may add any additional plant nutrients which they consider the constitution of the soil warrant.

Turfing

All highway verges and margins including areas required for visibility shall be covered with a layer of topsoil (minimum 150mm deep) rolled and turfed with cultivated weed free amenity turf. The turfs shall be laid with broken joints well butted up and rolled to regular contours.

Turfs shall be well bonded and laid diagonally on side slopes and if necessary wooden pegs shall be used for pegging turfs.

Seeding

Where approved by the SMBC Officer, the turfing of verges may be omitted and the prepared soil sown with seed. Seeding shall be carried out in accordance with BS 4428:1989 to a rate of spread to be approved by the SMBC Officer.

Grass seed

Grass seed sowing shall be carried out during March/April or September. The grass seed mix below is a general purpose mix which is suitable for most highway locations. It shall be a tested mixture from an approved source and certificates of purity and germination shall be provided. Unless otherwise agreed by the SMBC Officer, the mixture shall consist of the following:

- 50% Esquire perennial ryegrass
- 35% Samanta slender creeping red fescue
- 10% Highland browntop bent
- 5% Rivendel white clover

However, some of these varieties may be specific to certain `seed houses` and alternative mixes may be presented by the Developer. This is acceptable providing the grass species remain at the same proportions.

Minimum grass verge and planting bed sizes

Narrow grass strips between footways and carriageways and small isolated shrub beds are often neglected and over-run by vehicles. Where this occurs a form of hard paving is to be used. A minimum width of 1 metre and a minimum area of 10 square metres for grass and 1metre and 6 square metres for shrub and ground cover planting is normally acceptable

Reinforcing verges

Were it is necessary to reinforce verges to prevent erosion where vehicles are likely to be parked, including maintenance vehicles, you must use an approved system of reinforcement.

Tree planting within paved areas

Trees within hard paved areas should normally be planted within tree pits with the addition of tree grills and tree guards. For further information regarding the design and type of Tree Grills and Tree Guards please discuss with the relevant SMBC Officer. Folio Drawings showing typical details will be available during 2016.

NO DIG POLICY

Construction works adjacent to trees

Conventional road and footway construction within the Root Protection Area (RPA) of trees, employing excavation and backfilling of compactable load bearing sub base materials can seriously damage tree roots.

It is recognised that every situation is different and any details of proposed highway works within the RPA will need approval of the Solihull Metropolitan Borough Council Tree Officer – contact via SMBC Officer.

The design of such works shall be carried out in accordance with BS5837:2012 : Trees in relation to design, demolition and construction and NJUG Volume 4.

Trees and hedgerows

No trees or hedgerows are to be removed without consultation with the planning authority. Trees, hedges and stumps where so permitted shall be removed completely including the roots.

The holes resulting from grubbing up shall be filled and made good with approved material and compacted.

Removal of topsoil

All topsoil shall be removed from embankments and under paved areas. Any material suitable for re-use shall be stockpiled in a safe manner to the approval of the SMBC Officer.

Hard landscaping

Where an overrun is anticipated these areas should be adequately hard landscaped in colour/type to the approval of the SMBC Officer.

Any sight splays to driveways should be hard landscaped in the same material as the driveway.