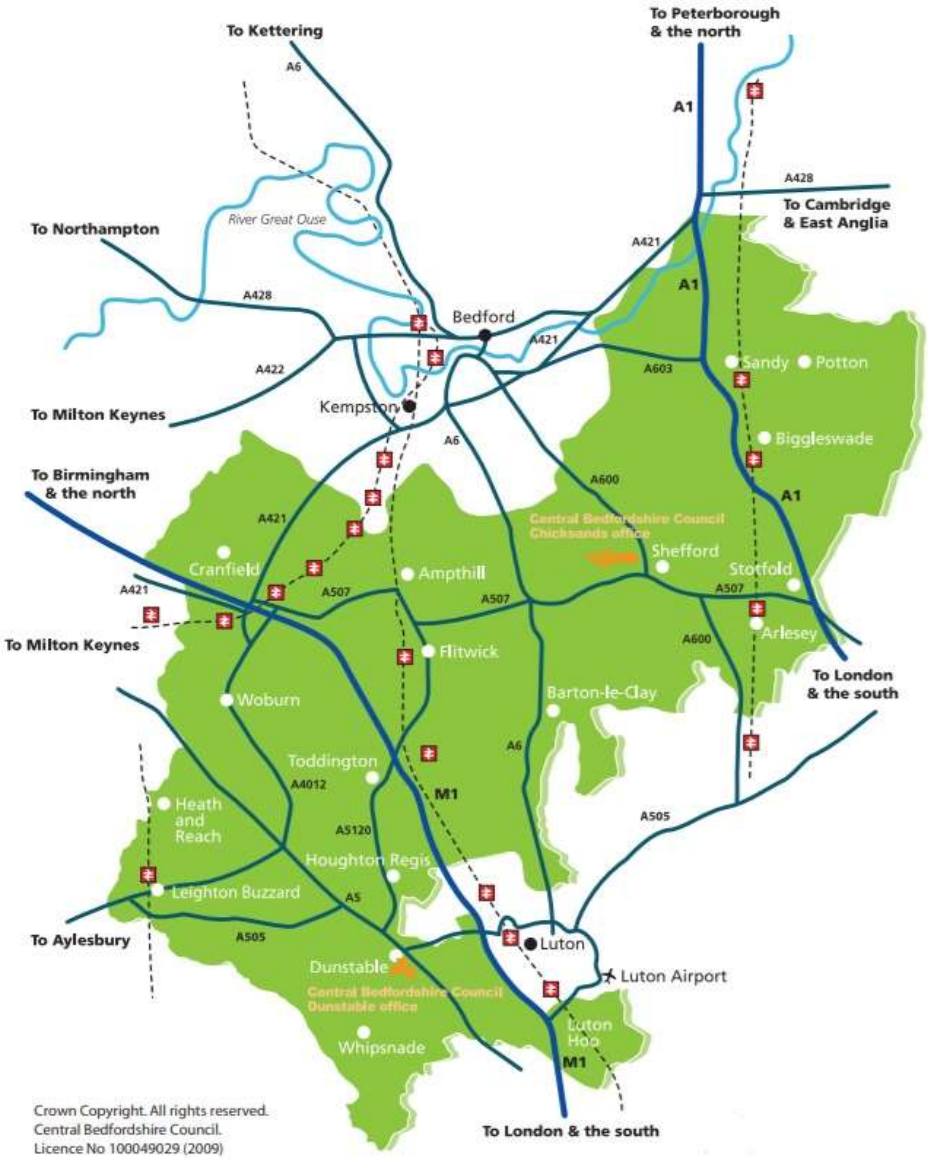
Appendix D

Central Bedfordshire

Highway Construction Standards & Specifications Guidance

Issue 8

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M1
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Heath
and
Reach
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Leighton Buzzard
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Luton
Hoo
Whipsnade
M1
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Glossary

CBC – Central Bedfordshire Council Local Authority.

HDM – Highways Development Management, Central Bedfordshire Council.

HAT – Highway Agreements Team, Central Bedfordshire Council.

LPA – Local Planning Authority.

LLFA – Lead Local Flood Authority.

S38 – Section 38 agreement of the Highways Act 1980.

S278 – Section 278 agreement of the Highways Act 1980.

Technical Audit Team – The appointed party to undertake technical audits on behalf of Central Bedfordshire Council.

Technical Audit – The process in which technical details of a submission are reviewed.

Adopted Highway - Area of land offered for Adoption by Central Bedfordshire Council to be maintained at public expense.

PROW – Public Right of Way is a right of access that will need to be considered as part of any development.

POS – Public Open Space

S104/106 – Section 104 agreement of the Water Industry Act 1991 for new networks. Section 106 of the Water Industry Act 1991 for new connections on to existing networks.

Local Water Authority – Organisation with the responsibility for water treatment, supply, sewage disposal, land drainage, river pollution and fisheries within the area of proposed development.

TAA – Technical Approval Authority for the purpose of structures approval. Central Bedfordshire Council will undertake this role.

SHW - Specification for Highway Works, Department for Transport.

DMRB – Design Manual for Roads and Bridges, Department for Transport.

SSD – Stopping Sight Distance is the unobstructed distance that a driver has available to see.

HAPAS – Highways Authority Product Approval Scheme have been created by marketing specialists in order to suggest reliable procedures in the testing of the products and systems that have been created to be used in the highway sector.

MSA – Million Standard Axles is simply one million standard axles.

UKAS – This is the Accredited body of the UK, that is accountable for the determination of the truthfulness and technical competence, of the organisations that are offering testing, calibration and certification related services.

TSRGD – The Traffic Signs Regulations and General Directions are the regulations for traffic signs that propose their design and use of roads in England, Scotland and Wales.

RSA – Road Safety Audit

TRO – Traffic Regulation Order

PSV – Polished Stone Value

STREETS – Highways defined by this document

ROADS – The wider Highway network to which Streets adjoin

1.0 Introduction

The purpose of this document is to assist applicants to formalise technical submissions under Section 38 or Section 278 of the Highway Act 1980, for approval by the Highway Agreements Team (HAT), Central Bedfordshire Council. Whilst this document will provide advice on the procedures, prospective Developers are encouraged to arrange early discussions with the HAT. Central Bedfordshire Council welcomes pre-application discussions on development proposals and the HAT will provide highway advice through the relevant Planning teams as part of any pre-application process. Based on the information provided by Developers, the HAT will provide objective advice in good faith but without prejudice to the formal consideration of any Planning Application. Any advice given will normally be confirmed in writing through the relevant Planning team.

Sections 38 and 278 of the Highways Act 1980 provide Central Bedfordshire Council, as highway authority, with the power to enter into agreements with relevant parties to allow them to make alterations and improvements to the highway and to construct new highways. Such agreements can include provision of the funding of these works by those parties and any relevant matters (such as the design and implementation of such works within the existing legislative framework) which the authority see fit.

The Guide contains details of the technical guidance, standards and processes of the Council for proposed works by Developers on existing Roads or for new highways. Legal advisors should be instructed in respect of those agreements required pursuant to Sections 38 and 278 of the Highways Act 1980 as a consequence of such proposed works.

The Guide should be adhered to where possible, but the information contained within it is not exhaustive and all schemes will be assessed on an individual basis, depending on adjacent development and/or impact on existing networks. The advice in this Guide is to cover residential and commercial developments of speed limits ≤ 30 mph (and peak hour traffic flows of <500 vehicles). For the purpose of this Guide, new highway infrastructure will be defined as Streets. The principles of providing residential streets should follow the philosophy of Manual for Streets but be supplemented by the key requirements set out in this document. Schemes that are of a higher proposed speed limit (>30mph), adjoin the existing highway network or have greater traffic flows, the guidance in the DMRB and Manual for Streets 2 should be followed.

Prior to submission of design details, Developers will be informed of any specialist requirements that need consideration by the HAT.

At the Developers earliest opportunity, a Section 38 or Section 278 application should be made online http://www.centralbedfordshire.gov.uk/transport/development-management/proposals.aspx. The HAT will inform Developers of all technical fees due to undertake the audit process.

Technical Approval will be given by CBC, as recommended by term consultants.

Technical Approval will remain valid for 12 months. Designer and Contractor will be required to enter into a standard form of warranty for all S278's and some S38's.

1.1 Planning Applications

The determination of Planning Applications will reside with the Local Planning Authority. The Highway Development Management team is a statutory consultee for the process and will comment on the appropriateness of applications. This Guide should form the basis of all related highways infrastructure, regardless of the status of Planning Application.

1.2 Section 38 Road Adoption Agreements

Central Bedfordshire Council will consider adopting new Streets as public highway maintainable at the public expense where they serve 5 or more dwellings/commercial premises.

A Developer must enter into a s38 agreement with CBC. CBC's Legal Team will issue the standard draft Agreement upon receipt of an undertaking for legal costs.

The agreement will require a bond guaranteed by a Surety equivalent o 110% of the tender value of the highway works inclusive of al drainage and utility infrastructure required for the works.

CBC will advise Developers of all fees due.

A s38 application should be made online using the link here:
Highways Development Management - Section 38 Road Adoption Agreements

1.3 Section 278 Agreements

A s278 agreement allows the carrying out of works on the existing public highway by a third party to approved standards of design and construction to mitigate the impact of development.

The agreement will require a bond guaranteed by a Surety equivalent to 110% of the tender value of the highway works inclusive of al drainage and utility infrastructure required for the works.

Warranties from the Contractor and Designer of the works will also be required. The standard level of cover is £10m.

CBC's Legal Team will issue the standard draft Agreement and warranties upon receipt of an undertaking for legal costs.

Where the proposed works also affect a trunk road or motorway, it will be necessary for the Developer to seek authority for such works from National Highways and enter into a s6 Agreement.

Works to a very minor nature may be permitted to be undertaken under CBC's S278 Minor Works Agreement. Each scheme is considered on its merit and the final decision rests with CBC.

A s278 application should be made online using the link here:
Highways Development Management - Section 278 Agreements

More information on s38 and s278 agreements can be found on CBC's website using the links above.

1.4 Departures & Relaxations from Standard

Any departures and/or relaxations should be highlighted to Highway Development Management team who will inform and consult HAT. It will not be the responsibility of Central Bedfordshire Council to seek out any departures.

Departures and relaxations from standard will not be considered for new Streets, only existing Roads where the Developer can show physical constraints.

1.5 Commuted Sums

Commuted Sums are payable by Developers for proposed features and non-standard materials that would incur a higher than usual ongoing maintenance cost. The HAT will advise the Developer of features that will attract a commuted sum on a scheme-by-scheme basis.

2.0 Highway Agreement Team Input

2.1 Technical Audit Process

The s278 and s38 process maps outlining the procedure for obtaining an agreement can be found here.

LINK

All s278 or s38 schemes will be subject to a technical review in order to discharge highway related planning conditions and to ensure compliance with the required standards.

The detailed submission for technical review must include all the relevant items listed in Appendix B and be issued to the HAT.

The technical review should be supplemented with a Road Safety Audit. CBC's Guidance can be found here:
Road Safety Audit Guidance

The detailed submission should include a stage 2 Road Safety Audit or Stage 1/2 if a Road Safety Audit was not carried out during the planning process. Road Safety Audits must be undertaken in accordance with GG119 of DMRB and the audit brief must be approved by the HAT. The Developer can commission a Road Safety Audit team of their choosing but CBC must be invited as an observer and approve Auditor's CVs. Following construction, the works will be subject to an RSA Stage 3. The Developer will again be required to have the audit brief approved by the HAT and an observer for CBC must be invited to be present at the RSA. The cost of the RSA process is the responsibility of the Developer.

No works are to commence on the existing public highway until technical approval and completion of the s278 agreement by CBC.

2.2 Site Inspections

A Site Inspector will be assigned to each scheme and the Developer will be informed of inspection costs to provide this service by the HAT.

Any s38 works commenced on site prior to CBC technically approving the design of the works will be the sole responsibility of the Developer and are built at the Developer's risk which may result in additional testing/coring and reinstatement works. Any attendance on site by CBC's Site Inspector prior to technical approval will be for the sole purpose of recording the works being undertaken and this will not be deemed as inspection or acceptance of the works by CBC.

Upon completion of the works, the scheme will need to comply with the requirements of Chapter 18.0 and the checklists here:

Maintenance Checklist

(i) Developer completes highway works as per approved technical drawings and legal agreement
(ii) Developer notifies CBC of completion
(iii) CBC will inspect scheme (civils and street lighting) and identify/notify a full set of remedial works
(iv) Developer undertake RSA Stage 3 and provide CBC with the Audit Report
(v) Developer complete and undertake remedial works (civils and street lighting) and RSA 3 recommendations to CBC satisfaction
(vi) CBC will reinspect scheme and confirm acceptance or otherwise of highway works
(vii) Developer provides CBC with copy of s104 maintenance certificate (if appropriate)
(viii) Developer provides CBC with street lighting electrical certificates
(ix) Developer provides CBC with full set of electronic as built drawings, CAD file and service drawings as constructed
(x) CBC complete Provisional Certificate and maintenance period commences
(xi) CBC instructs CBC Legal Team to reduce Bond

Adoption Checklist

(i) Upon expiration of the maintenance period CBC will inspect the scheme (civils and street lighting) and identify/notify a full set of remedial works
(ii) Developer makes good all defects, damage and remedial works to CBC satisfaction
(iii) CBC will reinspect scheme and confirm acceptance or otherwise of highway works
(iv) Developer provide CBC with all documents (where appropriate) listed in chapter 18 of HCS&SG
(v) Developer provides CBC with copy of s104 Vesting Certificate (if appropriate)
(vi) CBC complete Final Certificate adopting the highway works as highway maintainable at the public expense by CBC
(vii) CBC instructions CBC Legal Team to release Bond

3.0 Street Hierarchy

When considering new developments, the function of the Street is vitally important in providing safe and desirable routes. Based on the expected usage the correct type of Street should be chosen, as the respective layout will help to control vehicle speeds.

The following paragraphs identify the minimum requirements for Streets, defined as Shared Minor Street, Minor Streets, Access Streets, Main Streets and Collector Streets. This Guide indicates the requirements for residential and commercial developments of speed limits ≤ 30 mph (and peak hour traffic flows of <500 vehicles). Manual for Streets and the DMRB should be considered for all higher speed and higher capacity Roads.

Figure 3.1 below demonstrates the typical layout of the street hierarchy and the interaction between types of Street.

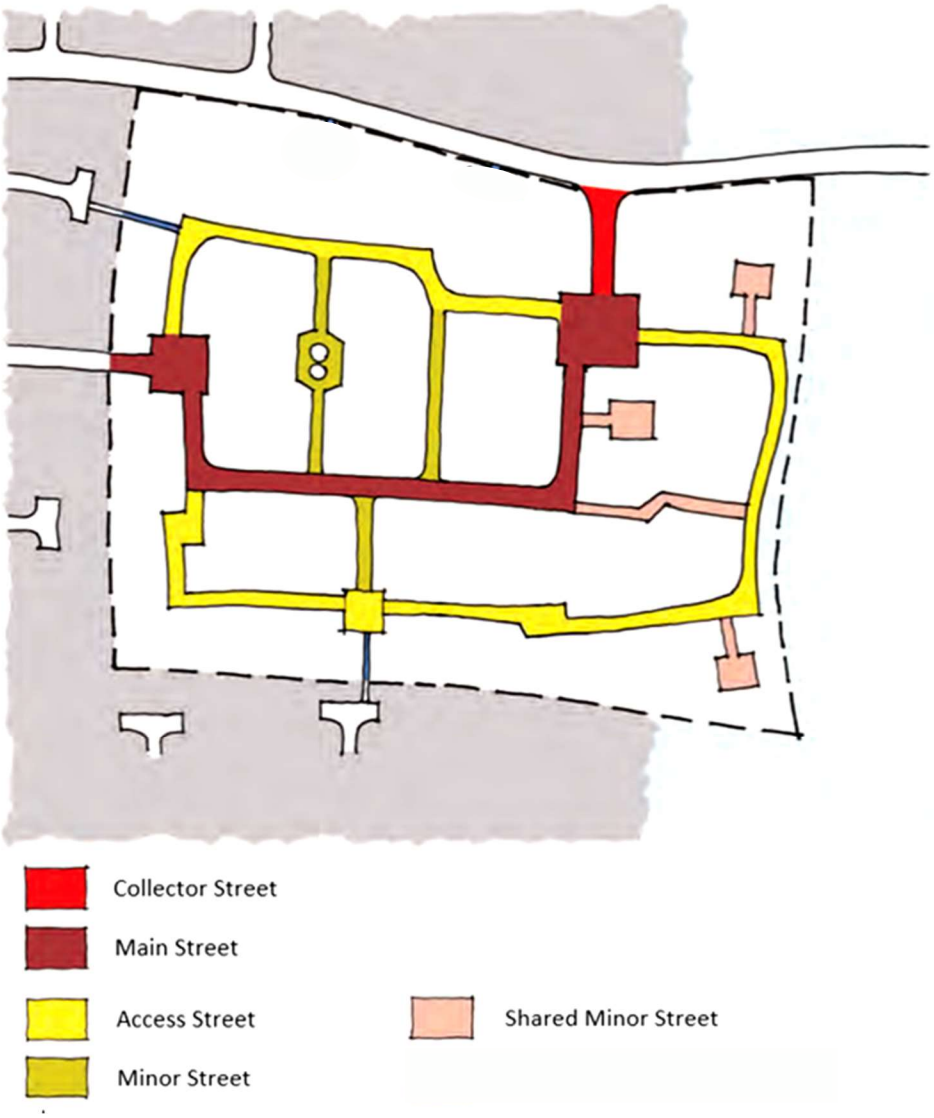


Figure 3.1 - Typical Street Network

3.1 Geometric Design of Streets

	Shared Minor Street	Minor Street	Access Street	Main Street	Collector Street
Design Speed	10-15mph	15mph	20mph	25mph	30mph
Dwellings	≤ 20	≤ 50	50-299	200-550	>400
Peak Hour Vehicle Flow	≤ 15	≤ 40	40-225	225-425	>300
Commercial Use					✓
Typical Carriageway Widths	8.8m (6.8m if development only on one side)	4.8m	5.5m	5.5 m – 6.5m (6.5m for bus routes)	6.5m – 7.3m (Industrial)
Minimum Footway Widths (See Chapter 10.0)	N/A	2m	2m	2m	2m (0.5m verge behind on embankment)
Minimum Verge Widths (if required by planning)	2m (1m where adjacent to POS)	2m (1m where adjacent to POS)	2m (1m where adjacent to POS)	2m (1m where adjacent to POS)	2.5m
Recommended Service Margin Width	N/A	2m	2m	2m	2.5m
Junction radii within Street*	N/A	6m (dropped access for <20 dwellings)	6m (dropped access for <20 dwellings)	6m (dropped access for <20 dwellings)	6/10m Residential 15m Commercial
Forward Visibility	17m	17m	25m	33m	43m
Minimum Centre Line radius	N/A	N/A	20m	30m	60m (Superelevation for bends <180m)
Maximum Link Length without Features (See Chapter 7.0)	N/A	30m	60m	75m	N/A
Typical Vehicle Tracking (See Table 6.1)	Refuse, Fire Tender	Refuse, Fire Tender	Refuse, Fire Tender	Refuse, Single Deck Bus	Refuse, Single Deck Bus, Pantechnicon TRL Design Vehicle
Junction Spacing	N/A	N/A	N/A	30m Same Side 15m Opposite	40m Same Side 20m Opposite
Access Permitted	Individual dwellings	Individual dwellings	Individual dwellings	In accordance with the design code for the development	In accordance with the design code for the development
Street Trees (See 13.1 for more info)	Tree pits and planters	Trees in verges	Trees in verges, boulevards	Trees in verges, boulevards	Trees in verges

*The type of junction onto the Road network will be assessed on a site-by-site basis.

Table 3.1 - Geometric Design of Streets

3.2 Shared Minor Street

Shared space streets will generally serve fewer than 20 dwellings. The typical width of highway corridor should be 8.8m, with no upstands/ kerbing within that width. Features, such as narrowing's, planting, defined parking, chicanes, street furniture should be introduced to maintain the design speed, the carriageway should not be less than 3.7m at any point for fire tenders' access and pedestrian routes must be considered. Designers may need to liaise with disability groups, to ensure that designs incorporate requirements for all. Shared surfaces should be block paved and contain street trees with low shrub planting as required.

Parking spaces may be used to break up vehicle movements and should be indicated by different coloured blocks. Where parking is provided within a shared space it should not immediately abut any adjacent buildings and should allow for additional width to enable drivers/passengers to exit the vehicle safely. Long lengths of perpendicular parking adjacent to a Shared Minor should be avoided as this compromises the intended place function of this street typology and results in a lack of lateral clearance and intervisibility with other road users. Similarly, careful consideration is required to ensure adequate intervisibility on Shared Minor Streets at locations such as intersections with shared private accesses, intersections with other Shared Minor Streets, and through bends. There should be no separate footways, but the designer must consider safe routes for pedestrians and bollards can be used to create pedestrian-only spaces in front of dwellings if required.

It would be expected that these Streets would form part of 20mph Zones with signed gateways to identify this. Commencement of a shared surface street will need to consider a change in carriageway level to create the shared environment, details of how this should be achieved are included in Appendix E.

3.3 Minor Street

A Minor Street will generally serve fewer than 50 dwellings and should take access from an Access Street. These routes can either be a through route or a cul-de-sac, where a cul-de-sac is proposed to serve more than 25 houses or will be longer than 100m, consideration should be given to provide a secondary means of access for emergency vehicles. In some cases, it may also be desirable to provide a secondary access from adjacent Streets. Direct vehicular or pedestrian access to dwellings should be provided.

3.4 Access Street

An Access Street will generally serve 50-299 dwellings. Direct vehicular and pedestrian access to dwellings should be provided. Usually links Main Streets and Minor Streets. This type of Street normally has two points of all-purpose access. Non-essential through traffic is discouraged but only when more desirable alternative through routes exist. In some cases, a bus route could be accommodated subject to the width being 6.5m wide.

3.5 Main Street

A Main Street will generally serve between 200-550 dwellings. The typical peak hour vehicle flow will be less than 500 vehicles and may accommodate a bus route. Direct vehicular access to dwellings may be provided. Any development exceeding 300 dwellings will require a secondary all-purpose access.

3.6 Collector Street

A Collector Street which collects traffic within a residential estate or commercial area. A typical formal highway serving greater than 400 dwellings by means of a loop street or inter-connected street pattern served by at least two points of access to the wider Road network. Alternatively, this type of Street will provide access to commercial areas where it must cater for the expected vehicle usage. Any development exceeding 300 dwellings will require a secondary all-purpose access.

4.0 Geometric Requirements

The paragraphs below indicate the minimum requirements for residential Streets offered for adoption (under s38) and minor works on the existing highways network covered by s278 agreements that comply to the Street type indicated in Chapter 3.0.

4.1 Section 38 Works

Residential streets should be based on Manual for Streets[2] principles and self-enforcing design speeds. The minimum requirements are identified below.

General Principles	Requirements
Horizontal Design	Follow the minimum requirements of the Street hierarchy and vehicle tracking. See Paragraph 6.1 which provides guidance on refuse collection requirements. The creation of 'false' junctions will not be permitted; junctions should not be used to change the direction of any category of Street.
Carriageway Width	Follow the minimum requirements of the Street hierarchy. Where driveway access is required, a minimum width of 6.0m should be available. This width is inclusive of vehicular crossovers (if present). Vehicle manoeuvring is not permitted over the opposite footway. Widening on bends must be considered following vehicle swept path analysis, see Paragraph 4.3.
Longitudinal Gradient	Maximum 1:20 unless site constraints preclude this then HAT will consider 1:12 for Minor Streets and 1:17 for Access Streets Minimum 1:100 (1:80 for block paving) At junctions, the minor arm should not exceed 1:25 for the first 15m
Carriageway Crossfall	1:40, applied to crowned or superelevation. Constant superelevation will be permitted for all alignments of Minor Street, Access Street & Main Street. Superelevation will be required at narrow junctions to allow smooth tie-in of levels and remove forced low spots in narrow accesses. Superelevation of bends will be required for Collector Streets. Maximum 1:30 superelevation.
Vertical Curvature	Maximum 900m radius. Minimum 200m radius. Where possible, the minimum length of curve should be 25m.
Forward (SSD)/Junction Visibility	See Chapter 5.0 for visibility requirements.
Vertical Features	Where ramps are required to provide shared space, the change in carriageway level should be no more than 75mm on bus routes and ramp gradients no steeper than 1:15. Ramps should be formed from bituminous construction or speed check kerbs with block paving infill.
Supporting Earthworks	Embankments supporting the highway will need to be included in the proposed adoption where the gradient is greater than 1:3. Private areas beyond the limit of adoption should not be greater than 1:10.
Private Drives	The gradient of any driveway should be no steeper than 1:10 for the first 6m into the site and be drained in accordance with Chapter 8.0 of this document.
Turning heads	Turning heads shall be determined by the swept path analysis. Typical layout of turning head should conform to Paragraph 4.4.
Footways	See Chapter 10.0 for footway requirements

[2] Manual for Streets 2007 – Department for Transportation

Table 4.1 – Geometric Design Guidance

The design of commercial estate roads should be developed as Collector Streets, tracking requirements should be in accordance with the DMRB.

Consideration must be given to the internal servicing/manoeuvring arrangements of any unadopted facility as any queuing vehicles must be able to stand clear of the adoptable/adopted highway.

4.2 Section 278 Works

The requirement for highway improvements under a Section 278 agreement will be assessed on a scheme-by-scheme basis. This Guide should be used for proposals that are to have a speed limit of ≤ 30 mph or adjoin an existing carriageway of the same speed limit.

4.3 Widening on Bends

Widening on bends will be required to accommodate vehicle swept paths, with the widening normally applied to the inside of the bend. Vehicle tracking to demonstrate no conflict between refuse vehicles and other expected users.

Widening shall only be applied to Collector Streets of 6.5m wide and Main Streets. Other Streets will not require widening unless desired vehicle tracking in one direction is unachievable, vehicles on these Streets will be permitted to cross the centre line. Minimum widening indicated below.

Centre Line Radius (m)	30	40	50	60	70	80
Amount of Widening (m)	0.45	0.35	0.25	0.2	0.15	0.1

Table 4.2 - Widening on Bends

4.4 Turning Heads

Turning heads should be provided wherever vehicles would otherwise have to reverse more than 15m. The layout of turning areas should be designed to allow for vehicles defined by the Street hierarchy and as a minimum should cater for refuse vehicles. All vehicles should be able to turn around in three manoeuvres and provide an area that will be easily maintained by a mechanical sweeper. To be effective and usable, the turning head must be kept clear of parked vehicles. Therefore, it is essential that adequate parking is provided for residents in suitable locations.

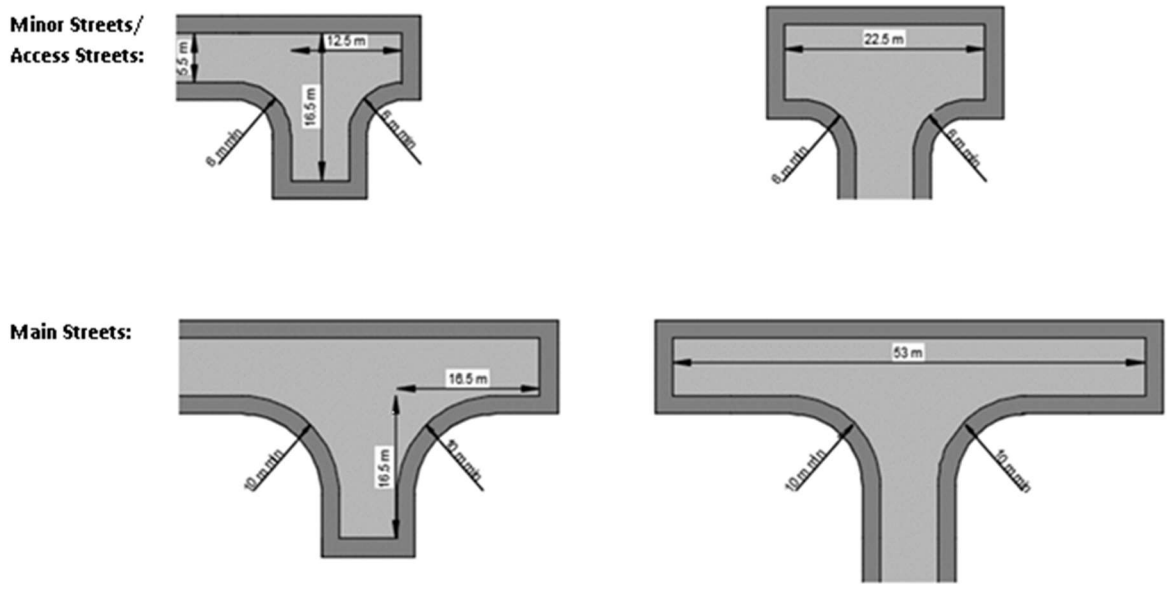


Figure 4.1 - Typical Turning Heads

4.5 Junctions

Junctions play a part in defining the street scene and help control vehicle speeds. For the purpose of this Chapter the major road is defined as the through road, where the minor road connects to it (see figure 5.1).

Movement patterns of larger vehicles at junctions can have a dramatic effect on the nature of the space. They are the hardest to incorporate into a layout when trying to influence drivers to keep speeds low. Wide swept paths create traffic dominated areas since there is a tendency for cars to follow these curves easily with a greater freedom of movement and little speed restraint.

All junctions with the existing highway network (Roads) will require a minimum of 6.0m radii to ensure that refuse vehicles can turn into the Streets without conflicting with vehicles turning out.

For all Streets, an entering refuse vehicle will be permitted to overrun the minor road centre line due to the low frequency of large vehicles entering and expected low vehicle speed.

Junctions should not be used to alter the alignment of spine roads through development. The dominant flow of vehicles should be accommodated, and Streets designed to conform to the standard set out in Chapter 3.0.

Care should be taken when designing junctions onto the existing highway network. In the majority of cases the vertical alignment of the existing Road should not be altered by the inclusion of a simple junction.

New junctions should not be located at low spots along the major road where standing water may occur. The minor road must fall away from the major road in these instances. Where the longitudinal gradient of an existing Road is slacker than 1:100 on the major road, the minor road should fall away.

The first 15m of all minor roads should have a maximum gradient of 1:25 to allow for safe operation of the junction.

It will be permitted and preferred for all residential Streets to be superelevated at junctions to match the longitudinal gradient of the major road.

Mini roundabouts can be used as junction types but must be appropriately sized for the required vehicle movements. Over run strips will not be permitted.

4.6 Continuous Crossing

Continuous footway crossings are a facility at priority junctions, which are suitable where the design speed of the side road is 20mph or less. These crossing facilities extend the footway across the junction, at footway level. They are ideal for reinforcing pedestrian/ cycling priority at junctions, where traffic entering and leaving the junction is required to give way to pedestrians/cyclists. Where a continuous footway crossing is to be proposed, the hourly pedestrian peak flow should not be less than 120 and the hourly vehicle peak flow should be no more than 80 with <5 HGV's per day. Dispensation may be granted in order to provide a consistent crossing type along selected Street.

Good visibility into the junction is essential. The paving material of the continuous footway needs to contrast with the carriageway surfacing and where appropriate the adjacent footway surfacing material should be applied across the junction to reinforce the footway continuity. A kerb is required across the junction bell mouth to delineate the edge of carriageway of the major road. It is essential that this is a bullnose type kerb with a typical upstand of 25mm to provide a tapping edge for visually impaired users. The minor road should approach the footway with a ramp to bring the carriageway up to the level of the footway. Radius kerbs should not be used to delineate the side road. Following the above requirements will avoid the requirement for tactile paving.

4.7 Private Access

Private accesses will be deemed to be single points of entry on to the highway network serving no more than 5 dwellings. Any more than 5 dwellings will have to be to adoptable standard regardless if it remains private.

Single dwellings vehicular access to be no less than 3.5m wide. Shared vehicle access (2-5 dwellings) to be no less than 4.8m wide.

This type of access must be provided with appropriate visibility to footway crossovers. Object height defined as 0.6m above ground and drivers eye height as 1.05m, See Figure 4.2 below. The width of the highway must be a minimum of 6m opposite an access to allow for vehicle manoeuvres.

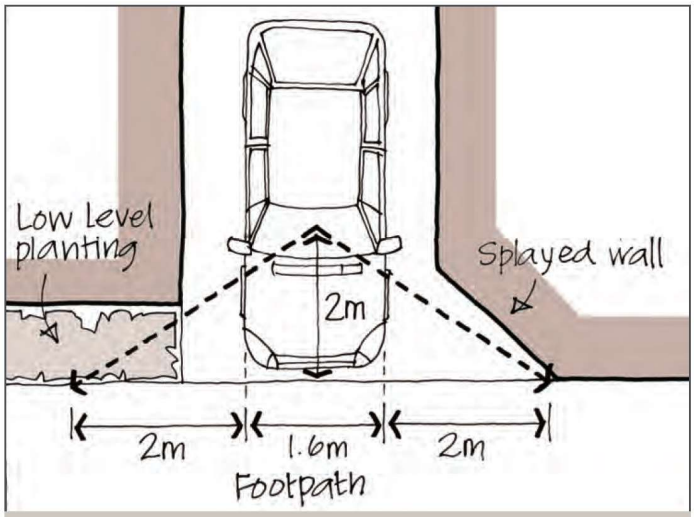


Figure 4.2 – Private Access – Minimum Visibility Requirements

The make-up of private accesses should be formed with bound material or paved, for the first 5m, measured into the site from the highway/site boundary, to ensure that loose materials do not spill on to the highway. Additionally, when the access grades towards the public highway, positive drainage should be provided to prevent the run-off of water onto the highway.

Any commercial/industrial units and private drives will be designed in such a way as to allow for vehicles to turn around within the curtilage of the private property.

Any gates for private dwellings must not open onto the adopted highway and be set back from the highway boundary far enough to accommodate the largest expected vehicle.

For a private access onto a carriageway, visibility requirements of the main carriageway must be satisfied. Where on-street parking is perceived to be an issue, H-bar marking may be used to discourage parking in front of private accesses.

4.8 Vehicular Parking

The assessment for parking provision in association with development will be made at the Planning stage. Developers will be required to demonstrate there is adequate provision of space within the site, for parking, manoeuvring, loading and unloading to fulfil the operational requirements of the proposed development. The act of delivering or manoeuvring should not obstruct the public highway or the public right of way. The provision of convenient and easy to use car parking facilities will be a significant factor in discouraging indiscriminate parking on pedestrian routes.

This guidance only refers to scenarios with parking on the adopted highway and not spaces allocated to properties. Allocated parking must remain in the ownership and control of private dwellings.

The following are standard space requirements of typical vehicles. These dimensions refer to the space only and do not take account of access, manoeuvring space or space required for loading/unloading. It should be expected that parallel parking spaces will need to be extended by a minimum of 1m.

Vehicle	Cars	Vans	Rigid Vehicles	Articulated Vehicles	Coaches (60 Seats)
Space Requirements	2.5m x 5.0m	3.0m x 9.0m	3.5m x 12.0m	3.5m x 17.0m	3.5m x 13.0m

Table 4.3 – Vehicle Space Requirements

Parking other than parallel will not be permitted on Collector Streets. Perpendicular parking or echelon parking can be employed on lower order Streets, but vehicle speed, visibility and layout must be considered.

Parking bays adjacent to solid structures should be widened by 1m to allow for improved manoeuvrability and entry/exit of people to/from the vehicle.

Landscaping should be given consideration as in some circumstances this can reduce the available parking bay size, obscure visibility and manoeuvrability into/out of parking spaces. Walking routes for passenger access must be considered, for example soft landscaping adjacent to parallel parking will not be permitted. Areas of hard standing should be detailed in accordance with the footway specification. A width of 1m will be accepted if the area is only used by a single parked vehicle.

Traffic Regulation Orders may be required to encourage the use of defined parking, these will be requested at the direction of the HAT and processed by CBC.

4.9 Motorcycle and Cycle Parking

Parking provision for motorcycles will be assessed on demand. Where provided or required the location of motorcycle bays within a development should take account of the requirements of users and recognise that they are vulnerable in tight or enclosed space.

Motorcycle theft is also a problem that concerns most riders. The provision of carefully planned, secure parking facilities which provide for natural surveillance can help to reduce this concern. Additional security can be afforded through the provision of security bollards.

The size of any on-street parking for motorcycles will follow the minimum dimension of neighbouring vehicular parking. Individual spaces are not to be marked. The minimum space required per parked motorcycle is 2.5m x 1.4m.

For the provision of cycle parking, please refer to the Central Bedfordshire Council's Cycling Strategy.

4.10 Disabled Parking

Parking bays for people with disabilities should be designed so that drivers and passengers, either of whom may have a disability, can easily and safely enter/exit a vehicle. Bays should be longer and wider than the preferred bay size to allow for improved access and protection from other vehicles.

Bays are to be marked in accordance with TSRGD 2016 – Chapter 5 and Diagram 1028.4. Dimensions to be as below:

- Parallel to Carriageway: 3.6m x 7.0m
- Bay Parking: 6.0m x 3.6m

The extent of full height kerbing around these facilities should be considered. Where facilities are provided with a footway route behind, suitable access arrangements for users should be made.

4.11 Adoptable Verges

All features proposed in adoptable verges should be identified on the submitted drawings. It would normally be expected that the verges are laid to grass, in accordance with Paragraph 13.2. No private infrastructure should be located within adopted verges, such as fencing, threshold steps, boundary walls, private drainage or planting (unless agreed with CBC via a planting licence). Limits of adoptable verges should be delineated in accordance with Paragraph 10.5.

5.0 Visibility Requirements

Visibility must be checked at junctions and along any Street, in both horizontal and vertical planes. Areas required for visibility must be included for adoption, with the limit of this area delineated in accordance with Paragraph 10.5. Where visibility is required across small areas of verge <2m2, these areas should be hard landscaped.

5.1 Visibility at Junctions

Junction visibility is required to ensure inter visibility between road users on the major and minor roads as defined by Chapter 4.5. Figure 5.1 and Paragraph 5.1.1 identify the measurement of visibility at junctions.

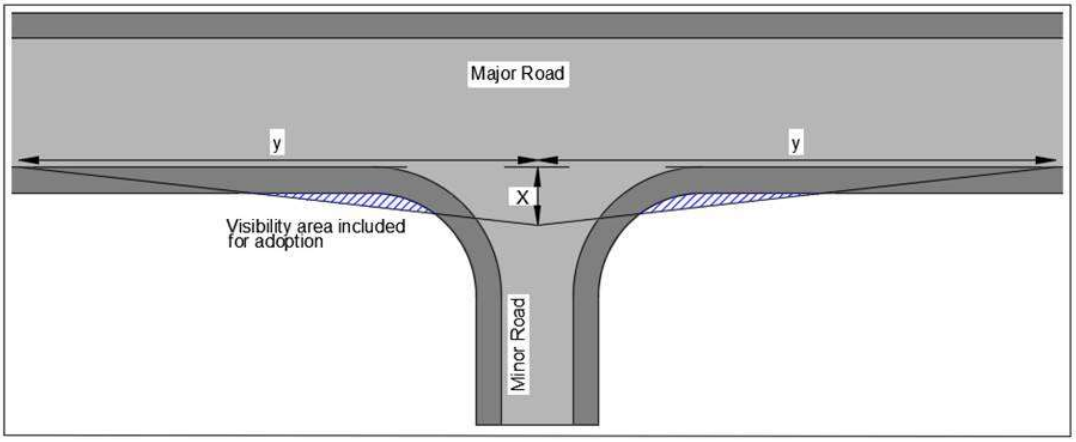


Figure 5.1 - Junction Visibility

5.1.1 Horizontal Visibility

The 'x' distance is measured along the centre of the minor road with the 'y' distance measured along the channel of the major road.

The Minimum 'x' distance is 2.4m, however this should be increased to 4.5m where traffic flows are more than 500 vehicles in the peak hour on the major road. For any agricultural access onto the network the 'x' distance should be 3.5m.

The 'y' distance will be dependent upon the design speed of the major road.

STREETS Section 38	
Vehicle Speed (mph)	**Forward Visibility/Y Distance (m)**
10	11
15	17
20	25
25	33
30	43

ROADS Section 278	
Vehicle Speed (mph)	**Forward Visibility/Y Distance (m)**
30	70
40	120
50	160
60	215
70	295

Table 5.1- Visibility Requirements at Junctions

Visibility will be assessed on an individual site basis. Submission of vehicle speed survey data in accordance with CA 185 DMRB following agreement of tube locations to determine the 85th percentile speed should be provided by the Developer to support any request to reduce the required visibility.

5.1.2 Vertical Visibility

The envelope of visibility is to be checked in the vertical plane. There should be no obstructions to drivers' visibility between a height of between 1.05m – 2m at vehicle to 0.6m – 2m at the limit of the required appropriate visibility.

Any landscaping in these areas should comply with Chapter 13.0.

5.1.3 Visibility Along Streets

The required SSD visibility should be considered with reference to Table 5.1 for the design speed. This distance is to be measured 1.5m off the nearside channel, as indicated in Figure 5.2. Envelopes of visibility should be free from obstruction; this is inclusive of parking laybys. However, the placement of street furniture and occasional trees (appropriate species and size) may be permitted.

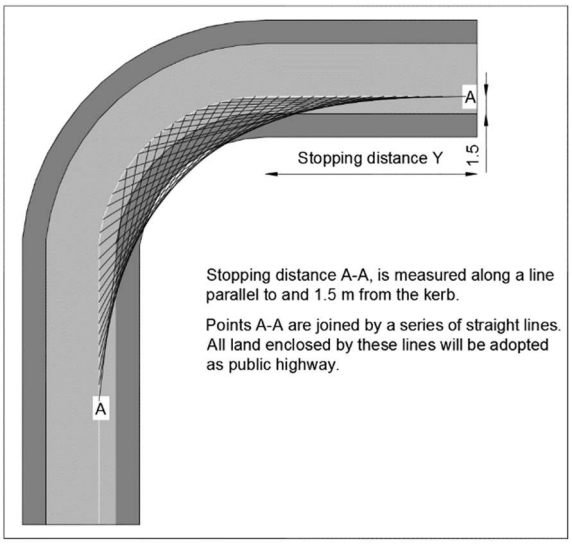


Figure 5.2 - Measurement of SSD

6.0 Additional Street Geometric Requirements

This Chapter outlines other geometric requirements that must be considered. The alignment and width of Streets is dictated in previous Chapters and by the vehicles that will use them, this Chapter highlights important criteria to follow for this purpose.

6.1 Requirements for Waste Management

Relevant Central Bedfordshire Council advice is contained within 'Managing Waste in New Developments' Supplementary Planning Document, Bedfordshire and Luton Waste Local Plan 2005. April 2006. Key aspects that will affect the adopted highway are as follows:

- Wherever possible the vehicle movement network should be designed to avoid the need to reverse, however a Refuse Collection Vehicle should not be expected to reverse a distance more than 15m.
- Waste collection vehicles do not enter private developments and therefore refuse collection points need to be provided at the site frontage outside of the public highway and any visibility splays. Facilities should be located as close as practicably possible to a waiting refuse vehicle. Where these are required, locations of such should be identified for reference.
- Drop-kerbs should be provided adjacent to the dedicated storage areas for containers. The pulling area should be free from permanent obstructions and have a suitable surface. Additionally, the gradient of the area must be considered as bins will not be collected where the gradient is deemed excessive and/or unsafe.

Dimensions of refuse collection vehicles currently utilised on current CBC contracts are as follows:

Overall Length	11.50 m
Overall Width	2.53 m
Overall Body Height	3.76 m
Min Body Ground Clearance	0.31 m
Track Width	2.53 m
Lock to Lock Time	4.00 s
Kerb to Kerb Turning Radius	11.55 m

Table 6.1 - Refuse Vehicle Dimensions

This vehicle must be used to check vehicle swept paths for all Street alignments and should allow for a 150mm offset to kerblines as a margin of safety.

CBC environmental services should be contacted regarding waste collection on private roads, should a suitable bin collection location on the public highway not be identified.

Standard street cleansing and grounds maintenance obligations (sweeping, litter removal, dog/litter bin installation and emptying, grass cutting, shrub maintenance etc) will remain the responsibility of the developer until adoption of the road. CBC will require details of maintenance

and green space prior to adoption to determine the necessary provisions required upon adoption. Additionally, Central Bedfordshire Council will only mechanically sweep adopted kerbed roads.

6.2 Emergency Access

Turning facilities such as a hammerhead or turning circle should be provided for any dead end. The maximum reversing length should be 15m. A fire tender should be able to gain access to within 45m of all parts of the ground floor of a dwelling from public highway.

The Developer is to consult with the local Fire Service to confirm the vehicle size for that particular area of development. Evidence of vehicle swept path, using the required vehicle, is required with any submission if this is more onerous than vehicle already tracked.

7.0 Traffic Management

New developments should be designed in such a way to ensure speed adherence is self-enforcing. The alignment, placement of junctions, SSD and roadside features all attribute to controlling vehicle speeds.

Where the alignment of a Street differs from the parameters set out in Table 3.1, traffic calming may be required to control vehicle speeds.

The layout of all Streets will influence vehicle speeds, which in turn will change the design speed along a Street. The table below shows the principle guidelines of how certain features alter design speed.

Feature	Assumed Design Speed (mph)
Centreline radius of 10m	10
Centreline radius of 15m	15
Centreline radius of 20m	20
Centreline radius of 25m	22
Centreline radius of 30m	25
Vertical Deflection	15
Horizontal Deflection	20
Narrowing to Single Lane	20
Mini roundabout	20
Narrowing to Reduce Width	30

Table 7.1 - Typical Anticipated Vehicle Speeds Related to Layout Features

Where required, the placement of features should adhere to the following requirements.

Collector Street	80-120m spacing*
Main Street	60-90m spacing**
Access Street	50-70m spacing**
Minor Street	N/A

*Where it is deemed appropriate to encourage lower speed.
** 50m spacing in 20mph zones.

Table 7.2 - Traffic Calming Spacing

All features must be considered during design development, rather than retro fitting.

Where traffic calming is proposed on Roads outside the proposed developments there are several solutions that can be employed, see Paragraph 7.1.

Consultation regarding traffic calming will be required with all statutory consultees & local residents to ensure proposals do not adversely affect their function/operation. Consultation will be undertaken by CBC at the Developers cost.

Appropriate warning signage and street lighting will be required where any traffic calming is provided. Street lighting will be required to illuminate chicanes, tight radii bends, islands and raised junctions.

7.1 Traffic Calming Design

Vehicle speeds can be reduced by a number of design features without causing discomfort and inconvenience to cyclists, drivers or their passengers. Where traffic calming is required horizontal features must be considered ahead of vertical features as these have less impact on busses and public service vehicles.

Solutions should be provided in accordance with DfT Local Transport Note 01/07 Traffic Calming guidance and Manual for Streets 2.

In order to minimise inconvenience to users, every effort should be made to maintain a minimum number/type of speed restrictions. It is essential therefore that HAT is consulted at an early stage in the design process to agree suitable traffic calming measures.

7.2 Acceptable Traffic Calming Design Features

The following paragraphs details specific requirements for certain calming features.

7.2.1 Road Humps

The provision of road humps should be provided in accordance with Traffic Advisory Leaflets 9/98 Sinusoidal, “H” and “S” Humps, 4/94 Speed Cushions and 2/96 75mm High Road Humps. See standard detail in Appendix E

Round or flat top humps should be a maximum of 75mm to avoid the chance of vehicle grounding.

7.2.2 Junction Plateau and Tables

Raised table should have a maximum height of 75mm and the ramp gradient should be 1:15.

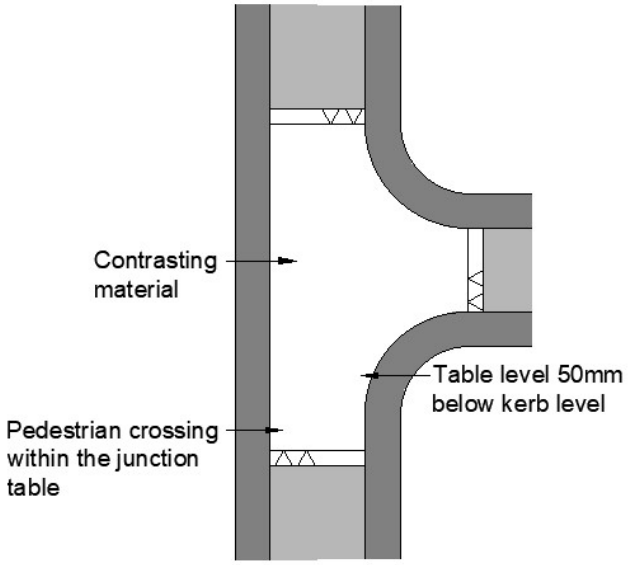


Figure Error! No text of specified style in document.**..1 - Typical Junction Plateau/Table**

7.2.3 Carriageway Chicanes

Chicanes offer an at grade solution that will controlled vehicle speeds. SSD must be considered when locating street furniture or trees. Routes should be autotracked with the appropriate vehicle to enure that there is no overrun of kerbs or centrelines.

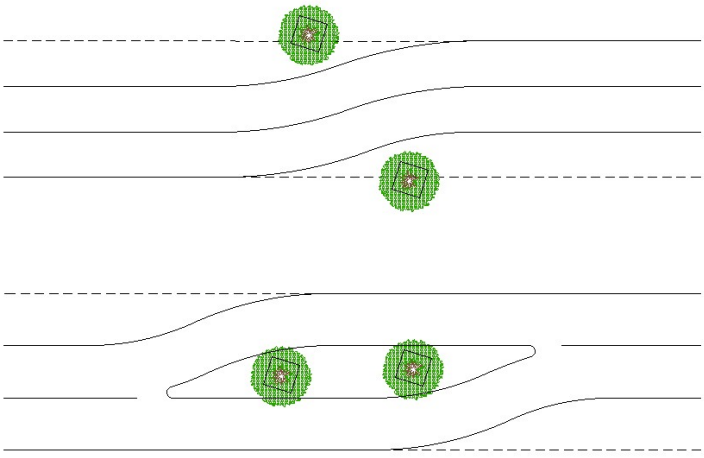


Figure Error! No text of specified style in document.**..2 - Typical Carriageway Chicane Layouts**

7.3 20mph Zones

20 mph zones are preferred in residential areas and should be subject to number of Streets to create the zone. DfT Local Transport Note 01/07 and DfT Circular 01/16should be consulted when setting out a 20mph zone.

Gateway signage to TSRGD diagram 674 should be used to mark the entrance to a zone. In a development where speeds are kept low, through good design, it will not always be necessary to

impose traffic calming measures. Where it is expected or recorded that the 85% percentile speed is >24mph traffic calming would be required Traffic calming features should be spaced at 50-70m to help control vehicle speeds. Traffic calming features should not be an afterthought but should form part of an integrated layout.

Consultation regarding 20mph zones will be required with all statutory consultees & local residents to ensure proposals do not adversely affect their function/operation. Consultation will be undertaken by CBC at the Developers cost.

Where a 20mph zone is implemented, warning signs of traffic calming measures are not required. All other signage within zone shall be reflectorised but there is no requirement for them to be illuminated

7.4 Pedestrian Crossings

The following matters shall be considered;

- Where the design speed exceeds 20 mph and high vehicle flows are predicted, it may be necessary to consider some forms of controlled crossing such as Zebra, Parallel Pedestrian and Cycle, Puffin or Toucan, to provide safe routes for pedestrians and cyclists. However, for design speeds of 20 mph or less, informal crossings are generally likely to suffice unless the Street is subject to high vehicular flows. Appropriate type of crossing to be design in accordance with LTN 2/95 and TSM Chapter 6. Additional advice on the design of signal-controlled features can be found in Appendix D.
- Crossings shall be positioned to follow pedestrian and cyclist desire lines, where the crossing width does not exceed 11m. Where this occurs, a refuge island should be considered, or inset crossings provided.
- Crossings shall be planned and designed consistent with recommended practices as described by 'The Design of Pedestrian Crossing Local Transport Note 2/95' and TSM Chapter 6. This is particularly important to ensure items of traffic signal equipment integrate elements such as audible beeps and rotating cones to respond to the needs of disabled users.
- For cycle crossings the guidance of LTN 1/20 should be followed
- For tactile paving guidance refer to the latest version of the DfT Guidance on the use of Tactile Surfaces. All tactile paving shall be contained by an edging kerb, laid flush. Extent of dropper kerbs must match the width of tactile paving.
- Where a refuge in the middle of the carriageway is required, this shall be provided in accordance with the following minimum standard:
    - 2.0m – width for pedestrian only use
    - 2.5m – width if used by cyclists
- Zebra Crossings, where used, should use lit Belisha Beacons with halo enhanced globes.
- Staggered islands can be protected with back-to-back kerbs rather than pedestrian guard rails.

Consultation regarding pedestrian crossings will be required with all statutory consultees & local residents to ensure proposals do not adversely affect their function/operation. Consultation will be undertaken by CBC at the Developers cost.

8.0 Drainage

A positive drainage system should be provided for all Streets to be offered for adoption. Historically, normal practice has been to provide highway gullies that discharge into a piped public sewer, subject to the relevant Section 104 or 106 Agreement under the Water Industry Act 1991. Whist this approach remains valid, Central Bedfordshire Council has an obligation and desire to embrace Sustainable Urban Drainage Systems (SuDS), and Developers will be required to demonstrate that SuDS principles have been considered when developing their adoptable highway surface water drainage strategy. Should connectivity to a public sewer system not be possible, a dedicated Local Authority adoptable highway surface water drainage system will be considered by Central Bedfordshire Council as part of the technical audit process.

Applicants must engage with the relevant Local Planning Authority (LPA), Lead Local Flood Authority (LLFA) and other interested parties at the outset of the design process to discuss highway surface water drainage collection, conveyance and discharge proposals. This will usually be at the concept development stage.

8.1 Adoptable Drainage Features

Central Bedfordshire Council will adopt a diverse range of dedicated highway drainage collection, conveyance and attenuation solutions, as well as traditional pipe and gully arrangements. The Council's Highways Service is willing to adopt SuDS that:

- Are within the adoptable highway boundary footprint;
- Can be adopted as part of a s278 or s38 agreement;
- Receive highway run off only;
- Comply with standards specified by Central Bedfordshire Council;
- Have been consulted upon with the Highways Service from the outline application or master planning stage to the final agreement of full planning permission and reserved matters;
- Have fully considered all technical and safety implications.

The following table sets out what Central Bedfordshire Council will consider adopting (dedicated highway drainage systems):

Will adopt subject to agreement of design / conformity with best practice	**Willing to adopt** subject to detailed pre application discussions
• Filter strips/drains • Swales and under-drained swales • Infiltration trenches • Soakaways • Below ground pipes	• Permeable paving • Bio-retention swales • Street SuDS planters & kerb extension planters • Tree pits/rain gardens • Infiltration basins • Attenuation basins & ponds • Underground / crate storage Permeable paving

Figure 8.1 – Adoptable Highway Drainage Options

The Council's Highways Service will require the following to be demonstrated:

- The SuDS drain the highway only and can be reasonably incorporated into the highway;
- The SuDS proposed are robust, well designed and of a good standard that the Council has approved;
- The SuDS proposed are designed for simple maintenance;
- The SuDS proposed are easy to access and allow for inspection and maintenance activities;
- The SuDS proposed meet the requirement of that SuDS type (i.e. site specific retention, conveyancing times required etc. as calculated by the design engineers);
- The SuDS will remain safe to remain open to the public during up to and including the 1 in 100 year storm event. Calculations must include an allowance for urban creep where required and climate change.
- SuDS proposed for adoption are free of statutory services and ducting (as this can interfere with their operation and could also cause issue if the service companies need to dig them out and do not replace like for like).
- The appropriate level of water treatment is provided.
- The development served by the Street is acceptable in all other highways and transportation respects.
- The SuDS are constructed as designed and perform as intended.
- The Council as the adopting authority has had opportunity to approve and inspect drainage design (and therefore we would not include any retrospective adoption).
- The drainage scheme for the development as a whole is acceptable in terms of surface water management.
- Inclusion of SuDS in the highway should improve the streetscape and enhance local character of developments, especially in historic and rural settings.

Developers should utilise design guidance in 'The CIRIA SuDS Manual (C753)' when developing their dedicated adoptable highway drainage solution designs for technical approval.

8.2 Overview of the Adoption Process

Once adoption has been agreed in principle and the SuDS have been inspected and signed off by CBC as being built in accordance with approved drawings, they will be adopted on the expiry of an agreed period (i.e. 1 year) provided that the developer has satisfactorily maintained the SuDS during that period. The maintenance period can be extended if agreed to by both parties. The Developer will be required to rectify any defects identified during that period or as identified at final completion. Adoption will not normally occur until the development is complete.

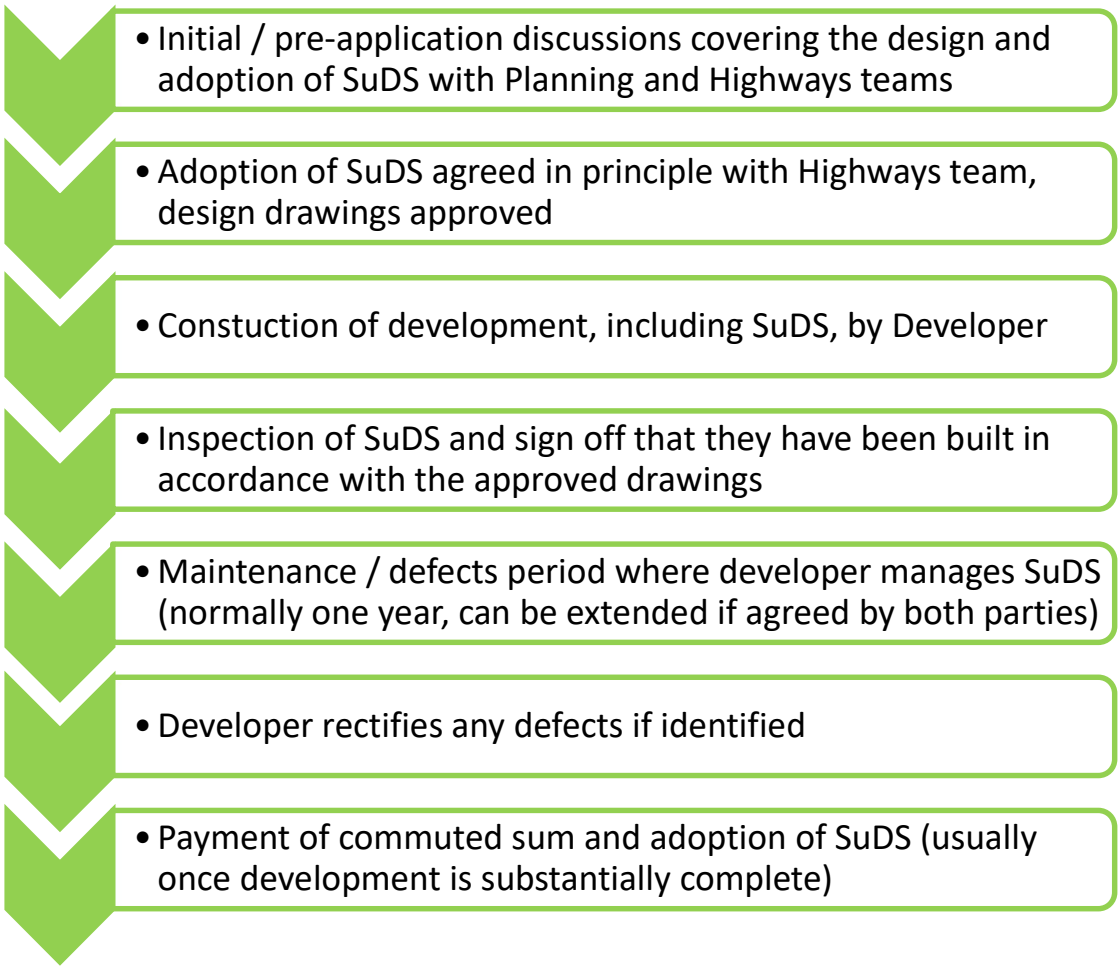


Figure 8.2 – Overview of the Adoption Process

Central Bedfordshire Council will decline to adopt any highway under a Section 38 agreement until the Local Water Authority has confirmed the adoption of all sewers within the highway. This also includes any other sewers not within the adoptable highway, but which carry water from it.

8.3 Commuted Sums and Maintenance Costs

ADEPT (The Association of Directors of Environment, Economy, Planning and Transport from Local Authorities) has produced guidance on commuted sums that summarises standard and best practice. The ADEPT document ‘‘Commuted Sums for Maintaining Infrastructure Assets” considers the use of commuted sums appropriate for “Unusual drainage systems including on-line storage, hydro breaks, pumping stations, open watercourses, sustainable drainage systems (SuDS), permeable paving, swales and soakaways”.

Commuted sums secured for SuDS assets shall include all costs that are likely to be incurred over the life of the asset under consideration. It is likely that an amount will have to be negotiated with the developer for non-standard assets (i.e. those requiring maintenance in excess of the standard requirement in order to keep the highway in a safe and functional state).

Where a Developer is proposing dedicated highway drainage SuDS, discussions must be had with all relevant parties at an early stage (before a planning application is submitted) to agree responsibility for these.

8.4 Drainage Design

It is recognised that storm and foul networks will be approved by the Local Water Authority, however the items below should be adhered to as Central Bedfordshire Council stipulations.

8.4.1 Hydraulic Design

Where a dedicated highway surface water drainage system is offered to Central Bedfordshire Council for adoption, a detailed drainage design submission based on the Modified rational method, Volume 4 of the Wallingford Procedure will be required for review. The Developer will be required to supply calculations and simulation outputs generated via industry recognised computer drainage design software (e.g. Microdrainage) to support the technical auditing process.

Hydraulic design criteria shall comply with the following requirements:

- Application of climate change allowances within the design, based on Environment Agency best practice or where present, at values indicated within associated Planning Conditions/Planning approved drainage strategy;
- FEH13 rainfall theory shall be used;
- The design will demonstrate that no part of the highway drainage system will surcharge in line with 2 and 5 year return period hydraulic design parameters set out in the latest version of 'Sewers for Adoption';
- The design will demonstrate that no part of the highway drainage system will flood in a 30 year return period design storm*;
- All surfaces and catchments within the adoptable highway footprint shall be assumed to have 100% impermeability, unless otherwise agreed in writing by Central Bedfordshire Council;
- A minimum flow velocity of 1m per second is required within adoptable gravity highway surface water sewer pipework to promote self-cleansing;

The drainage design should consider all the areas of the adoptable highway footprint being offered for adoption and any contributory factors at tie-ins to the existing highway network.

*Note flooding requirements vary for ponds (100-year return period design storm + climate change) and infiltration drainage solutions (see Appendix I).

8.4.2 Water Quality Management

Central Bedfordshire Council has a responsibility to ensure that any surface water runoff emanating from adoptable highway footprints complies with obligations under water quality legislation. Traditional adoptable highway pipe and gully drainage systems offer limited opportunities to manage pollution and sediment control, hence the requirement for Developers to demonstrate consideration of SuDS components within their adoptable highway drainage designs. Surface water quality improvements can be obtained through the use of SuDS that provide settlement or biological breakdown of pollutants, and SuDS that reduce flows entering sewer systems can reduce downstream overflow facility operation and occurrences, reducing sewerage and siltation discharge into waterbodies.

Developers must also comply with any water quality demands or feature requirements (such as oil/vortex separators) emanating from the discharge consenting process (see 8.4.4).

8.4.3 Flooding Protection

The Developer is required to demonstrate that any flooding emanating from highway surface water drainage collection, conveyance and attenuation solutions in a 100-year return period storm event (+ climate change allowance) is contained within the development and adoptable highway footprint boundaries and does not encroach on third party private land (unless as part of an agreed, dedicated highway drainage flooding containment strategy). Suitable drain-down measures must be designed where highway flood water accumulates or is temporary stored, and exceedance flow paths identified and illustrated (via plan) as part of the technical audit drainage submission.

8.4.4 Discharge Consents and Outfalls

Developers are required to obtain permission to discharge highway surface water via agreement from the relevant authority, at no cost to Central Bedfordshire Council, and confirmation of such will be required to support technical audit process.

An adoptable highway drain must discharge to a positive outfall which can be one of the following:

- Infiltration to ground (dedicated highway sewers only) – See Appendix I;
- A suitable river or other watercourse, subject to approval from the Environmental Agency or local Internal Drainage Board. Copies of the written consent to discharge (including conditions) must be provided prior to the completion of the Section 38 Agreement;
- A public sewer, subject to approval from the Water Authority. Confirmation must be provided prior to completion of the Section 38 Agreement.

Where the highway drain discharges into a watercourse, outfall design (such as the decision for inclusion of a non-return valve) and hydraulic calculations shall take into account the possibility that the watercourse may be flooded. Developers should also note that a localised topographical survey of the receiving watercourse may also be a requirement of the approving body as part of the discharging consent application, as well as confirmation of riparian owner approval (where necessary).

In exceptional circumstances, where all other means of outfall are be shown to be unfeasible, Central Bedfordshire Council may grant permission to discharge to an existing highway drainage network owned and maintained by the Local Authority. Developers must be aware that there is no automatic right to connect to existing highway drainage networks. Permission to connect may be given providing there is sufficient capacity within the system and there are no downstream outfall problems or restrictions. A charge may be levied for connection to the highway drain. Developers will be required to prove the existing highway drainage network capacity and condition before approval for the connection is given. This will include the commissioning of a drainage survey (including CCTV) of the existing highway drainage network to the extents required by Central Bedfordshire Council, and the completion of any improvement works found to be necessary, all at the Developers expense.

8.4.5 Land Drainage

Where there is or is likely to be surface water run-off from landscaped areas, open spaces and land adjoining the adoptable highway boundary, you must make appropriate arrangements for land drainage. This can include providing intercepting drains and ditches, with satisfactory outfalls

agreed in accordance with Paragraph 8.4.4. Roadside ditches may be necessary in some locations, particularly where roads are located in greenways to connect existing systems severed by development or new systems in areas of open land. Roadside ditches, and pipes under accesses will remain the responsibility of the adjoining landowner or the authority responsible for the ditch. Unless subject to culverting policy and bylaws, such features will not be the responsibility of the Central Bedfordshire Council.

8.4.6 Sub-surface Drainage

You must construct a system of sub-soil drainage below the adoptable highway footprint, discharging to a suitable agreed outfall all to Central Bedfordshire Council's satisfaction where:

- The winter height of the water table is within 600mm of formation level; or
- The sub-soil is unstable because of being waterlogged; or
- There is a likelihood of water running from or out of adjacent ground; or
- Springs, land drains or watercourses are present; or
- The finished carriageway is below existing ground level, regardless of the water table; or
- The sub-grade is likely to be altered due to groundwater

Any requirement to install sub-soil drainage should be provided in accordance with DfT Manual of Contract Documents for Highway Works, Highway Construction Details F series. Developers must consult the LLFA should high groundwater be identified during pre-planning site investigations, given such scenarios may require specific flood risk assessment to be completed as part of the Planning process.

8.4.7 Infiltration Drainage

Where dedicated adoptable highway soakaways are to be considered (including permeable infiltration pavement, infiltration basin and infiltration trench solutions), it will be at the discretion and approval of CBC. Such features are subject to detailed technical checks by Central Bedfordshire Council and it is essential that Developers understand minimum technical submission requirements. Further advice is provided within the supplementary guidance note in Appendix I. The Developer is to note:

- Technical Assessment of adoptable infiltration features is subject to a separate fee and not included with Local Authority S278 and S38 assessment and inspection fees. Fee value is dependent on the type, size and number of adoptable infiltration features proposed to drain the S278 or S38 footprint.
- All adoptable infiltration features are subject to commuted sum payments, at a value dependant on type, size, and assessment of anticipated future maintenance liabilities.

8.4.8 Collection Systems

Central Bedfordshire Council will adopt a wide range of surface water collection systems, in line with their ambition and obligations to incorporate SuDS within their adoptable highway drainage asset portfolio. Whilst the use of gullies is acceptable, Developers should demonstrate that alternative highway surface water collection methods are not feasible, in the interests of maximising the many water quality, ecological and visual benefits less traditional collection features offer.

Collection systems should be designed in line with guidance provided within CIRIA C753F 'The SuDS Manual' 2015, and relevant manufacturer instructions. Developers will be required to provide detailed collection system design information as part of their technical audit submission, which should include catchment plans and any sizing and/or spacing calculations. Please note that commuted sums may apply (see section 8.3).

Collection systems Central Bedfordshire Council are willing to adopt include:

- Tree pits;
- Permeable paving (infiltration and storage solutions);
- Swales (over the edge and side inlet contribution);
- French/filter drains (including those with infiltration properties);
- Gullies (and associated surface water channels where present);
- Slot/linear drains (typically limited to lightly trafficked areas of public open space);
- Kerb drainage (in exceptional circumstances only).
- Rain gardens

Developers should note that the selection of permeable paving and surface water channel products is likely to require adherence to local materials pallets, and guidance should be sought via Planning when developing hard landscaping proposals in line with relevant Planning obligations.

Should gullies be utilised to drain surface water from the adoptable highway footprint, the following design parameters will apply:

- The area draining to each road gully should not exceed 180 square metres;
- The spacing of gullies should not exceed 50m along each channel;
- A pair of gullies are required at all low points along a road channel and have independent connections;
- The minimum size for a gully connection is 150mm and should be constructed using clayware CE marked pipe with a minimum crushing strength of 45kN/m;
- The maximum length of a gully connection shall not be more than 25m;
- All gullies shall be 1050mm min deep, 450mm diameter and be trapped. It will not normally be acceptable to connect one gully connection directly into another;
- Where the Street is superelevated, gullies shall be sited 5m before the point where the adverse camber is removed to prevent water in the upstream channel flowing across the carriageway;
- In areas of shared space pedestrian friendly/heel guard grating should be used;
- Gullies shall be positioned away from areas of regular vehicle overrun, including driveways;
- Gullies will be required immediately upstream of block paviours, pedestrian crossing points and junctions but shall never be located within crossing point.

8.4.9 Ironwork

- All ironwork located with the proposed adopted highway that requires raising sections shall be undertaken using pre-cast concrete sections, of appropriate size for the frame or engineering brick work. Proprietary shimming pieces in the same materials should be used to achieve carriageway gradients.

- Chamber covers should be sized in accordance with Local Water Authority requirement but all should be D400 150mm deep double triangular covers for normal conditions. In locations where HGV usage is expected to be high, the loading class should be increase to E600.
- All road gully gratings are to be D400 captive hinged 150mm deep in all locations.
- All ironwork in areas of block paving is to be suitably deep enough to all for bedding of the frame and no reduction in paver thickness
- Gully gratings should not be located where they would interfere with a pedestrian crossing location
- Iron work in general should be located outside of expected motorcycle wheel track desire lines.

8.4.10 Kerb Drainage Units

Kerb drainage units (KDU) will only be permitted in exceptional circumstances. Where the use of KDUs is approved by the HAT the units are to conform to E600 loading when in close proximity to live traffic lanes. It may be requested that the use of KDUs is complimented by the use of gully pots.

8.4.11 Adoptable Flow Control Chambers

Flow chambers constructed to control surface water discharge to existing drainage networks or watercourses should ideally be situated outside of the highway when offered for adoption. Large chambers (>3.0m diameter) will not be permitted within the carriageway without consideration of all maintenance activities and safeguarding the movement of members of the public during any works, including the replacement of a chamber cover slab. All chamber cover slabs should be kitemarked, where chamber cover slabs are bespoke, a structural design will need submission for review. See Chapter 14.0 for further details on the information required for review.

8.4.12 Private Drainage

Drainage of private areas shall be considered as part of the technical submission. Run off from private driveways and courtyards is to be intercepted by linear channels and discharge into the private network. In a similar fashion, the drainage design should ensure that no surface water runoff from proposed adoptable highway enters areas in private ownership

Private Culverts/Structures will not be permitted within areas offered for adoption.

8.4.13 General Design Requirements

- Highway drainage should be sited within the adopted highway or an existing public highway. It would be preferable for all highway drainage to be located beneath footways or highway verges;
- Only in exceptional circumstances where no other viable alternatives are present will it be permitted to offer a highway drain across private land. In such circumstances an easement will be required, 3m each side. The completion of a Section 38 agreement will be dependent on completion of this easement;
- All pipe work, covers, gratings, chambers, cover slabs and raising sections are to be kitemarked
- Chamber covers located in the highway should have a slip resistance equivalent to 65PSRV;
- Where surface water channels are proposed in areas of shared space, the geometry of such conveyance features (both horizontally and vertically) should be designed in order to maximise

surface water interception. Channels shall match the width of the gully frame as close as practicable;

- The use of combined kerb drainage units (KDU) will not be permitted unless it can be demonstrated that all other options have been considered & dismissed for technical reasons.
- The minimum diameter of a carrier drain is 225mm;
- The maximum spacing between inspection chamber shall be 90m, catchpits will not be permitted in the carriageway. Where catchpits are proposed there are to be constructed in accordance with Highway Construction Details, DMRB, with the inclusion of a 600mm sump.
- Future maintenance and access to chambers must be considered, chamber must not straddle centrelines/lanelines/kerblines or middle of junction in order to minimise disruption and where possible be outside wheel tracks.
- Chamber cover slabs should be situated below the bituminous pavement layers
- Any 'special' cover slabs required for flow control chambers will require structural assessment in accordance with Chapter 14.0 of this document.
- The minimum cover to carrier drain is 1.2m without protection, pipes with cover between 0.9m and 1.2m will be permitted but concrete protection will be required. 150mm thick ST4 concrete bed and surround will be required for all pipes with less than 1.2m cover.
- Backfill to trenches under carriageway to be Type 1 sub base material.
- In locations where new drainage pipes are installed in areas of existing carriageway, the existing pavement must be fully reconstructed where drainage pipes are closer than 1.5m to one another.
- Where pipes are proposed that are larger than 900mm or have cover of less than 900mm under the highway protection may be required. Design should be submitted in accordance with BS 9295.

8.5 Testing and Post Construction Requirements

All highway drainage must comply with the following requirements;

- Drain run shall be air tested, air shall be pumped in by suitable means until a stable pressure of 100mm head of water is indicated in a U-tube connected to the system. The air pressure shall not fall to less than 75mm head of water during a period of 5 minutes without further pumping, after an initial period to allow stabilisation. Drains with traps shall be tested to 50mm head of water and the permissible loss shall then be no more than 13mm head of water in 5 minutes without further pumping after the initial stabilising period. If pipes fail this testing a water test can be performed.
- The test pressure for highway drains shall not be less than 1.2m head of water above the pipe soffit or ground water level, whichever is the higher, at the highest point and not greater than 6m head at the lowest point of the run. Steeply graded drains shall be tested in stages in cases where the maximum head, as stated above, would be exceeded if the whole run were tested in one length.
- The drain shall be filled with water and a minimum period of 2 hours shall be allowed for absorption, after which water shall be added from a measuring vessel at intervals of 5 minutes and the quantity required to maintain the original water level noted. The length of drain shall be accepted if the quantity of water added over a 30-minute period is less than 0.5 litre per linear metre of nominal diameter.

- Notwithstanding the satisfactory completion of the above test, if there is any discernible leakage of water from any pipe or joint, the pipe shall be replaced and/or the joint remade, as appropriate, and the test repeated until leakage is stopped.
- Drains shall be tested and cleaned, including the cleansing of gullies, on completion of the Works, and at other times at the direction of the Central Bedfordshire Council.
- Jetting and a CCTV survey of the system with the exception of gully connections shall be carried out on completion of the Works and again before the end of the maintenance period. A copy of the video and survey reports including gradient profile shall be supplied, free of charge, to the Central Bedfordshire Council.
- The drainage system, including gullies, shall also be cleaned at the end of the maintenance period prior to the inspection for adoption.

9.0 Pavement

The surface finishes shown in the Technical Submission should reflect those which are shown on the Approved Planning Layout unless written consent to vary or change the surface finishes has been secured.

The Chapter below indicate the minimum requirements for carriageway construction for adoption by Central Bedfordshire Council.

9.1 Section 38 Pavement

Table 9.1 identifies the minimum requirements pavement construction on Section 38 schemes. Where traffic volumes are expected to be greater than 2 MSA, pavement design shall be in accordance with HD26 DMRB.

Layer	Material	Thickness
Surface Course	HRA 35/14 surf 40/60* PEN des with 20mm pre coated chippings to Clause 911 SHW. or HRA 55/10 C surf 40/60* PEN to Clause 911 SHW. or AC 10 close surf 70/100 PEN to Clause 912 SHW**	45mm thick
Binder Course	AC 20 dense bin 40/60 PEN to Clause 929 SHW**	60mm thick
Base	AC 32 dense base 40/60 PEN to Clause 929 SHW**	125mm thick
Sub Base	Type 1 granular material to Clause 803 SHW	225mm min thick (See CBR Table 9.4)

*PEN values of the bituminous material can be reviewed with the Site Inspector if low temperatures are expected during laying operations.
**Warm Mix Asphalt (WMA) can be applied to materials, in accordance with producer's instructions and SHW Clause 908

Table 9.1 - Minimum Bituminous Carriageway Construction for Section 38 Schemes

Table 9.2 identifies the minimum requirements block paved pavement construction on Section 38 schemes. Where traffic volumes are expected to be greater than 2 MSA, pavement design shall be in accordance with BS 7533. Block paving in areas of expected traffic volumes greater than 8 MSA will not be permitted.

Layer	Material	Thickness
Block Paving	Concrete paviour to BS 7533 colour to be agreed at Planning (based on samples provided by the applicant), laid herringbone or 90deg to direction of travel, bounded with a single stretcher course. Minimum cut block to be no smaller the 1/3 the units size. In shared spaces, a contrasting 4-block wide drainage channel is required to align with gully positions. All paving to receive sand stabiliser and surface sealant, product and method to be agreed with the Site Inspector	80mm thick
Binder Course	Category II sand to BS 7533-3	30mm thick
Base	AC 32 dense base 40/60 PEN to Clause 929 SHW**	125mm thick
Sub Base	Type 1 granular material to Clause 803 SHW	225mm min thick (See CBR Table 9.4)

**Warm Mix Asphalt (WMA) can be applied to materials, in accordance with producer's instructions and SHW Clause 908

Table 9.2 - Minimum Block Paved Carriageway Construction/Shared Space

In locations where channelised running is expected, MSA traffic volumes should be increased by three and the pavement design undertaken to accommodate.

The existing Road must be subject to the pavement design of the development. Core samples are required to be taken to establish the make-up and condition of the existing Road that is to be used as part of any developmental access. Should this be found to be sub-standard remedial works may be required.

9.2 Section 278 Pavement

All Section 278 schemes will be subject to a pavement design in accordance with the DMRB to ensure that the minimum pavement thickness in table 9.1 is appropriate. In locations where channelised running is expected, MSA traffic volumes should be increased by three and the pavement design undertaken to accommodate this

Surfacing materials will be in accordance with table 9.3:

Layer	Material
Surface Course	HRA 35/14 surf 40/60* PEN des with 20mm pre coated chippings to Clause 911 SHW.

*PEN values of the bituminous material can be reviewed with the Site Inspector if low temperatures are expected during laying operations.

Table 9.3 - Surface Course Options for Section 278 Schemes

9.3 Surface Course PSV

The PSV of surface course aggregate shall comply with CD236 DMRB, it will be permitted for the investigatory level to be the lowest for each respective site description. In locations where the advice states a requirement for high friction surfacing (HFS), its use should be discussed with the HAT. Any locations where HFS is approved, this material should be cold applied and comply with Clause 924 SHW.

9.4 Laying Bituminous Materials

All bituminous materials are to be laid in accordance with BS 594987. Special attention should be made to the requirement for bond coat between all bound layers and sealing of vertical faces including kerbs and ironwork in accordance with Clause 920 SHW.

Any defective work will be treated in the same way as Chapter 11.0 for minimum reinstatement.

Where junctions are proposed onto the existing Road network it will be expected that the existing carriageway will be resurfaced, full width, for a minimum distance of 7.5m beyond the tangent point of the proposed access.

The limit of surfacing shall be indicated on a construction plan and be in accordance with the minimum surface course reinstatement (refer to Table 11.1) following the installation of utility apparatus associated with the development. Any defects within the existing pavement to allow for the laying of surface course will have to be rectified at the direction of the site inspector and at the cost of the developer. It may be requested for areas of deflective pavement to receive a binder course reinstatement with geogrid reinforcement.

The minimum step in bituminous layers is 300mm for transverse joints and 300mm for longitudinal joints. It may be requested for longitudinal joints to receive geogrid to reduce the effects of any reflective cracking. Adequate planning of the existing carriageway should be undertaken to accommodate a machine laid width of binder course as well as machine laid surface course. Joints for surface course will only be permitted along the channel, laneline or centreline.

Where it is intended to run temporarily on binder course for a period of greater than 6 months the layer thickness will be increased by 20mm to protect this layer during construction. Layer to be planed off prior to surfacing operations and inspected in accordance with Chapter 16.0.

Where required the use of ST4 concrete will be permitted as a substitute for base, in narrow widening, for widths up to 1.0m. In areas of narrow widening, it will also be requested that a reinforcement geotextile is installed to the underside of binder course in order to reduce any reflective cracking.

9.5 Pavement Formation

Site testing as described in Paragraph 9.6 is to be carried out to establish the existing bearing pressure of the pavement formation. Where results do not meet the requisite CBR value of greater than 15% a capping material or increased sub-base in accordance with the 'IAN 73/06 will need to be specified.

CBR	Capping Option		Sub-base Only Option
	Capping Thickness	Sub-base Thickness	Sub-base Thickness
15%	150mm	150mm	225mm
10%	170mm	180mm	250mm
8%	190mm	200mm	270mm
5%	210mm	240mm	330mm
4%	230mm	270mm	360mm
3%	240mm	320mm	420mm
2.5%	250mm	350mm	450mm
<2.5%	Detailed design required. Site Inspector approval should be sought		

Table 9.4 - Capping Requirement Table

Where clay subgrade is encountered the Site Inspector should be notified as soon as possible. Additional testing may be required to confirm the plasticity of the subgrade prior to confirming required formation thickness

All materials within 450mm of the surface must be non-frost susceptible

9.6 Pavement Site Testing & Inspection

All schemes will require testing, undertaken in accordance with BS 594987 by a UKAS accredited laboratory, approved by CBC, with the results issued to the site inspector and the HAT;

Following any carriageway planning the Site Inspector is required to attend site to confirm whether further planning and carriageway works are required. The Developer will be liable to rectify any underlying issues with the existing carriageway that may result in early failure.

10.0 Footways/Cycleways & Kerbing

The layout and design of footways should aim to provide safe, reasonably direct, secure and visually attractive routes for pedestrians. Connectivity, with existing network and any PROWs must be considered. This may mean continuation of footways/cycleways beyond the limits of the development as well as adjoin to adjacent developments. Wherever possible a development should be designed so that pedestrian and cycle facilities are more convenient than vehicular alternatives. Where there is the requirements to improve or alter PROWs Appendix K includes guidance on standards and materials to be used.

Whenever footways interconnect with carriageways at pedestrian crossing points, dropped crossing kerbs should be installed to assist wheelchair users and those with prams or pushchairs.

Footways should be designed to take account of;

- The type and function of adjacent carriageways.
- The location of apparatus for statutory and other services.
- The number of pedestrian movements.
- In the vicinity of schools, shops or other community buildings there may be a need for variations in design compared to those adjacent to dwellings.
- Bollards may be required to prevent use of any footway by vehicles or motorcycle.

Where footways have been proposed the paragraphs below indicates the minimum standards. Designers should refer to LTN 1/20 for specific advice on the design of cycle infrastructure as there is a requirement to provide compliant routes for all Collector and Main Streets. It is suggested that early engagement with the Planning department is undertaken to fully understand and agree the limits to where this standard should apply.

10.1 Geometric Design

The general geometric requirements for both footways adjacent to the carriageway and independent routes are listed below:

Footway Width	Minimum 2.0m May vary to take account of pedestrian volumes.
Shared Footway/Cycleway	<300 cyclists per hour: 3.0m >300 cyclists per hour: 4.5m
Segregated Footway/Cycleway	In accordance with LTN 1/20
Longitudinal Gradient*	Will normally match the carriageway gradient but should adhere to: Maximum 1:20 Minimum 1:125
Crossfall	1:40 1:12 at crossing points. Where numerous driveways cross the footway, over a distance >7.5m, footway crossfall of 1:40 shall be maintained.
Service Margin Width	Minimum 2.0m wide. Consideration of street furniture required

*The design for the construction of new footways/footpaths should aim for a general maximum longitudinal gradient of 5% (1 in 20) or an absolute maximum gradient of 8% (1 in 12). In these circumstances special provisions might be required dependent on the circumstances e.g. handrails, landing areas, anti-slip surfacing etc.

Table 10.1 - Footway Geometric Layout

LTN1/20 is a national cycling guidance document that allows designers to incorporate cycling infrastructure into highways schemes. LTN 1/20 guidance should be used where the highways Street type is a Collector or Main Street.

The main core design principles of LTN 1/20, to achieve more people travelling by cycle or on foot are as follows:

- Networks and routes to be Coherent
- Networks and routes to be Direct
- Networks and route to be Safe
- Networks and route to be Comfortable
- Networks and route to be Attractive

Where cyclists are proposed to be running along Collector Streets, priority junctions should be designed in which cycleway routes are set-back by at least a car length (5m) from the channel. On Main Streets, the cycleway route does not need to be set-back the same distance from the channel, but vehicle/cycle conflict should be considered. In both scenarios the minor road should be raised to form a table in conjunction with tighter radii to further improve the NMU crossing facility

For further guidance advise on design cycling infrastructure, refer to LTN 1/20 guidance document.

10.2 Construction Details

The table below identifies the minimum requirements for bituminous footways and vehicular overruns.

	Surface Course*	Binder Course	Sub-base
Standard Footway	AC 6 dense surf 100/150 PEN to Clause 909 SHW 25mm thick	AC 20 dense bin 100/150 PEN to Clause 906 SHW 60mm thick	Type 1 granular material to Clause 803 SHW 200mm thick
Strengthened Footway (Vehicle crossover by 2 or more properties)	AC 6 dense surf 100/150 PEN to Clause 909 SHW 25mm thick	AC 20 dense bin 100/150 PEN to Clause 906 SHW 80mm thick	Type 1 granular material to Clause 803 SHW 200mm thick
Strengthened Footway (Vehicle crossover by 4 or more properties)	The areas are to be constructed as carriageway, minimum 450mm thick, however surface course to match the above.		
Shared Space	Where shared space areas are specified these shall be designed to match that of the carriageway, full width if vehicle overrun is not restricted.		

*Surface course must be machine laid

Table 10.2 – Minimum Typical Footway Construction

Areas of block paved or slabbed footway will need to be proposed in accordance with BS7533, once the Planning Department have accepted the appearance and characteristics of the material, the technical aspects and appropriateness will be considered through the technical audit process.

10.3 Service Margin

Where service margins are provided, consideration of the construction is required, when the width is less than 2.0m. Bituminous material is not permitted for use in narrow service margins, where service margins are bounded by gardens laid to grass, verge will be permitted. In other locations they will need to be shown as block paving

10.4 Earthworks

Where the adjoining gardens are at a higher level than the surface of the footway/verge, the private areas will be designed to have a maximum gradient of 1:10.

Where the adjoining land is lower than the finished surface of the footway/verge the earthworks reprofiling shall be extended level for 0.5m beyond the back edge of the footway/verge and from this point shall be formed to a batter sloping not more than 1 in 6. The limit of adoption will be permitted to remain at the back of footway/verge.

10.5 Kerbing & Edgings

The type of kerbing should be determined at planning stage, however the principles below set out the minimum requirements for standard road kerbs and footway edgings. Kerb upstands shall be as follows:

Kerb type	Upstand
Standard carriageway	125mm
Bus Stops (using Kessel kerbs or similar)	160mm
Table tops	50mm
Pedestrian crossings	0-6mm
Vehicular crossings	25mm
Parking bays (Parallel)	15mm
Shared space (see below)	0mm

Table 10.3 - Kerb Upstands

For locations where the kerbface is between 0-50mm the kerb profile is to be bullnose. Where flush kerbs are requested, square edged kerbs will be required

Between driveways the minimum length of full-face kerbs is two, exclusive of dropper kerbs.

Where block paving features are proposed, these are to be bound by a kerb or edging. For carriageway areas these are to be 255mm deep kerbs laid flush on a 150mm thick ST4 bed and a minimum of 150mm thick type 1 sub-base. Paving within the footway is to be bounded by a flat top edging kerb.

All kerb radii are to be designed using available manufactured radius units of the style of kerb chosen. Radii between 12m & 20m require the use of 600mm long straights. No cut kerb or edging will be less than 300mm in length, mitred joints will not be permitted, radius kerbs should be used

The kerb bed is to be 225mm wider than kerb unit for a two-part construction process, 175mm wider than kerb unit will be permitted for a one-part construction process. The bed and backing should be a minimum of ST2 and where kerbs are installed as a two-part process, 16mm Φ steel dowel bars at 450mm centres must be installed. For two-part construction the kerb race can be formed using a kerb extruder. In all scenarios, the sub-base shall extend 500mm back from the channel. Kerb bedding is to be installed prior to base and binder course being laid.

Flat top edgings, laid flush are to be specified where required to retain back of footway or limits of paving with the footway.

The proposed limits of adoption will require physically marking for future reference. Where these are not marked by discernible features, such as fences, kerbs or walls a marker will be required. Where visibility splays or service margins are through areas of verge, PCC edging should be laid flush, hit and miss, along the line of adoption. At unadopted roads the limit of adoption should be marked using an aluminium 100m x 100mm road stud within each channel, 100mm off the face of kerb.

For areas of shared space drainage channels should be formed from block paving laid flat to match the width of proposed gully gratings. The block paving should be laid on a ST4 concrete kerb bed, 150mm thick (min) and a minimum of 300mm wider than the surface feature to allow for a haunch. Unit to be laid on mortar with 10mm joints, the joints being filled with flowable grout. Movement joints may be required for long lengths of channel or at changes of direction. Where required these are to be formed from 10mm thick compressible material and sealed with coloured sealant

11.0 Utilities

It is critical to liaise with the utility companies at an early stage in the design process to consider the location and installation of public utility equipment. Desirable service margin widths are indicated in Chapter 3.0. The advice in this section is supplementary to New Roads and Street Works Act 1991 and identifies the works required by Developers.

11.1 New Utilities

Where possible underground utility apparatus shall be laid beneath service margins or footways. Designers must check specific standards used by utility providers in relation to the placement and depth of utility apparatus in order to cater for current needs and future demand. This would not be possible in shared surface streets; however, routing should be focused on development frontage.

It is important that landscape proposals are considered during this period to help ensure conflict between trees/shrubs and utility routes are avoided. Existing trees that are to remain should be considered in the same way.

All planned new and diverted utility apparatus routing as a result of the scheme will require submission to the HAT. All required trenching works within the existing adopted highway, limited to the site frontage, will be subject to the following minimum surface course reinstatements.

	Minimum Length	Minimum Width
Reinstatements within the Carriageway	15m (extended to any existing joint within 5m of the reinstatement)	A lane width (full width where the existing carriageway is <5.5m wide)
Reinstatements within the Footway	5m	Full width between kerb and edging or to solid line or threshold

Table 11.1 - Minimum Reinstatements

The reinstatement of the binder course is to step a minimum of 300mm beyond trench width.

Where existing carriageway of < 15m in length remains between areas of resurfacing, this area will also need to be resurfaced.

All works required on the adopted highway as a result of operations by either the development or utility providers will need to be included in the adoption area plan and be coloured accordingly (see Appendix B).

11.2 Advance Ducting Works

All ducting plans shall include a proposed minimum depth for areas of carriageway, footway and verge. All carriageway duct crossings must extend beyond the channel a minimum distance equivalent to its depth; this is to ensure that any kerb race is not undermined by connection works. Where possible ducting provision should be installed prior to the installation of kerb bed. Services located in service margins should be laid in accordance with The National Joint Utilities Group guidance. Care should be taken not to undermine kerb races by digging to install services. Any undermined kerb races will need full removal and relaying.

2 no. 150mm diameter spare ducts may be requested at road crossing and junctions to avoid future disruptions. Ducts must extend into individual development plots to minimise future disturbance.

11.3 Utility Chambers

Where duct boxes or utility chambers are located within areas of verge the covers to these must be a minimum of 100mm deep, B125. Future maintenance of verges should be considered, and all covers must be installed flush to allow for grass cutting.

Recessed covers should be specified for use with telecommunication chambers in locations of block paved footways. Guidance on approved cover manufacturers should be obtained from the statutory undertaker. The blocks/slabs must be bedded into the frame using a high strength epoxy bedding mortar.

All chamber covers located within block paving must be specified with frames at a sufficient depth to allow for a full depth paviour to be laid adjacent to the cover, reduction in the depth of a block will not be permitted. All ironwork located with the proposed adopted highway that requires raising sections shall be undertaken using pre-cast concrete sections, of appropriate size for the frame. Bedding of such ironworks shall be undertaken using HAPAS approved polyester resin bedding mortar. Proprietary shimming pieces in the same materials should be used to achieve carriageway gradients.

All water stop taps located in the adopted highway are to be ductile iron 150mm deep and receive ST2 concrete surround to underside of frame.

All chambers and covers located in shared space are to be constructed for carriageway loading unless vehicle overrun is restricted.

Position of chambers should avoid locations where changes in levels occur, such as behind dropped kerbs.

11.4 Above Ground Utility Equipment

Any utility equipment that is above ground shall be sited so that it provides a clear footway width of at least 1.2m clearance so that equipment does not obstruct users. In areas of high pedestrian activity (i.e. pedestrian flows over 500 pedestrians an hour), the clearance provided shall be increased to 2.0m. Equipment located within 5m of other street furniture should be in line with one another.

Utility equipment is to be located preferably at the back of the footway, away from windows or walls to prevent unlawful access into surrounding building. Access doors to any utility equipment shall open to the footway and allow operatives to face the direction of oncoming traffic.

Where utility equipment cannot be located in the footway, it may be located in the service margin with suitable hard standing area, at least 500mm wide, around the equipment to facilitate the maintenance of the verge.

Careful consideration must be given so utility equipment does not affect trees and other planting.

12.0 Street Lighting

A suitable system of street lighting on all adoptable Streets shall be considered at the beginning of the design process. A street lighting design brief and specification will be provided by the HAT once the application has been registered and an application fee is paid. An example of a typical design brief and design considerations can be found in Appendix J Street Lighting Specification and Lighting Design Brief Guidelines.

Where proposed works affect street lighting apparatus within a Town or Parish, it will be necessary for the Developer to seek consent from the relevant Town or Parish Council.

12.1 Street Lighting Design

The principals of the design should comply with BS 5489-1:2020 and the supplied design brief.

Where the existing private network is affected a detailed site survey will be required to establish the full extent of existing power network that may be severed by the proposals.

Care should be taken when locating street lighting column to ensure they do not cause a nuisance to existing or new homeowners where lanterns are positioned close to bedroom windows. Also, consideration is required for existing or proposed landscaping that may affect the lighting design. Street lighting must avoid strategic landscaping and green infrastructure to minimise negative impacts of lighting on habitats and wildlife.

Unless otherwise agreed all new streetlights should be Distribution Network Operator (DNO) supply and should be located at the back of the adopted area. All streetlights that are on independent footways and do not provide suitable access need to be raise and lower columns. Any equipment required to raise/lower the columns must be provided to Central Bedfordshire Council at the cost of the Developer.

Signs are to be illuminated to TSRGD 2016 and DfT Circular 01/2016 regarding sign clutter, with the exception of traffic bollards and signs in 20mph zones that can be non-illuminated

12.2 Installation

The Developer is to supply, erect and install the whole of the equipment as specified in the agreement, together with any material which may not be expressly specified, but which is necessary for the satisfactory completion of the installation. Only specialist Street Lighting Contractors shall be employed on installation works. They shall be members of the Highway Electrical Association.

Columns must be located in areas offered for adoption. Columns should be located a minimum of 800mm from the carriageway channel. In areas of shared space and footway the column should be positioned at the back, inside any kerbs or edging. Columns located in areas of verge should include for an edged hardstanding, 1.2m x 1m. Access doors shall be positioned to allow operatives to face oncoming traffic.

Following the erection of columns in accordance with the approved details the Developer should request details on numbering from the Central Bedfordshire Council.

12.3 Adoption and Maintenance

Prior to the implementation stage, the applicant shall ensure that;

- The position of the street lights on site for the street lighting contractor are exactly marked.
- The electricity supply is arranged with the electricity company.
- Test certificates are provided in accordance with BS7671:2008.

The applicant shall pay the cost of a 'bulk clean and lamp charge' when this is required and in case where adoption is delayed as shown below;

- Section 38 agreements: if there are more than three years between:
    - Beginning the work and issuing the final certificate.
- Section 278 agreements: if there are more than two years between
    - Beginning the work and issuing the final certificate; or
    - Completing the Section 278 agreement and issuing the final certificate.

Until the date of adoption, the Developer shall pay for all aspects of works, including energy charges and maintenance of the street lights, before Central Bedfordshire Council issues the final certificate of completion.

13.0 Landscaping

The location and species of planting will be determined through the planning process however is it vitally important that all statutory undertakers' equipment (including plot connections) and street furniture is considered in association with locations of trees and shrubs, both existing and proposed, and appropriate offsets are included in design proposals. For the purposes of the technical audit, composite drawings including proposed street lighting positions, proposed landscaping and all utility routing will be requested to satisfy the Technical Audit Team, that no clashes are present.

13.1 Highway Trees

Trees situated within areas of carriageway or footway construction will require special treatment in order to support the surrounding ground and ensure the long life of the tree. The minimum size of pit shall be in accordance with Table 30/1 in the SHW and be constructed from ridged cells and root director to accept topsoil backfill. The ridged cells shall be bounded by a linear root barrier system that is capable of redirecting roots. The pit will include for aeration and irrigation systems. The tree grille/cover will be reviewed on a scheme-by-scheme basis. Where grilles are to be used the void between the gaps within the grille is to be backfilled with decorative gravel, permeable resin bounded material or an alternative approved method.

Where trees are located within highway verge or adjacent to the highway within private land the tree pit will receive a linear root barrier system, capable of redirecting roots. The barrier is to be 1000mm deep, parallel with the carriageway/footway for a distance of 4m. Where tree pits are proposed within 750mm of the carriageway edge, structural soil will be required below the zone of influence of the carriageway (i.e. a line at 45° from the channel when drawn in section). New trees adjacent to carriageway must be accommodated within an adequate offset from the carriageway to avoid impact from highsided vehicles or, where appropriate offset cannot be secured, trees be of a selected species / type with slender girth and canopy to avoid damage.

All new tree planting close to structures or services shall adhere to the recommendations given in table A.1 of BS 5837:2012 Trees in Relation to Design, Demolition and Construction – Recommendations or its subsequent revisions.

Existing trees, which will become maintainable at public expense, shall be the subject of condition survey to ascertain their health. These trees will be protected in accordance with BS 5837:2012 during construction. Any trees which are not deemed to be of a healthy condition and recommended for removal must be replaced with equivalent number, species and types appropriate to the site and setting in accordance with CBC advice regarding trees and hedgerows in urban settings.

All new highway trees should be subject to the appropriate species selection, nursery production, handling and storage, planting procedures and post planting management and maintenance, to be undertaken in accordance with BS 8545:2014 Trees from nursery to independence in the landscape – Recommendations or its subsequent revisions. The trunk should be maintained free of side shoots and branches to a height of 2.1m, 2.4m adjacent to or above cycleways, footways and carriageways.

13.2 Highway Verges

Highway verges and visibility splays will require a minimum of 150mm topsoil, either seeded or turfed.

Small areas of grass should be avoided, as they are likely to produce future maintenance problems. The minimum width of verge is 1.0m and the minimum area of verge is 2.0m2.

In instances where it is found that vehicle overrun on the verges has occurred remedial measures will need to be considered; which could include the installation of bollards, larger planting or reinforcement mesh protection.

13.3 Legal Restrictions

Before proceeding technical evidence shall be provided regarding any restrictive covenants, Tree Preservation Orders, Conservation Areas conditions attached to the planning concept relating to any of the tree shrubs or hedgerows on the site. Maintenance provisions need to be provided until such a time adoption occurs.

13.4 Site Levels

Trees and shrubs have the majority of their roots within the top 1.25 metres (4 feet) of soil and they generally extend to just beyond the spread of the line of the canopy of the trees. Consequently, any change in level or soil compaction within or immediately adjacent to this area of the tree will reduce the effective functioning of the roots. Trees especially, older ones, are very sensitive to such changes, although the effect, usually culminating in the death of the trees, will not be seen for several years after development has been completed. Covering the rooting area with impervious material is to be avoided and has a similar affect as altering the levels. If possible, it is usually an advantage to direct any surface water towards the roots of the tree but only if it is free of oil and other pollutants.

13.5 Hedges

Local native hedgerow planting should be included in new development proposals within appropriate setting with species selected according to location and following liaison with CBC. Planting of hedges should be on private land and should be positioned to allow for growth of the hedge to not obstruct the highway. Any hedgerow or planting should be set back a minimum of 1.0m from the highway boundary to allow for vegetative growth (between maintenance cuts) without overhanging the highway.

Thorny species should not be accepted immediately adjacent to footways and cycle tracks. If existing hedges contain thorny species, cycle tracks should be positioned at least 3 metres from the extremities of the hedge to prevent problems with hedge-cutting debris. Existing hedges adjacent to the existing highway should be transferred to private frontages for maintenance.

Where existing hedgerows are affected by proposed development then the Developer must be mindful of legislation relating to the protection of these Hedgerows Regulations 1997. Hedges and trees should not be removed in the nesting season (1 March to 31 August) without an ecological survey having been undertaken immediately prior to the works. Any proposals should avoid

negative impacts on hedgerows; where proposals require loss of hedgerows compensatory planting on site will be requested.

13.6 Planting in Shared Surface Areas

In areas of Shared Surface, it may be required to install planting beds to break up vehicle movements. Low level planting areas would need to be provided behind kerbs. It will be the responsibility of the developer to erect temporary fencing to discourage overrun of planting areas and ensure establishment.

14.0 Structures

14.1 Design Approval

Structures supporting, carrying, spanning or adjacent to the adopted highway require technical approval in accordance with the Highways Act S167. Submissions will be in accordance with CG 300 (formerly BD 2/12), Technical approval of Highway Structures, published by National Highways.

Designs are to be generally in accordance with Eurocodes and the standards listed in the DMRB Technical Approval Schedule (TAS). For the purpose of this document, the Technical Approval Authority (TAA) is Central Bedfordshire Council.

14.2 Scope of Structures

The Council may adopt certain structures adjacent to, under or over the highway. In circumstances, the only structures that will be considered for adoption are those upon the Highway land, refer to Appendix F for further guidance. As a minimum there must be a 2.0m maintenance area around all structures, which should be designated as adopted highway. A minimum easement of 1m is required to structures. Any easement would need to link to the adopted highway.

A structure requiring Technical Approval is defined as being a:

- Bridge (other than a footbridge), culvert, or tunnel that has a span greater than 0.9m.
- Retaining wall, or headwall, with a retained height from finished ground level in front of the wall of over 1.5m.
- Noise attenuation barrier exceeding 1.8m high.
- High mast for lighting/lighting systems and/or television cameras.
- Sign/signal gantry.
- Canopy or building overhanging the highway.
- Basement beneath or adjacent to the highway.
- Structure designated by the County Council to be as such because of its construction, and status.
- Modification or addition to an existing structure as defined above.
- Buried, water attenuation structure within or adjacent to the highway that has a span greater than 1.2m.

The structure category is to be as per the criteria set out in section 3 of CG 300 unless agreed otherwise with CBC. Additional to the advice of CG 300, a CBC AIP document will be required for all Category 0 structures. To reflect to reduced risk nature of a Category 0 structure, a template can be found in Appendix G for a simplified Approval in Principle document, alternatively an Outline Approval in Principle document in accordance with Appendix P of CG 300.

14.3 Approval Process

14.3.1 Design Stage

The applicant shall submit to CBC the name of one person, who shall be nominated as co-ordinator for the design and construction. CBC will expect to liaise only with the nominated coordinator.

In the case of a structure to be adopted, the applicant should note that CBC is the ultimate owner of the structure.

The Technical Approval shall be based on the following separate stages:

1. Acceptance of the Approval in Principle document. This document agrees the form of the proposed structure, applied loadings, applicable design standards and the category of the design check. A General Arrangement drawing will be included in the AIP. Refer to Appendices A to F of CG 300.
2. Acceptance of a Design Certificate, or in certain circumstances, a combined Design and Check Certificate. Refer to Appendices I to M of CG 300.
3. Acceptance of a Check Certificate. Refer to Appendices I to M of CG 300.
4. Acceptance of a Construction Compliance Certificate including submission of as constructed drawings and a Maintenance Manual incorporating the Health and Safety File. Refer to Appendix N of CG 300

Initially, the applicant shall submit to CBC a copy of a draft AIP document and associated drawings for each structure. The drawings shall generally include the following:

- A location plan for the structure showing the structure in relation to nearest town or village. A further larger scale location plan should also be provided to show the location of the structure within a new development if applicable.
- The structural form, including articulation and preliminary substructure proposals.
- Proposed construction materials.
- The proximity and effect of the proposals on any existing highway structure and overhead or buried services
- If applicable, the structural elements to be eventually offered for adoption by CBC.
- If applicable, the obstacle to be crossed, including clearances.
- An interpretive geotechnical report.

Each page of the AIP shall have the structure name printed at the top and all copies shall bear digital signatures. Schedules of the standards to be used in the design of the structure shall be appended to the AIP. These schedules shall take the form given in Annex H of CG 300.

The AIP, as appropriate, must contain evidence of consultation and discussions with statutory undertakers, Local Planning Authority, the Environment Agency, Internal Drainage Board and any other relevant body statutory or otherwise.

The applicant should note that CBC is not required by the Technical Approval process to review calculations that are submitted. However, CBC may request that the designer shall submit calculations for review at any time during the process. On completion of the Technical Approval

process, submission of designer's calculations will be required for record purposes for all structures to be adopted by the Authority.

CBC will review the submission and reply accordingly to the applicant with comments on the submission. When CBC consider the submission to be acceptable, the applicant will be asked to submit a copy of the AIP to CBC. The applicant should note and allow in his programme that it may take several draft submissions before CBC are able to recommend a submission for formal approval. Following formal approval by CBC, a copy of the AIP, signed as accepted by the TAA, will be returned to the applicant.

Proposed design changes made subsequent to Technical Approval shall be submitted to CBC for approval.

The Approval in Principle is valid for three years from the date of acceptance by the CBC. If the construction has not commenced within this period, the AIP shall be reviewed by the designer against current standards and amended as necessary. The document shall be submitted to CBC for review and acceptance as if it were a new submission. Any previously agreed Design and Check Certificates are also required to be updated and resubmitted.

For Design Certification, as per 2.78 of CG 300 a single organisation (the Principal Designer) will assume responsibility for the entire design. Where an element or elements are sub-consulted to specialist suppliers such as precast suppliers, the applicant is to ensure the AIP provides the necessary information for the supplier to design from. The applicant should then satisfy themselves of the appropriateness of the design and sign of any Certificates as the sole signatory. Where the proposal is entirely comprised of proprietary manufactured structures, the applicant should refer to Appendix P of CG 300 for guidance.

14.3.2 Construction Stage

Construction shall not proceed until the design approval procedures have been completed. The applicant should be aware that CBC may not adopt structures that have been constructed before the technical approval procedures have been completed.

CBC may undertake site monitoring to ensure compliance with standards and the approved design. The applicant will be required to supply up to date drawings and information to CBC as construction proceeds.

The applicant shall submit to CBC a works programme.

14.3.3 Post-Construction Stage Records

For structures intended to be adopted by CBC, the applicant will supply the following documentation on completion of construction:

- A certificate stating that the structure has been constructed in accordance with the approved drawings (Construction Compliance Certificate). Appendix N of CG 300.
- Two full sets of as constructed drawings for each structure.
- A Structure Maintenance Manual for each structure. The applicant should note that information for the Health and Safety File will be required to be gathered during the construction phase

- One complete set of calculations.
- An interpretive geotechnical report (a geotechnical report already submitted with the AIP will satisfy this requirement).

The applicant should also note that the Health and Safety File (as required by the Construction (Design and Management) Regulations 2015) shall be passed to CBC at the time of adoption.

The applicant should note that recommendation for adoption will only be made on receipt of all of the relevant documentation.

14.4 Vehicle Restraint Systems

Vehicle Restraint Systems (VRS) should not generally be required within residential development as the need shall be designed out by providing layouts that are safe to use. Where safety fencing is unavoidable in a residential area, or required to address existing situations where problems exist or circumstances have changed, then reference shall be made to CD 377.

15.0 Roads Signs, Street Furniture & Associated Features

15.1 Signage

Where required, road signs shall be designed in accordance with the latest edition of the TSRGD. Refer to Dft Circular 01/2016 for sign clutter guidance.

All S278 schemes will be subject to the inclusion of temporary warning signs to highlight any new or altered junction. These signs should be erected for a duration of 3 months and removed during the maintenance period

The designer should be conscious of any consequential signage as a result of a development. At the discretion of the HAT a network study may be required to confirm that destinations proposed are suitable.

It should be accepted that for all S38 schemes and the majority of S278 schemes, street name plates will be required. The Developer can propose street names but these will need to be reviewed and accepted by Building Control prior to erection. Street name plates should be fixed as near as possible to street corners and located at the back of the footway.

Sign posts will not be permitted in areas of cycleways or shared footway cycleways. Where sign posts are located near these areas, they should be set back a minimum of 500mm.

15.2 Street Furniture

At any point during the review, construction or maintenance period of a scheme, Central Bedfordshire Council representatives may request for the inclusion of street furniture. This may include, but not limited to, bollards, cycle stands, bins or benches. The style of these features should be proposed by the Developer for acceptance by the HAT.

Dependent upon the location of street furniture it may be requested for features to be strengthened or installed in NAL (or similar approved) sockets.

Where a pedestrian safety risk has been identified, refer to LTN 2/09 Pedestrian Guard Railing for guidance and where possible, aim to design out the need for guard rails.

15.3 Bus Gates

Where bus gates are proposed these are to be appropriately signed but not physically controlled. Use of the gates is to be enforced by Automatic Number Plate Recognition (ANPR) cameras. Appropriate signage must be erected to inform motorists that an ANPR camera is in operation. Equipment specification, monitoring requirements and hours of operation are to be discussed with the HAT.

15.4 Bus Shelters

At the discretion of CBC bus stops may require the installation of bus shelters. Information on bus stop and bus shelters can be found in Appendix H.

15.5 Traffic Regulation Orders

Where road markings and/or signage has been requested that needs to be supported by a Traffic Regulation Order (TRO), this process will be undertaken by Central Bedfordshire Council at the Developers cost. The Developer will be expected to provide all drawings associated with the TRO to allow for statutory consultation to be undertaken on their behalf. The process of application and advertisement of TRO's can be found at **www.centralbedfordshire.gov.uk**.

16.0 Site Inspector

The role of Site Inspector will be undertaken by a Central Bedfordshire Council representative and will commence following direction from the HAT. If technical approval is granted with conditions, we reserve the right to remove our site inspector if there is no resolution of condition within 20 working days of any request. As a minimum the following information is to be given to the HAT for issue to the site inspector:

1. Contractors Details
2. Site Agents Contact Details
3. Contact details of the Principle Designers under CDM 2015
4. Construction Programme for the Highway elements
5. HERR Forms – Site specific risk assessments
6. Pre-Construction Information Pack & Construction Phase Plan
7. Traffic Management – Proposals for all required traffic management (see below)
8. Works Phase Plan – Statement of how the Works are to be phased
9. Pavement Condition Survey
10. Foundation test results – Location Plan, data recorded as CBR %
11. Pre-condition Survey
12. Materials Management Plan – A copy the declaration reviewed by a member of Contaminated Land: Applications in Real Environments or Environment Agency must be provided prior to works on site.

Any works to be undertaken on the existing adopted highway cannot commence until there is a signed S278 agreement in place. Central Bedfordshire Council will notify the Developer once the agreement is entered into.

16.1 Site inspections

The site inspector will undertake periodic inspections and shall be given access to all parts of the works but the site agent must give at least two working days notice to the site inspector of the following operations;

- Back filling of drainage trenches
- Installation of highway manholes
- Formation level
- Sub-base in carriageway and footway
- Gullies and connections
- Kerb bed, dowel bars and kerb installation
- Base course in carriageway*
- Binder course in carriageway*
- Surface course in carriageway*
- Binder course in footways*
- Surface course in footways*
- Signing & Lining
- Street Lighting
- Traffic signal installation
- Concrete pour to any insitu cover slabs
- Any air or water testing of highway drains in accordance with Chapter 8.

*All bituminous material delivery tickets shall be made available for inspection by the site inspector

Failure to comply with this requirement may result in the contractor being asked to undertake testing by an approved laboratory at their own expense. Remedial works may be required if it is

deemed that the constructed work has not been installed in accordance with the approved details. In this instance the site inspector may complete a non-compliance form notifying all parties of the issue.

All materials testing including CBR and cores must be undertaken by a UKAS accredited laboratory, approved by CBC. Results are to be made available no later than 10 working days after the testing was undertaken.

The actual limits of resurfacing works will be agreed on site with the site inspector to ensure a suitable tie in point is selected.

The reuse of any existing signage or street furniture is to be agreed with the site inspector on a case-by-case basis.

It should be clearly understood that the site inspector acts solely for Central Bedfordshire Council and must not be regarded as the 'Clerk of the Works' acting for the schemes contractor. The Contractor must have a named representative on site whilst work is in progress, whom the site inspector can liaise.

16.2 Construction Sign off

Developer/Contractor to inform Site Inspector of works completion, the site inspector will then complete a joint snagging walk through of the site and raise items they consider to be unsatisfactory. At the Developers earliest opportunity, it is recommended that all information listed in Chapter 16.0 is submitted.

Any structures reviewed as part of the technical audit will require HAT to accept a Construction Compliance Certificate including submission of as constructed drawings and a Maintenance Manual incorporating the Health and Safety File. Refer to Appendix N of CG 300

Where required the Developer shall undertake an independent Stage 3 Road Safety Audit in accordance with the DMRB and provide a copy along with designers' comments to the Technical Audit Team. The RSA process map can be found here: Transport Strategy - Highways and transport guidance.

The Developer is required to undertake all remedial works raised during the snagging inspection and any agreed recommendations from the Safety Audit. Once completed, these works will be re-inspected by the site inspector, after which provisional certificate will be issued and the scheme put on to maintenance.

17.0 Streetworks

The Developer is to ensure that all relevant streetworks notices and agreement are in place with the Central Bedfordshire Council prior to commencement of works site. Further details can be found at **www.centralbedfordshire.gov.uk**.

It is strongly advised that streetworks are contacted well in advance of works on site as Central Bedfordshire Council operate a permit scheme for all proposed road opening. The purpose of the permit scheme is to improve the strategic and operational management of the highway network through better co-ordinating, planning, scheduling and management of activities to minimise disruption to all highway users. Consultation with the street works team will need to include traffic management proposals for approval.

Advance warning signs detailing the agreed start date and outline programme will be required to be erected in advance of the works. Details of the sign design and time of erection will be provided by streetworks.

Prior to the implementation of any traffic management and commencement of works on the network, a pre-start meeting should take place with a streetworks representative.

18.0 Project Close Out

Prior to issue of provisional certificate of completion and reduction in any bond/surety by Central Bedfordshire Council, the following items must be completed to the satisfaction of the HAT. The items below are listed as a minimum and are not exhaustive of what may be required.

- **Health & Safety File containing**
  - Scheme Description
  - Contact details of key parties, Developer, Designer & Contractor
  - Sub-contractors and material suppliers
  - Operation Manuals for traffic signals
  - Operation Manuals for any Structure including design certificates
- **Data sheets of Key Construction Materials**
  - Bituminous materials
  - Block/slab paving, highlighting the size and colour of unit used
  - Sand laying course
  - Kerbing
  - Street furniture
  - Street lighting - lanterns and columns
  - Landscaping and maintenance schedule
- **Site Testing undertaken by a UKAS accredited laboratory, approved by CBC**
  - CBR – laboratory results and location plan
  - NDM Results to confirm compaction of base and binder course
  - Electrical testing certificates for all illuminated signs and street lights. See Appendix J.
  - CCTV of all drainage. Data supplied as .xml file as well as .pdf
- **As built drawings stamped/signed by the Contractor including**
  - Drainage drawing
  - Construction areas plan, including all areas of resurfacing
  - Utilities plans
  - Construction details confirming pavement and footway materials
  - Road Markings
  - Signs and post details
  - Street lighting
- **Water Authority Acceptance Certificate & Plan**
- **Completion of the Inventory List, template provided in Appendix C**
- **A composite AutoCAD representation the As-built layout**
- **A list of any Residual Risks**

All submitted details will be required in hard and electronic copies.

Appendix A. Additional Guidance Documents

The hyperlinks below provide some useful additional CBC specific guidance documents.

Guidance Documents	URL Links
Highways Development Handbook	Highways Development Handbook Document
Pedestrian Guardrail Guidance	Pedestrian Guardrail Guidance Document
Road Safety Audit Guidance	Road Safety Audit Guidance Document
Speed Management Guidance	Speed Management Guidance Document
Highways Tree Policy Guidance	Highways Tree Policy Guidance
Travel Plans for New Developments	Travel Plans and Transport Assessments
Speed Indicator Device Guidance	Speed Indicator Device Guidance Document
Highway Asset Management Strategy	Highway Asset Management Strategy Document
Electric Vehicle Charging Technical Guidance	Electric Vehicle Chargepoint Plan

Appendix B. Drawings & Data Required

Where applicable the drawings/data below shall be provided in the form of an electronic copy posted to the Technical Audit Team. Drawings should be submitted at a scale no smaller than 1:500 (with the exception of the location plan). **All designs are to be based on a 3D topographical survey in line with RICS specification.**

- **Location Plan** – A4 plan identifying the location of the site, site boundary, road names and nearest postcode.
- **Planning Layout** – A copy of the approved planning layout along with a copy of the Decision Notice and Conditions
- **Ground Investigation Report** – particularly important for proposed structures or SUD's features but should be provided to offer information to support the proposed pavement foundation design.
- **Land Dedication Plan** – Identifying the limits to be offered for adoption. As a minimum, new accesses shall be adopted up until the tangent point of the minor road. Buildings adjacent to the proposed adoption limits should allow 300mm for foundations and private drainage. A copy of the existing adopted highway network should be submitted as basis of the technical drawings. Area should be shaded pink to identify the land offered for adoption.
- **S38 Adoption Plans** – A standalone drawing will be required that clearly indicates the features being offered for adoption. The drawing(s) is to include the following – carriageways and footways (include herringbone hatch if block paved) as brown, verges as green, street lighting, illuminated signs and bollards as purple, street furniture, traffic signs and street name plates etc. as black, surface water drainage (adoptable by CBC) as red, surface and foul water drainage (adoptable by water authority under S104) as blue, site boundary (extent of developers ownership) as red, trees as dark green, highway structures as black and works within the existing highway under S278 as light blue. Cut lines are not permitted and limits of adoption should be indicated on one drawing.
- **Isopaches Drawing for S278 Works** – Drawing must be banded to allow determination of proposed pavement construction/overlay.
- **Road Safety Audit Stage 1 & 2** – For all S278 & S38 schemes a copy of RSA 1/2, completed in line with DMRB GG119, is required; as well as a copy of the designer's comments completed in accordance with Appendix K of GG119.
- **Autotracks** – of detailed vehicle in Chapters above, AutoCAD version to be provided.
- **Highway Chainage & Road Numbers** – A carriageway chainage and road numbers to be included on at least one drawing; plot numbers to also be stated. A drawing must also include dimensions where areas of the proposals are not as per any typical sections
- **Alignment Drawing** – indicating the complete survey base in grey and the proposed alignment in black. No hatching is to be present on this drawing
- **Drainage/Contour Plan** – All areas of highway offered for adoption should be contoured at 25m intervals including 15m past the tie in points to the existing highway. Proposed gully locations together with high and low spots must also be indicated.
- **Private Drainage** – Spot levels and drainage provision should be indicated, private drainage required to prevent run off onto the area offered for adoption.
- **Discharge Consent, S104, S106 or S185** – Copy of confirmation from applicable authority stating acceptance and accompanying drawings.
- **Drainage Calculations** – Network and simulation results for any drainage system to be adopted by the Central Bedfordshire Council. Calculation based upon the Wallingford Procedure.
- **Visibility Splays** – Forward visibility and junction visibility to be included, stating 'x' and 'y' values.
- **Longitudinal Section** – Section to indicate level information 15m beyond the design tie in showing SWS, FWS and any Highways drains.
- **Highway Boundary Treatment Plan** - Plan identifying the limits of the site
- **Pavement Layout Plan** – Plan identifying the type and extents of all pavement construction, key to match construction detail descriptions.
- **Kerbing & Footways Plan** – Plan identifying the type, kerbface and limits of kerbing works with footway types and extents identified. Key to match construction detail descriptions.

- **Reinstatement Details** – Trench reinstatement and narrow widening details for construction. Tree pit details for the landscaping and root protection details for retained trees.
- **Tactile Paving** – All tactile paving to be in line with 'DfT, Guidance on the use of Tactile Paving Surfaces'.
- **Construction Details** – All features within the adopted highway should be depicted, including pavement construction, kerbing and drainage.
- **Cross-Sections** – All topographical survey works should be such to allow for cross-section of the design through the existing landform to be submitted if requested
- **Traffic Signing & White Lining** – Where required sign details including foundation, post and sign face materials. White lining diagram number and any specific dimension must be shown.
- **Traffic Signals Details** – Construction drawing to include ducting plan and staging diagram. TR2500 controller specification required. Designers will be required to attend FAT & SAT. Refer to Appendix D.
- **Street Lighting** – Refer to Appendix J.
- **Utilities** – Copies of all statutory undertakers' apparatus plans identifying all new services and required diversions. Depths of all ducting to be identified.
- **Structures** – Design drawings including rebar schedule, AIP or Design Certificates in accordance with DMRB BD2.
- **Landscaping** – location and type plan, tree pit standard detail
- **Ecological Surveys/Restrictive covenant** – Where applicable or a statement of fact where it is not required
- **Schedule of Proposed Assets** – To include the type and quantity of the following: bollards, ornate fencing, VRS, culverts >900mm, bespoke chamber cover slabs, specialist materials, conservation kerbing, coloured surfacing, block paving, ornate street lighting, traffic signals and trees all assessed structures.

The technical review process will not commence until all of the applicable items above have been received and validated.

Appendix C. Scheme Inventory

Scheme Inventory

Upon completion of the works, the inventory below should be completed for elements located in the highway, associated with the agreement entered into. The inventory must document specific materials used that do not accord to the HCS&SG or are additional to it and not reflected by the as-built drawings

Item Number	Inventory Item	Quantity	Manufacturer	Specification	Dimensions
1	Fencing				
2	Recessed covers				
3	Kerb drainage units				
4	Specialist kerb units				
5	Tactile paving (other than Precast concrete)				
6	Coloured surfacing Footway				
7	Block Paving Footway				
8	Coloured surfacing Carriageway				
9	Block Paving Cariageway				
10	Slab paving				
11	Sett Paving				
12	Lighting columns				
13	Lighting lanterns				
14	Bollards				
15	Street trees				
16	Tree grille and or guard				

Additional items will be requested at the discretion of the Site Inspector.

Appendix D. Design of Signal Control Features

All traffic signal proposals should accord with the Standard Specification for Traffic Signals and Systems, a copy of which is available from the HAT. Additional advice can be found below.

Design Document & Drawing Requirements

As part of the design check review, the following drawings and documents need to be submitted by the Developer:

1. Traffic Signal Approval Drawing
2. 12/5 Specification
3. 5/2 Specification
4. 2500 Datasheet
5. MOVA Datasets (If applicable)
6. Signal Timings Calculations
7. Designer risk assessment

Traffic Signal Approval Drawing

The Traffic Signal Approval Drawing need to have the following details incorporated into the design:

1:200 viewport – Detailing signal poles, signal equipment, tactile paving, road markings, full road names ie. B1008 New Street, Signal timings, Pole Schedule, Phase Timings, Phase Intergreens, Staging Diagram, Permitted Stage Change Diagram, Loop Setting Out Details, SHE BOX, Pole Schedule, North Point, MOVA Link Diagram (If applicable), Magnetometer Diagram (If applicable), Key defining all items on drawing and Notes, poles to be numbered clockwise from the pole nearest the chamber, all relevant road markings, all signage relating to traffic signals, all kerb lines and dropped kerbs to be shown.

The design drawing should take into account:

- The 85th %tile speed (Standard Site) – A survey should be undertaken to determine this speed. The 85th %tile speed is then used to determine the most suitable vehicle detection system;
- The 15th %tile speed (MOVA Site) – A survey should be undertaken to determine this speed. The 15th %tile speed is then used to determine the distance the MOVA loops should be installed away from the stop line;
- The visibility to signal heads;
- The intervisibility zone;
- The pedestrian flows and desire lines;
- The traffic flows;
- The traffic signal Linsig modelling;
- That all infrastructure is within the Highway boundary;
- The environmental site surveys;
- That HFS/high PSV>68 are considered and should be in accordance with the requirements detailed in CD 236;
- That all signage installed is in accordance with the latest version of the Traffic Signs Manual and the TSRGD 2016;
- That existing statutory undertakers, in order to mitigate the possibility of a cable/pipe strike which could lead to an operator being injured. All major risks to be identified within the SHE box;
- That the lighting levels at sites with pedestrian facilities are in accordance with BS5489-1 :2003 and BS5489-1 :2020.

12/5 Specification

An example of what to incorporate into a 12/5 Specification can be found at the following link:
https://www.tiipublications.ie/library/CC-GSW-01200-02.pdf

5/2 Specification

The 5/2 Specification document should incorporate details of ducting installation requirements, chamber requirements and a Chamber/Duct schedule.

2500 Datasheets

Datasheets to be completed by competent Designer.

MOVA Dataset (If applicable)

To be completed in accordance with AGD44 and AGD45 MOVA guidance documents.

Signal Timing Calculations

Signal Timings to be completed in accordance with TAL 5/05.

Designers Risk Assessment

All major risks to be identified and incorporated within the SHE box on the Traffic Signal Drawing. Major risks are those that are deemed to be cause injury/death to an individual. Where possible the designer should look to mitigate and reduce the risk.

Traffic Signal Guidance & Standards

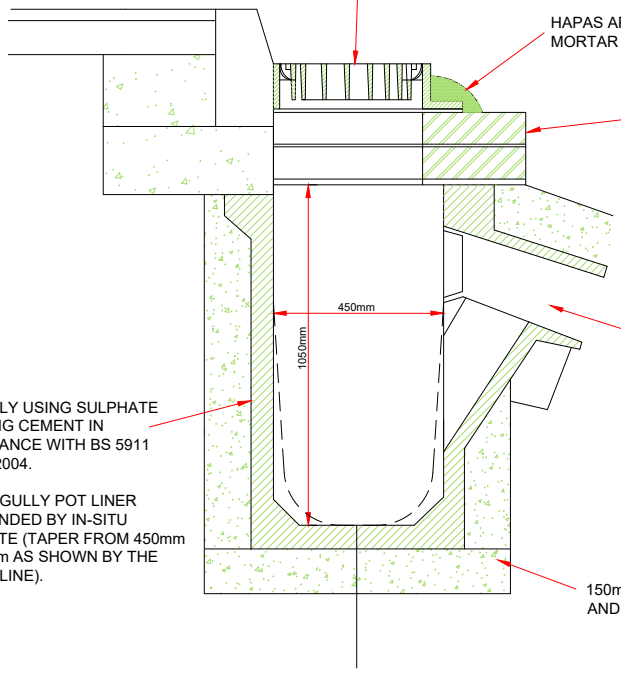
Drawings and documents should be produced in line with national standards and guidance such as the ones highlighted below:

- Guidance on the use of Tactile Paving Surfaces
- LTN 1/09 Signal Controlled Roundabouts
- LTN 1/95 The Assessment of Pedestrian Crossings.
- Manual of Contract Documents for Highway Works
- Puffin Good Practice Guide (Department for Transport 2006)
- TA 86/03 Layout of Large Signal Controlled Junctions
- TAL 1/01: Puffin Pedestrian Crossing
- TAL 1/02: The Installation of Puffin Pedestrian Crossings
- TAL 1/06: General Principles of Traffic Control by Light Signals
- TAL 2/03: Signal Control at Junctions on High Speed Roads
- TAL 3/03: Equestrian Crossings
- TAL 4/98: Toucan Crossing Development
- TAL 5/05: Pedestrian Facilities at Signal-Controlled Junctions
- TAL 16/99: The use of Above Ground Vehicle Detectors
- TD 89/08 Use of Passively Safe Signposts, Lighting Columns and Traffic Signal Posts to BS EN 12767
- The Design Manual for Roads and Bridges
- The Traffic Signs Regulations and General Directions 2016
- The Zebra, Pelican and Puffin Pedestrian Crossings Regulations and General Directions 1997
- TR2206A Specification for Road Traffic Signals
- TR2500 Specification for Traffic Signal Controller
- Traffic Signs Manual

Appendix E. Standard Details

- CBC-SD-500/01 ROAD GULLY
- CBC-SD-500/02 SHALLOW CATCHPIT (INSITU CONCRETE)
- CBC-SD-500/03 TYPICAL CATCHPIT DETAIL
- CBC-SD-700/01 TYPICAL CARRIAGEWAY CROSS SECTION
- CBC-SD-1100/01 KERBING & EDGING TYPES
- CBC-SD-1100/02 KERB AND EDGING BEDDING
- CBC-SD-1100/03 SHARED SURFACE DRAINAGE CHANNEL
- CBC-SD-1100/04 TYPICAL RAMP SECTION
- CBC-SD-1100/05 RAMP DETAIL PLAN
- CBC-SD-1100/06 TACTILE PAVING CROSSING DETAIL (AWAY FROM JUNCTIONS)
- CBC-SD-1100/07 TACTILE PAVING CROSSING DETAIL (AT JUNCTIONS)
- CBC-SD-1100/08 ALTERNATIVE VEHICULAR CROSSING > 7.5m
- CBC-SD-1100/09 CONTINUOUS CROSSING DETAIL
- CBC-SD-1200/01 STREET NAME PLATE DETAIL

GULLY GRATE & FRAME SHALL BE KITE MARKED TO BS EN 124:2015. D400 CAPTIVE HINGED GULLY FRAME. HINGE TO BE LOCATED ON SIDE FACING ONCOMING TRAFFIC. MINIMUM WATERWAY AREA 1000cm2. MINIMUM FRAME DEPTH 150mm. A SINGLE GULLY COVER & FRAME MANUFACTURER MUST BE USED FOR EACH DEVELOPMENT.



HAPAS APPROVED POLYESTER RESIN BEDDING MORTAR

PRECAST CONCRETE RAISING SECTIONS A MINIMUM OF 2 AND A MAXIMUM OF 4.

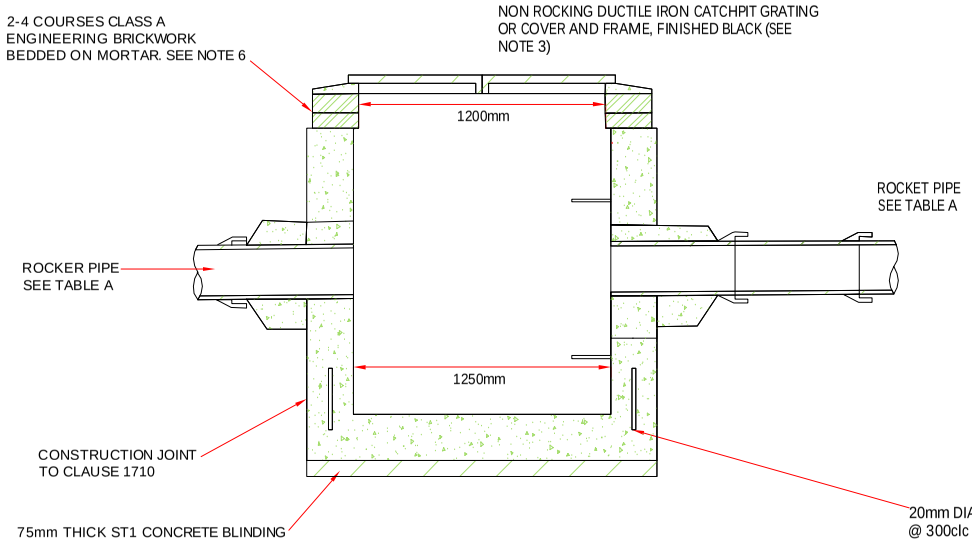
A PLASTIC RISING LINER MAY BE USED IN CONJUNCTION WITH THE PLASTIC GULLY POT. THIS IS TO BE CUT DOWN TO SUIT REQUIRED DEPTH OR BRICKWORK AS FOR PRECAST GULLY.

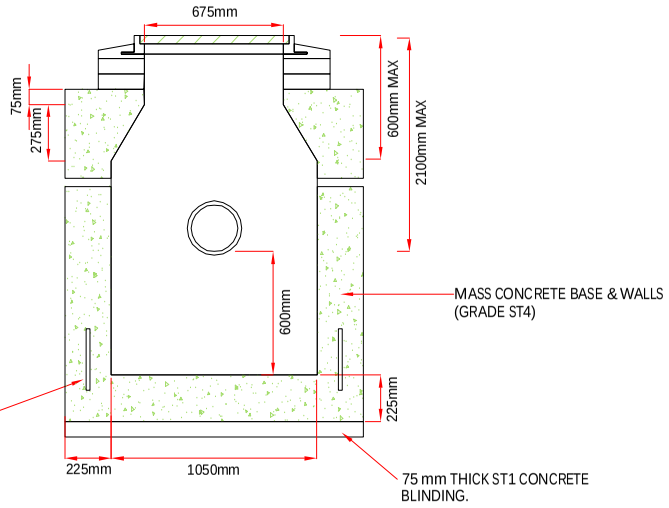
150mm DIAMETER CONNECTION WITHIN 150mm ST4 CONCRETE BED AND SURROUND. CONNECTION TO BE LAID TO CONSISTENT LINE AND LEVEL.

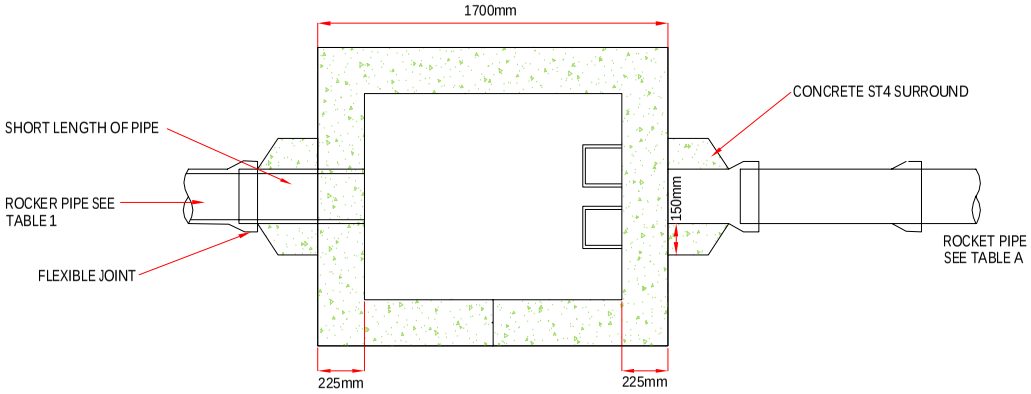
PCC GULLY USING SULPHATE RESISTING CEMENT IN ACCORDANCE WITH BS 5911 PART 6, 2004.
OR
PLASTIC GULLY POT LINER SURROUNDED BY IN-SITU CONCRETE (TAPER FROM 450mm TO 400mm AS SHOWN BY THE DASHED LINE).

150mm ST4 CONCRETE FOUNDATION AND SURROUND.

Central Bedfordshire	Dwg No: CBC/SD/500/01	Scale: NTS @ A4
	Date: August 2022	Revision: C01
	ROAD GULLY	For references purposes, only use on Central Bedfordshire Council Streets.







ROCKER PIPE LENGTH	
TABLE A	
PIPE DIAMETER	PIPE LENGTH
150 - 600	600mm
675 - 750	1000mm
OVER 750	1250mm

NOTES:

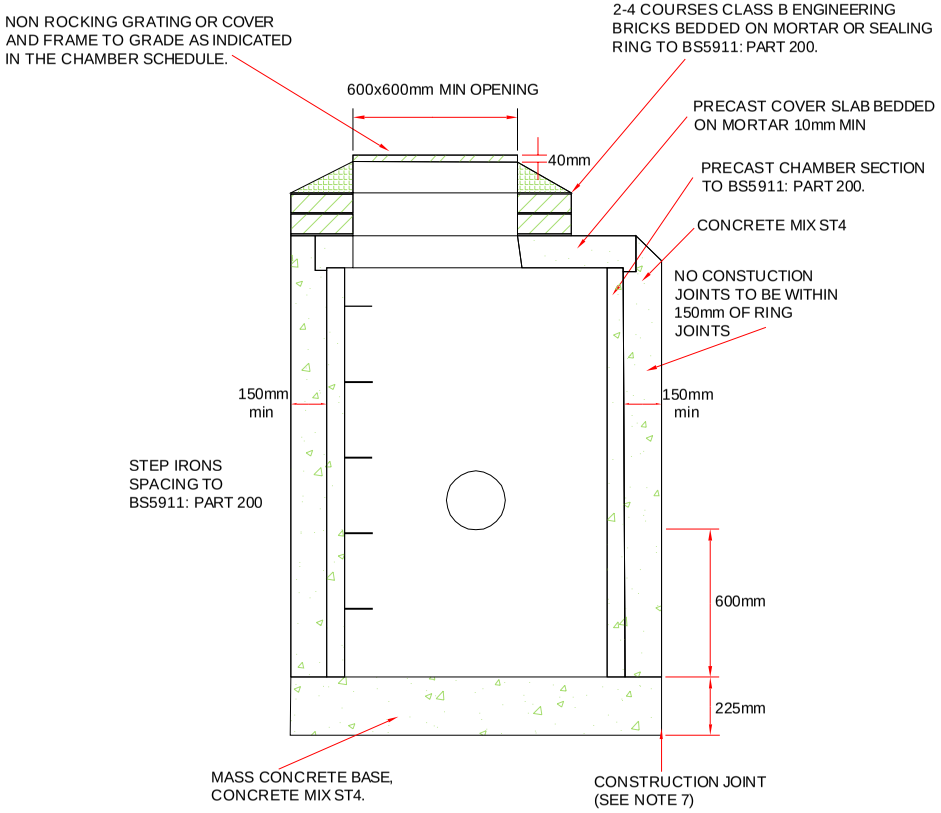
1. ALL DIMENSIONS ARE IN MILLIMETERS
2. CLAUSE REFERENCES RELATE TO THE SPECIFICATION FOR HIGHWAY WORKS (SHW). THE CHAMBER SHOULD COMPLY WITH CL. 507.
3. GRATING OR COVER AND FRAME TO COMPLY WITH BS EN 124 AND TO BE OF THE GRADED DESCRIBED IN THE CHAMBER SCHEDULE OR SHOWN ON THE DRAWING.
4. SPECIFIED GRADES OF CONCRETE SHALL BE IN ACCORDANCE WITH CL.2602. IF REQUIRED CONCRETE SHALL BE SULPHATE RESISTING GE3 DESIGNED TO BRE CONCRETE IN AGGRESSIVE GROUND (SPECIAL DIGEST 1) IN ACCORDANCE WITH SHW NG 1703 PARA. 11.
5. FINISHED CONCRETE SURFACES (CLAUSE 1708) SHALL BE AS BELOW:
   a. EXTERNAL FORMED SURFACES F1.
   b. INTERNAL FORMED SURFACES F3.
   c. TOP OF BASE U2.
   d. TOP OF WALLS U1.
6. HAPAS APPROVED POLYESTER RESIN BEDDING MORTAR
7. STEP IRON TO COMPLY WITH CL. 507.

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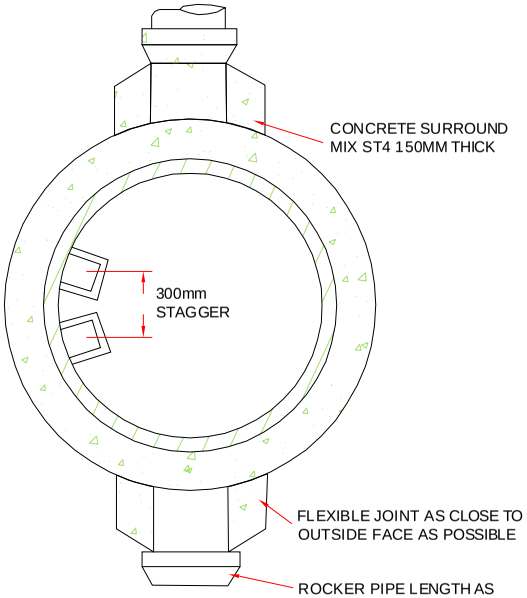
Drawing No.: CBC/SD/500/02	Scale: NTS @ A4
Date: September 2020	Revision: C02

SHALLOW CATCHPIT (INSITU CONCRETE)

For reference purposes, only for use on Central Bedfordshire Council Streets.



Max Pipe Diameter (mm)	Chamber Ring Diameter
Less than 375 (where depth to invert 1.35 - 1.50m)	1050
Less than 375	1200
375 - 450	1350
500 - 700	1500
750 - 900	1800



PIPE DIAMETER	PIPE LENGTH
150 - 600	600mm
675 - 750	1000mm
>825	1250mm

NOTES:

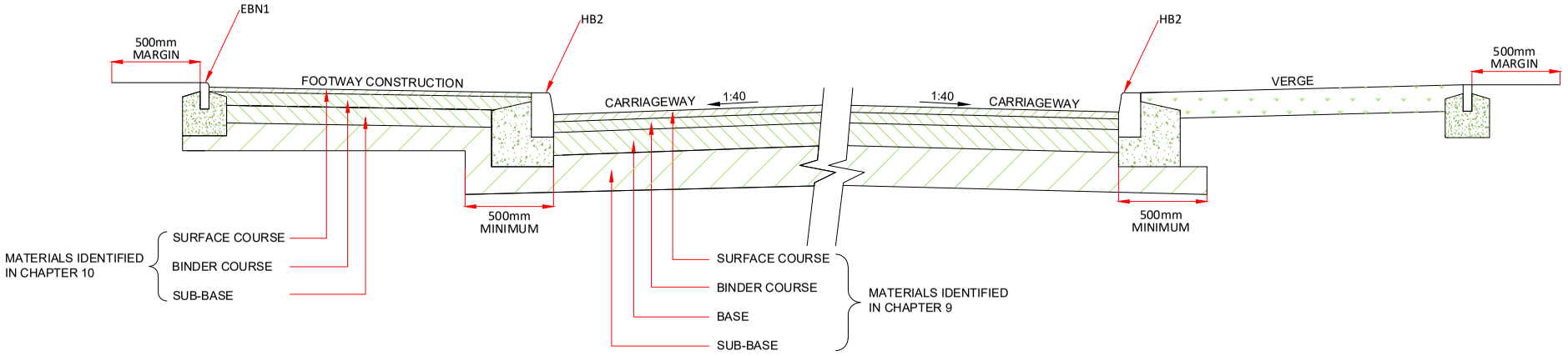
1. ALL DIMENSIONS IN MILLIMETERS
2. IF REQUIRED CONCRETE SHALL BE SULPHATE RESISTING
3. FOR SUMP AND PIPE INVERT DETAILS, NUMBERS OF BRANCHES, TYPE OF GRATING OR COVER AND FRAME, SEE THE CHAMBER SCHEDULE.
4. DUCTILE CAST IRON GRATING OR COVER AND FRAME, FINISHED BLACK TO EN T24.
5. HAPAS APPROVED POLYESTER RESIN BEDDING MORTAR.
6. HEAVY DUTY PRECAST COVER SLAB TO BS 5911-3:2002.
7. AS AN ALTERNATIVE TO THE CONSTRUCTION JOINT BELOW THE BASE CHAMBER SECTION, THE CONCRETE CAN BE FLOAT FINISHED; AND 20mm DIA. DOWELS 300mm LONG, PLACED AT 300mm CENTRES AROUND THE MANHOLE BASE.
8. FORMED CONCRETE SURFACES SHALL BE AS BELOW TO CL.1708;
   a) ALL EXTERNAL FORMED SURFACES F1
   b) INTERNAL FORMED SURFACES F3
   c) BASE OF CHAMBER - U2
   d) TOP OF WALLS - U1

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Drawing No.: CBC/SD/500/03	Scale: NTS @ A4
Date: September 2020	Revision: C01

TYPICAL CATCHPIT DETAIL

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NOTES:

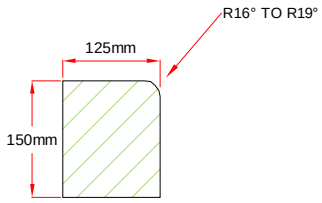
1. BOND COAT TO BE LAID BETWEEN ALL BITUMINOUS LAYERS
2. ALL PAVING TO BE AGREED WITH THE PLANNING OFFICERS ONCE SAMPLE PANELS ARE CONSTRUCTED.
3. SUB-BASE TO EXTEND 500mm BEHIND KERB FACE.
4. SEE DRAWING CBC/SD/1100-01 FOR KERBING AND EDGING DETAILS

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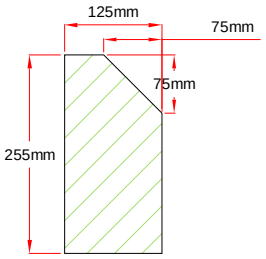
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Date: October 2019	Revision: 0

TYPICAL CARRIAGEWAY CROSS SECTION

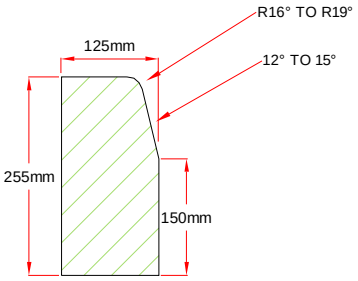
For reference purposes, only for use on Central Bedfordshire Council Streets.



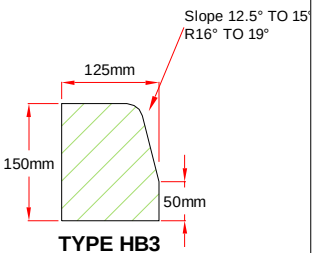
TYPE BN
BULLNOSE



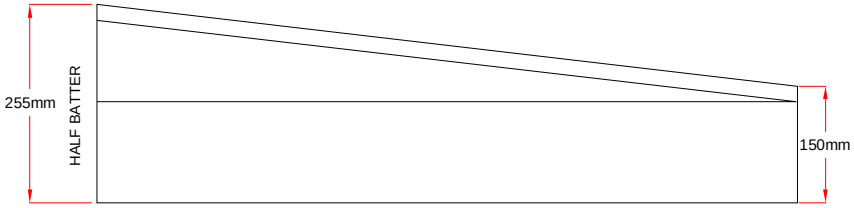
TYPE SP
45° SPLAY



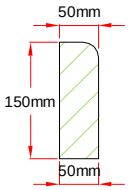
TYPE HB2
HALF BATTER



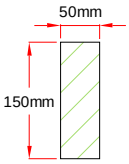
TYPE HB3
HALF BATTER



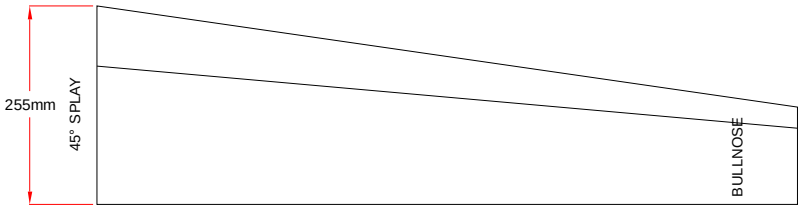
TYPE DL1
DROPPED KERB LEFT HAND TYPE HB2 TO TYPE BN



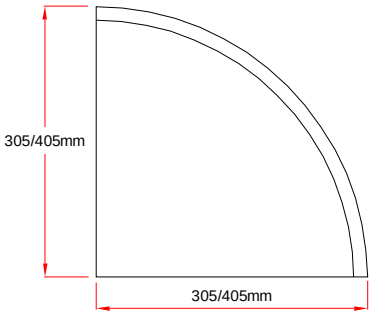
TYPE EBN1
BULLNOSED



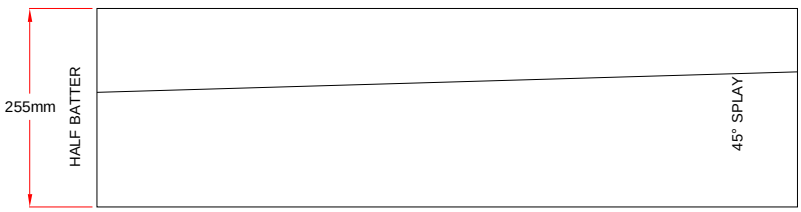
TYPE EF1
SQUARE



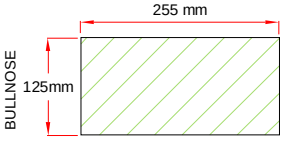
TYPE DL2
DROPPED KERB LEFT HAND TYPE SP TO TYPE BN



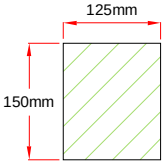
TYPE QHB
FOR SECTION SEE HB 2



TYPE TL
TRANSITION KERB LEFT HAND HALF BATTER TO 45° SPLAY



TYPE CS1
SQUARE CHANNEL



TYPE CS2
SQUARE CHANNEL

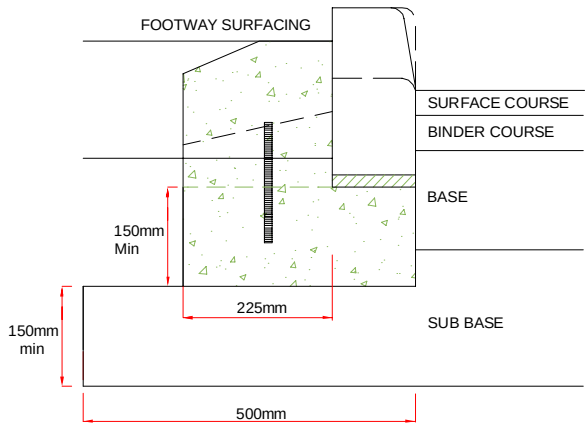
NOTES:
1. ALL UNITS TO BS EN 1340:2003
2. HB1 - AS HB2 EXCEPT 305 x 150
   ER2 - AS ER1 EXCEPT 200 x 50
   ER3 - AS ER1 EXCEPT 250 x 50
   EF2 - AS EF1 EXCEPT 200 x 50
   EF3 - AS EF1 EXCEPT 250 x 50
   EBN2 - AS EBN1 EXCEPT 200 x 50
   EBN3 - AS EBN1 EXCEPT 250 x 50
   DR1 AS DL1 EXCEPT RIGHT HAND
   DR2 AS DL2 EXCEPT RIGHT HAND
   TR AS TL EXCEPT RIGHT HAND

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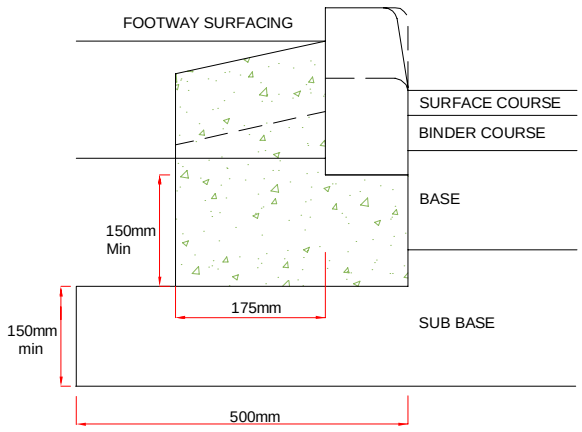
Drawing No.: CBC/SD/1100/01	Scale: NTS @ A4
Date: September 2020	Revision: C01

KERBING & EDGING TYPES

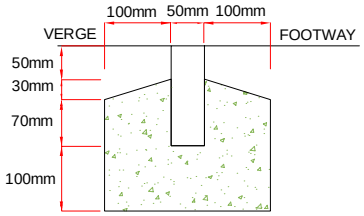
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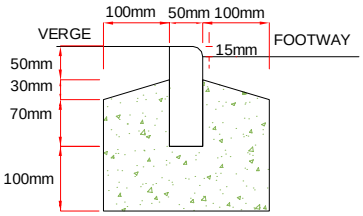
KERB DETAIL
TWO PART CONSTRUCTION



KERB DETAIL
PERMITTED WET LAID CONSTRUCTION



SQUARE EDGING



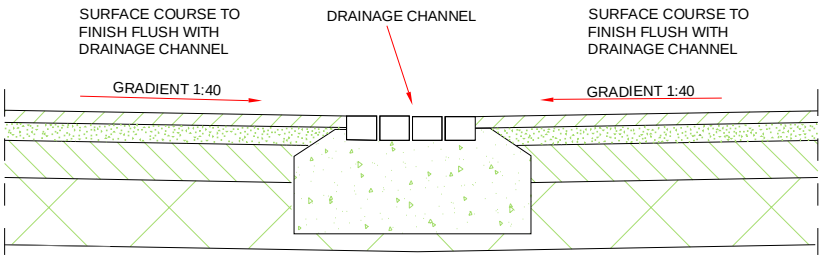
BULLNOSED EDGING

NOTES:

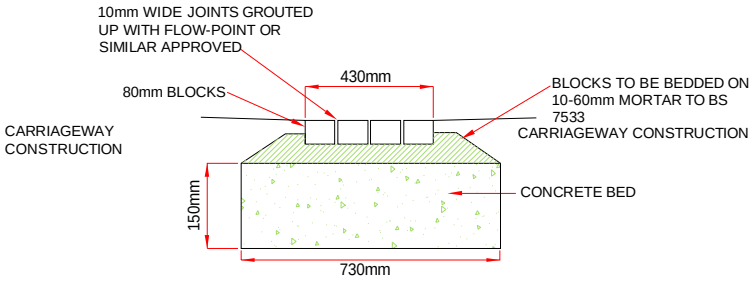
1. KERBS TO BE BEDDED ON 10-40mm THICK MORTAR TO BS7533-6.
2. DEPTH OF KERB BASE VARIES, WHERE LEVEL SUB BASE IS MORE THAN 150mm BELOW KERB, THICKNESS OF CONCRETE TO B INCREASED TO SUIT.
3. CONCRETE AND BACKING TO BE GRADE ST2 UNLESS STATED OTHERWISE
4. BACKFILL BEHIND BASE AND BACKING BELOW PAVED AREAS TO BE GRANULAR TYPE 1, AND BELOW GRASS VERGES TO BE ACCEPTABLE MATERIAL.
5. FOR CURVES OF RADIUS 12m OR LESS, KERBS OF APPROPRIATE RADIUS SHALL BE USED.
6. FOR CURVES OF RADIUS GREATER THAN 12m AND UP TO 20m, STRAIGHT KERBS OF 600mm LENGTH SHOULD BE USED.
7. NO KERBS SHORTER 300mm SHALL BE USED.
8. KERB BACKING IS TO BE PLACED WITHIN 2 HOURS OF KERB BED OR CONSTRUCTION JOINT FORMED.
9. FOR TWO PART CONSTRUCTION 16mm Ø DOWEL BARS TO BE PROVIDED AT 450mm CENTRES.
10. FOR LOCATIONS OF BLOCK PAVED OR SLABBED FOOTWAY CONCRETE BACKING TO BE LEFT LOW TO ALLOW FULL DEPTH PAVING UNIT AND LAYING COURSE.

Central Bedfordshire	Dwg No: CBC/SD/1100/02	Scale: NTS @ A4
	Date: September 2020	Revision: C01
	KERB AND EDGING BEDDING	

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TYPICAL DRAINAGE CHANNEL LAYOUT

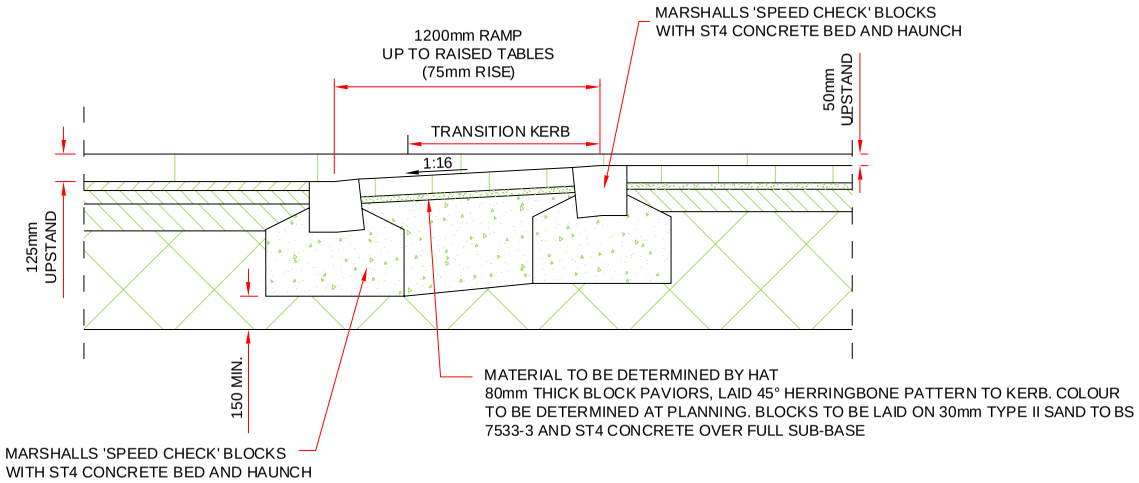


DRAINAGE CHANNEL CONSTRUCTION DETAIL

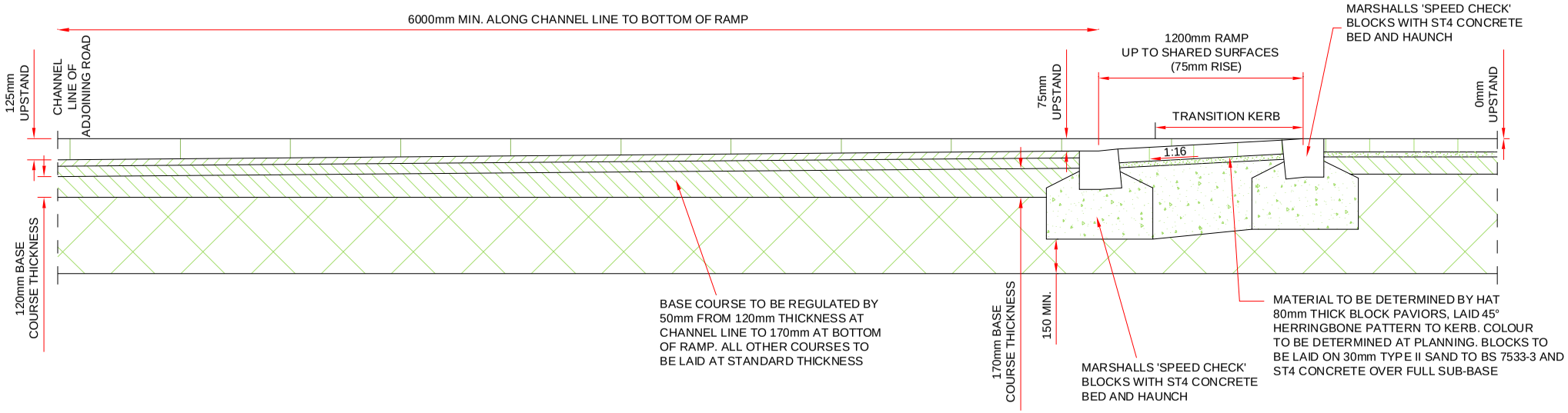
NOTES:

1. DRAINIAGE CHANNEL WITH 200x100x80mm CONCRETE BLOCKS IN STRETCHER COURSE WITH CONCRETE GRADE ST4 BED. MOVEMENT JOINTS FORMED FROM 10mm THICK COMPRESSIBLE MATERIAL (FLEXCELL OR SIMILAR APPROVED WITH COLOURED SEALANT) ARE TO BE PROVIDED AT ALL MITRED CORNERS AND AT POINTS 640mm ON THE LOW SIDE OF ALL GULLY'S (MEASURE FROM INTERNAL EDGE OF GULLY POT).

Central Bedfordshire	Drawing No.: CBC/SD/1100/03	Scale: NTS @ A4
	Date: September 2020	Revision: C01
	SHARED SURFACE DRAINAGE CHANNEL	For reference purposes, only for use on Central Bedfordshire Council Streets.



TYPICAL CROSS SECTION THROUGH BLOCK PAVED RAMP TO RAISED TABLES



TYPICAL CROSS SECTION THROUGH BITUMINOUS CARRIAGEWAY REGULATING & BLOCK PAVED RAMP TO SHARED SURFACES

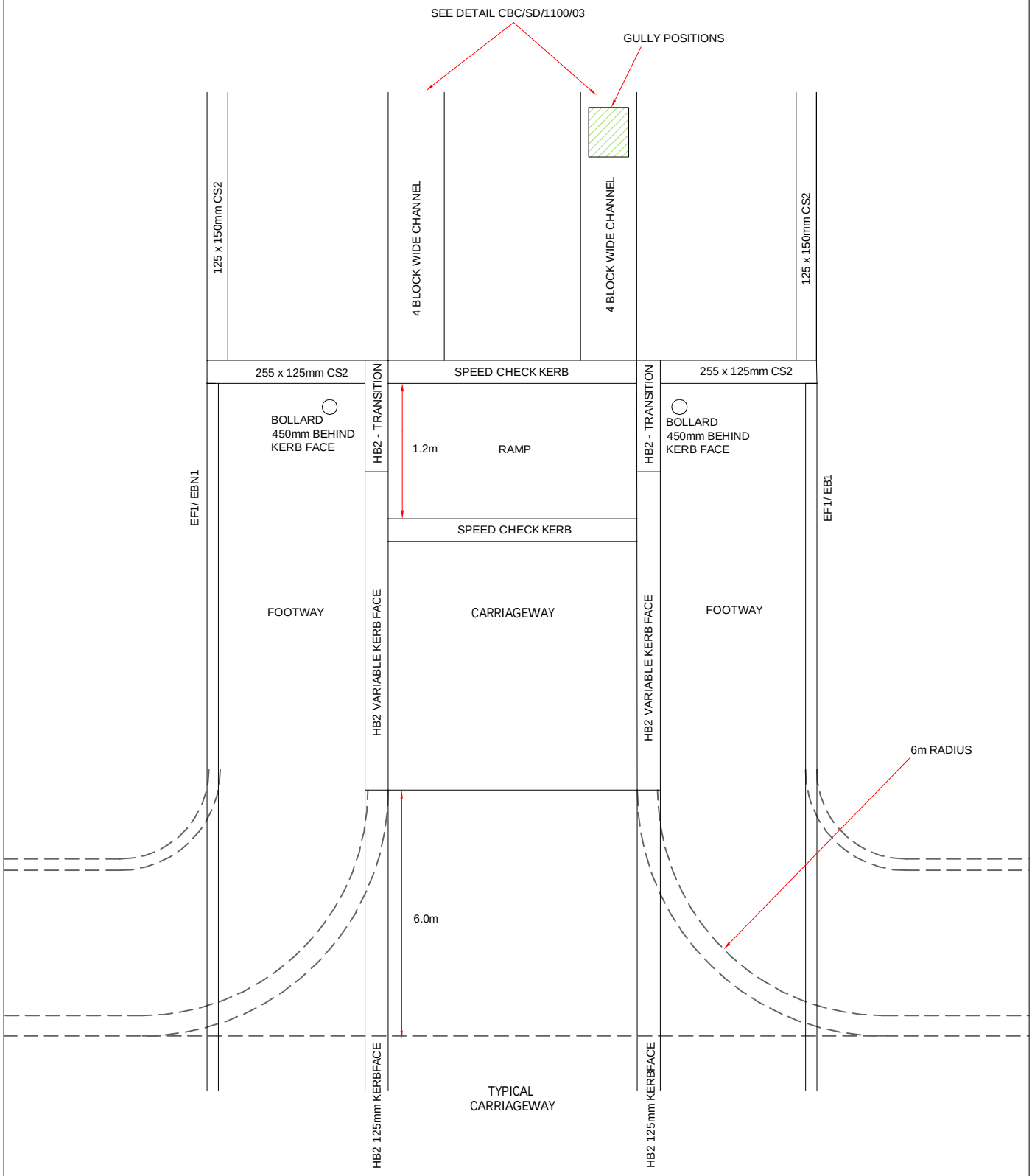
Central Bedfordshire

Drawing No.: CBC/SD/1100/04	Scale: NTS @ A4
Date: September 2010	Revision: C01

TYPICAL RAMP SECTION

For reference purposes, only for use on Central Bedfordshire Council Streets.

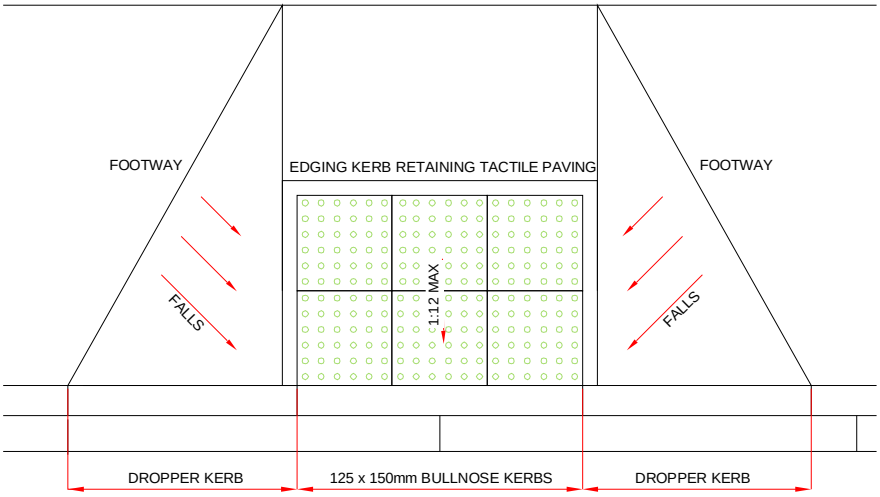
SHARED SURFACE STREET



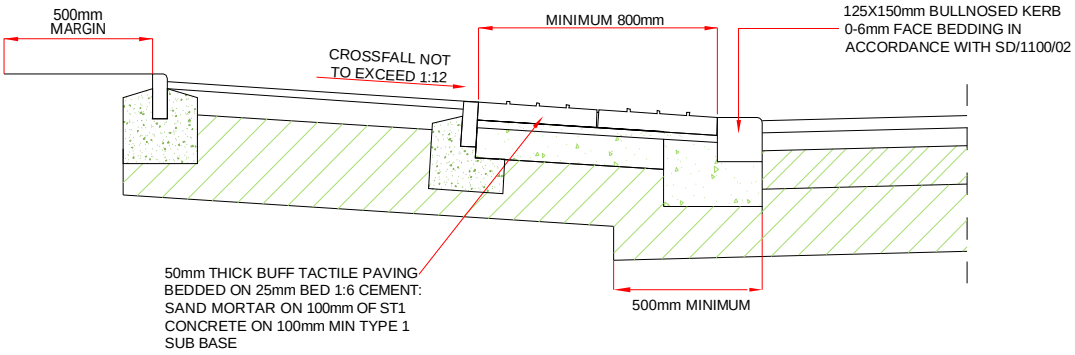
NOTES:

1. REFER TO DRAWING CBC/SD/1100/01 FOR TYPES OF KERB DETAIL.
2. FOR RAMP DETAILS, SEE DRAWING CBC/SD/1100/04.

Central Bedfordshire	Dwg No: CBC/SD/1100/05	Scale: NTS @ A4
	Date: September 2020	Revision: C01
	RAMP DETAIL PLAN	For reference purposes only for use on Central Bedfordshire Council Streets



PLAN DETAIL OF UNCONTROLLED TACTILE PAVING CROSSING

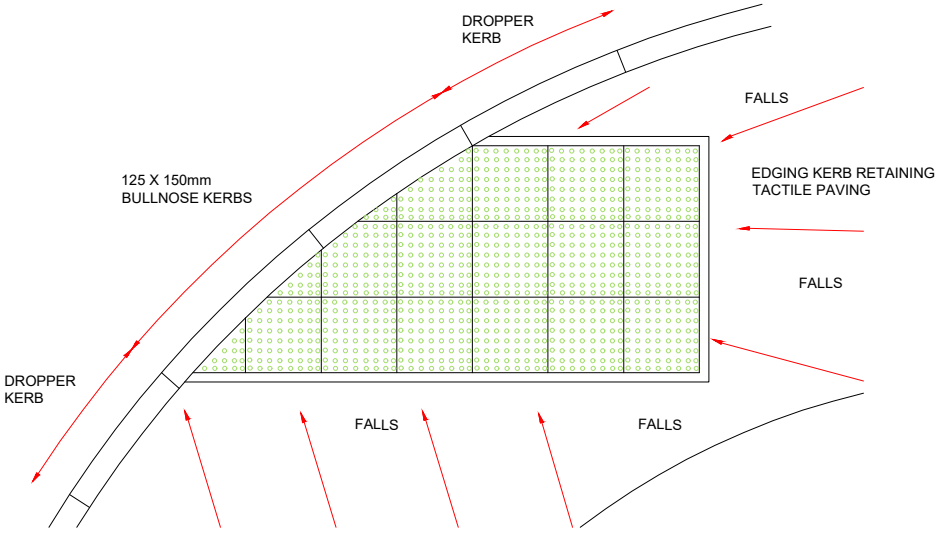


SECTION THROUGH TACTILE PAVING CROSSING

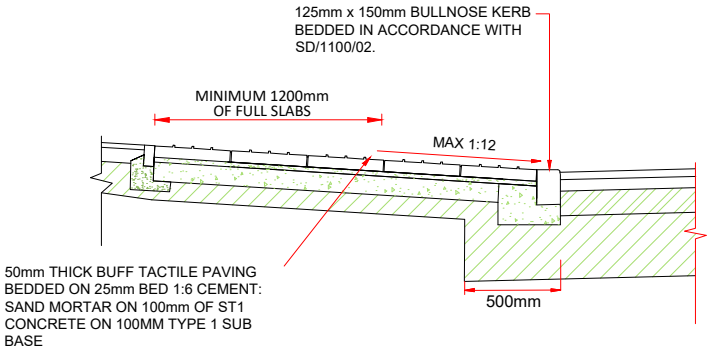
NOTES:

1. FOR FURTHER DETAILS/LAYOUTS PLEASE REFER TO CBC GUIDANCE NOTES FOR UNCONTROLLED AND CONTROLLED FACILITIES.
2. ALL TACTILE PAVING SHALL BE RETAINED BY AN EDGING KERB, LAID FLUSH.
3. EXTENT OF DROPPER KERBS MUST MATCH THE WIDTH OF TACTILE PAVING.

Central Bedfordshire	Drawing No.: CBC/SD/1100/06	Scale: NTS @ A4
	Date: September 2020	Revision: C01
	TACTILE PAVING CROSSING DETAIL (AWAY FROM JUNCTIONS)	For reference purposes, only for use on Central Bedfordshire Council Streets.



PLAN DETAIL OF UNCONTROLLED CROSSING

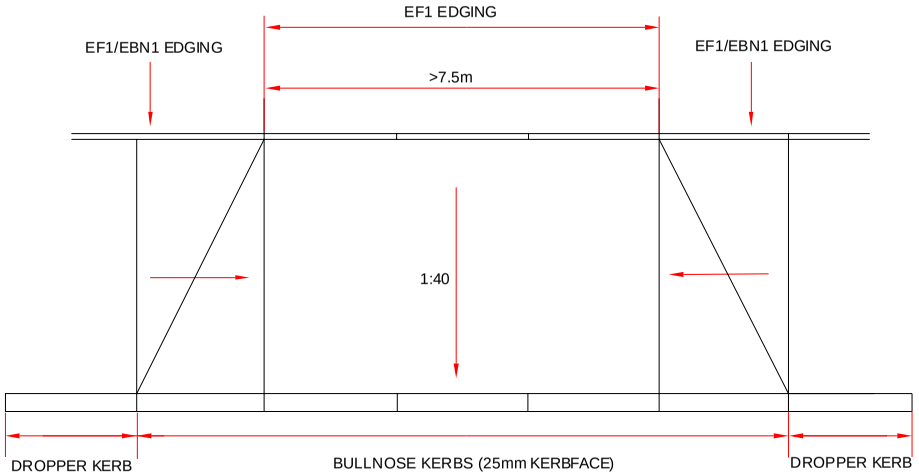


SECTION THROUGH UNCONTROLLED CROSSING

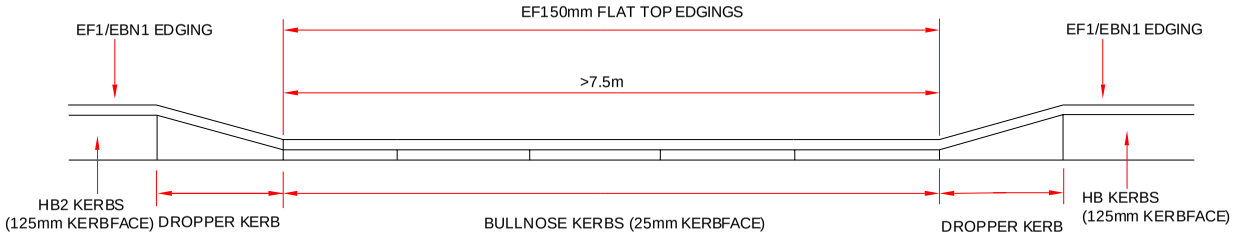
NOTES:

1. ALL TACTILE PAVING SHALL BE CONTAINED BY AN EDGING KERB, LAID FLUSH.
2. EXTENT OF DROPPER KERBS MUST MATCH THE WIDTH OF TACTILE PAVING.

Central Bedfordshire	Dwg No: CBC/SD/1100/07	Scale: NTS @ A4
	Date: October 2019	Revision: 0
	TACTILE PAVING CROSSING DETAIL (AT JUNCTIONS)	For references purposes, only use on Central Bedfordshire Council Streets.



PLAN DETAIL

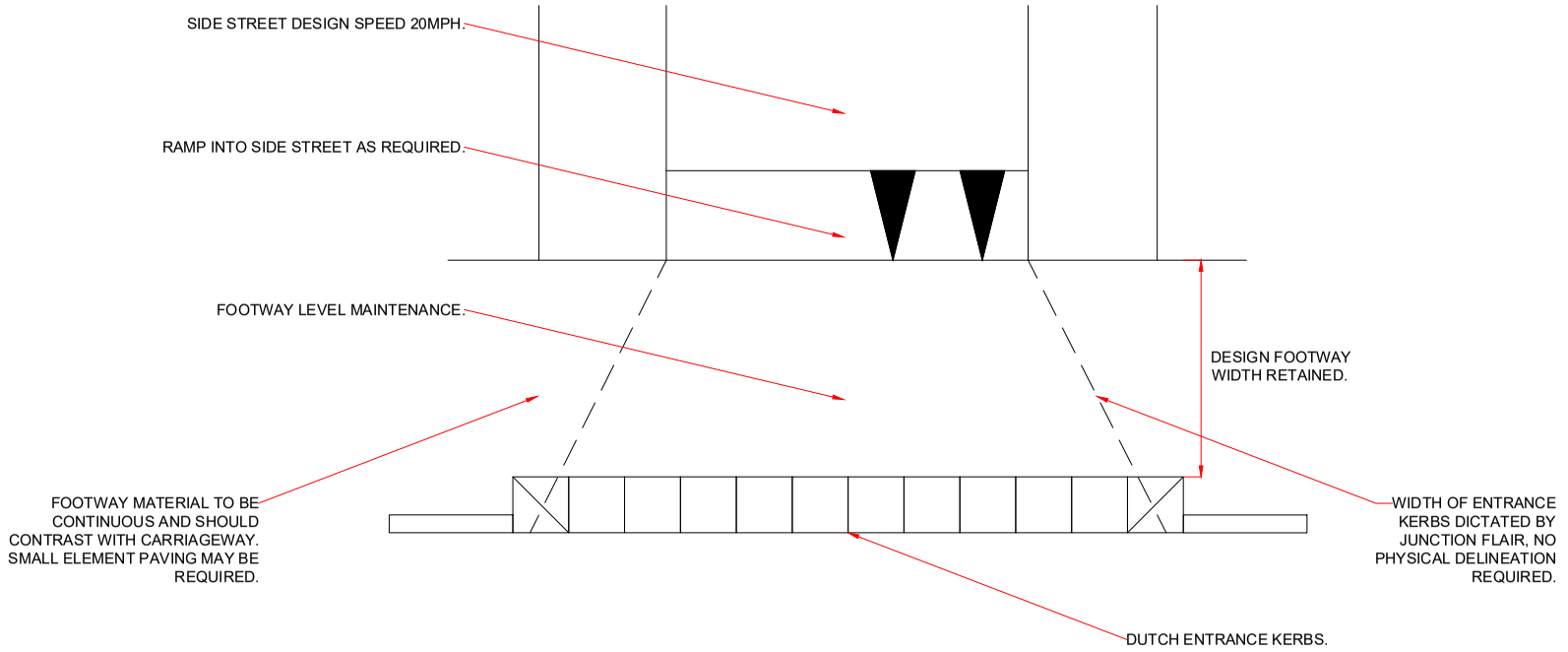


ELEVATION DETAIL

NOTES:

1. THE 1:40 FOOTWAY CROSSFALL SHOULD BE MAINTAINED THROUGH THE VEHICLUAR CROSSING POINTS AND THE REAR EDGING KERB ADJUSTED ACCORDINGLY

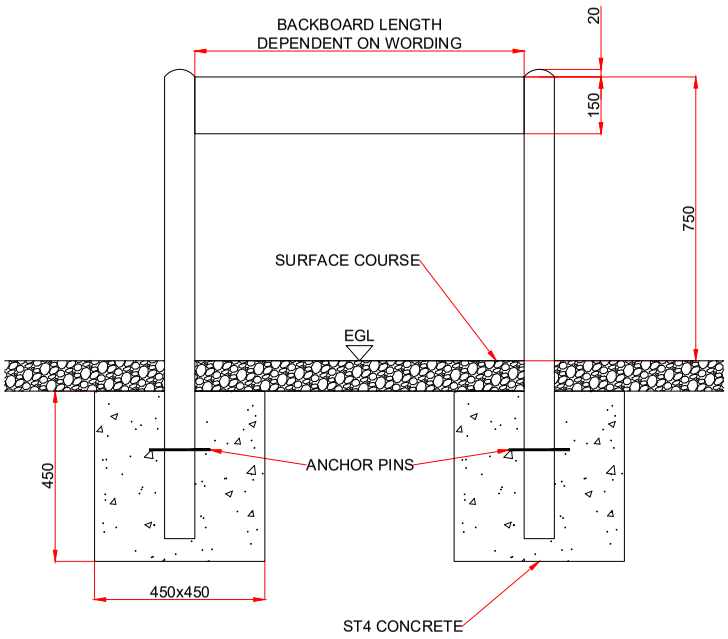
Central Bedfordshire	Drawing No.: CBC/SD/1100/08	Scale: NTS @ A4
	Date: September 2020	Revision: C01
	ALTERNATIVE VEHICULAR CROSSING >7.5m	For reference purposes, only for use on Central Bedfordshire Council Streets.



Drawing No.: CBC/SD/1100/09	Scale: NTS @ A4
Date: July 2022	Revision: 0

CONTINUOUS CROSSING DETAIL

For reference purposes, only for use on Central Bedfordshire Council Streets.



SPECIFICATION

POSTS
- BLACK RECYCLED PLASTIC POSTS
- POST DIMENSIONS 80 X 80 X 1220MM WITH BEVELLED TOPS
- MILLED (ROUTED) AT TOP OF POST TO ACCEPT MAIN BACKBOARD ASSEMBLY
- BASE OF POST DRILLED TO ACCEPT 10MM X 160M ANCHOR PINS WHICH ARE TO BE CONCRETED INTO FOUNDATION

BACKBOARD
- 30MM X 150MM SECTION, OVERALL HEIGHT AND LENGTH OF BACKBOARD IS DEPENDENT UPON NUMBER OF LINES AND LENGTH OF WORDING

SIGN FACE
- STABILISED IMPACT RESISTANT POLYCARBONATE

CHANNEL
- "U" SECTION CHANNEL TO BE FITTED TOP AND BOTTOM OF BACKBOARD TO RETAIN SIGN FACE
- "U" CHANNEL TO BE BONDED WITH 3M SCOTCHWELD EX BONDING ADHESIVE

LETTERING
- 89MM HIGH, KINDERSLEY (HERITAGE USE) OR MOT (STANDARD USE)
- 'NO THROUGH ROAD' SYMBOL TO TO DIAG. 816.1 TO BE ADDED TO STREET NAME PLATE WHERE THE ROAD IS A NO THROUGH ROAD

FOUNDATION
- POSTS WILL REQUIRE ST4 CONCRETE FOUNDATIONS 450 X450 X450MM TO UNDERSIDE OF SAND LAYING COURSE/SURFACE COURSE

NOTES

1. ALL ROAD NAME PLATES ARE TO BE INSTALLED WITHIN ADOPTABLE HIGHWAY PRIOR TO FOOTWAY SURFACING WORKS, AT THE BACK OF THE FOOTPATH/ADOPTABLE BOUNDARY IN POSITIONS TO BE AGREED WITH A HIGHWAYS AUTHORITY REPRESENTATIVE.
2. THE MOUNTING HEIGHT TO THE TOP OF THE NAME PLATE IS TO BE 750MM.

Central Bedfordshire

Drawing No.: CBC/SD/1200/01	Scale: NTS @ A4
Date: July 2022	Revision: C01

STREET NAME PLATE DETAIL

For reference purposes, only for use on Central Bedfordshire Council Streets.

Appendix F. Structures Guidance

Retaining Walls

The following forms of structure are considered to be a Retaining Wall

A retaining wall is any wall constructed that retains soil or other materials at locations where an abrupt change in level is generated. There are many types of structures used to retain soil and other materials including:

- Cantilever Walls (e.g. Reinforced Concrete)
- Gravity Walls (e.g. Mass Concrete, Masonry, Gabion Baskets)
- Sheet Piling
- Geotechnical Solutions (e.g. Reinforced Earth, Soil Nails)
- Reinforced Concrete Contiguous Pile Walls

When is a Retaining Wall defined as a 'Highway Related Structure'

A retaining wall or similar structure will be classed as a 'Highway Related Structure' in accordance with Section 167 of the Highways Act 1980, and therefore requires technical approval if the structure meets either criterion below:

Figure A - Where the retained width (W) is less than 1.5 times the retained height (H) of the structure, this will be deemed a highway related structure.

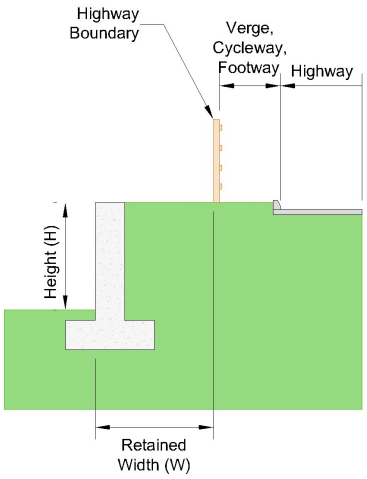
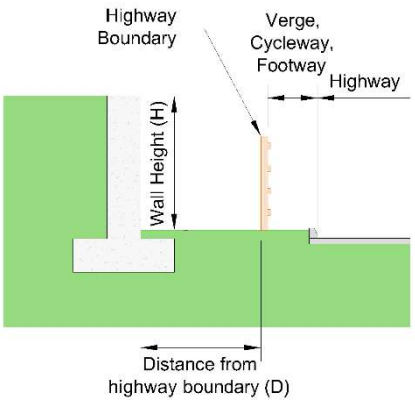


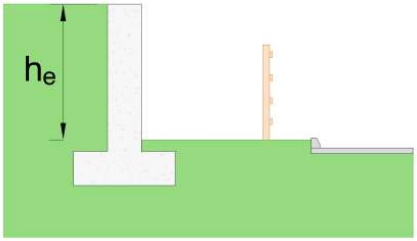
Figure B - Where the distance from the highway boundary (D) is 3.65m or less and the retaining wall height (H) is above 1.37m, the wall will be deemed to be a highway related structure.



How do the characteristics of a Retaining Wall determine the Category of Check required in the Technical Review process?

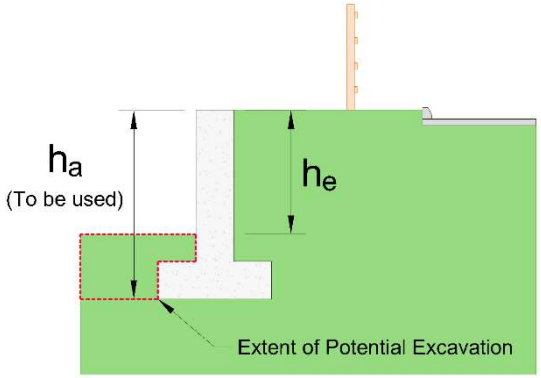
Once it has been determined that a retaining wall or similar structure requires technical approval, as per the previously discussed criterion, a category of check will be assigned to the structure in accordance with CG 300, with the addition of an enhanced check for minor structures. The category check applied to a retaining wall will be defined by the effective height of material it retains (he); typically, a structure will be appropriated to the following category check:

- **Minor Structures -** h_e < 1.5m (Where the distance from the highway boundary is less than 1.5 x h_e)
- **Category 0** - 1.5m ≤ h_e < 2.0m
- **Category 1** - 2.0m ≤ h_e < 7.0m
- **Category 2** - 7.0m ≤ h_e < 14.0
- **Category 3** - 14.0m ≤ h_e



Who has the responsibility to define the Category of Check required in the Technical Review process?

It is the Developer's responsibility to propose a category of check to the Technical Audit Team, however ultimately it is at the discretion of Technical Audit Team to confirm the category of check required. The Technical Audit Team may also determine that the actual height (h_a) of the retaining wall may define the check, rather than the effective height (h_e). This scenario will typically occur where the presence of passive pressures may not be considered guaranteed; for example, on private land, where a homeowner has the potential to excavate to the base of the wall (See below).



What other responsibilities fall under the Developers remit?

Where a retaining wall or similar form of structure is constructed alongside the highway and considered a 'highway related structure', the Developer has a responsibility to assess roadside hazards. Roadside hazards are generally assessed using the Road Restraints Risk Assessment Process (RRRAP), however the RRRAP is constrained by a speed limit of 50 mph or greater and/or an Annual Average Daily Traffic flow of 5,000 or greater. The alternative to this process is a risk assessment which must be undertaken in accordance with the Design Manual for Roads and Bridges and CD 377. This process will be undertaken by the Developer either internally or by a third party and will be

submitted for review to the Technical Approval Team before the structure can receive certification. Where it is deemed that a road restraint system is required due to the hazards identified the detailed design and installation need to be completed by a registered supplier listed under National Highway Sector Scheme Certification.

The Developer has the responsibility to employ a competent, experienced engineer to design their structures and an engineer suitably qualified to sign off any internal components of the technical approval process. The Technical Audit Team will not relax the requirement for Design & Check certificates to be signed by a Chartered Engineer (MICE, MIStructE or equivalent).

What Technical Approval Process are Pre-Cast Retaining Wall units subjected to

Precast units such as L-Walls & Vertical Cantilevers with specific attributes do not require a full technical approval. In order to bypass the majority of this process, units must be:

- Fully compliant with the Construction Products Regulation
- Either CE marked or a similar recognised product registration system (to current and national Standard)
- Being used for their correct intended use
- Satisfy specified performance standards

Evidence of compliance with all of these attributes must be submitted to the Technical Audit Team along with appropriate certificate. In circumstances under which precast units are combined with insitu construction a combination of the two approaches will be used.

Flow Control Chambers

The technical approval process of flow control chambers (known colloquially as hydro-brakes) applied by Central Bedfordshire Council incorporates the methods and practises set out in the Design Manual for Roads and Bridges, CG 300, Technical Approval of Highway Structures, with some additional structure specific procedures.

What components of a Flow Control Chamber require Technical Approval?

A typical flow control chamber comprises three main elements, the chamber and any associated foundations, the flow control mechanism and the cover slab. In general flow control chambers will only have to go through the technical approval process where a design includes components that are not ‘off the shelf’. Any flow control chamber that is designed either in house or by a third party requires a technical review, this also includes the use of designs based on any technical standard details. The technical approval process for flow control chambers follows the same step by step process as retaining walls. The exception being the way in which the category of check is selected. Any Flow Control Chamber built underneath the highway or highway adopted land will be considered a ‘Highway Related Structure’ and must go through the technical approval process in order for the highway to be adopted under a Section 38 agreement.

What characteristics of Flow Control Chambers determine the Category of Check required in the Technical Approval process

The proposed check category for cover slabs will be based on its maximum span in accordance with the Design Manual for Roads and Bridges and CG 300. Whereas the category of check required for chambers will be defined by diameter. The category of check required for both cover slabs and chambers can be typically designated as follows (where cover is less than 1.0m):

- **Category 0** - 0.9m < Span < 5.0m
- **Category 1** - 5.0m ≤ Span < 20.0m
- **Category 2** - 20.0m ≤ Span < 50.0m
- **Category 3** - 50.0m < Span

What Technical Approval Process are Pre-Cast Flow Control Chambers/Cover Slabs subject to?

As with pre-cast retaining wall units, pre-fabricated flow control chambers and cover slabs will not require a full technical check, provided a certificate and evidence of compliance with the following criteria can be provided:

- Fully compliant with the Construction Products Regulation
- Either CE marked or a similar recognised product registration system (to current and national Standard)
- Being used for their correct intended use
- Satisfy specified performance standards

Appendix G. AIP Document

Logo....

Scheme Name

Design Statement for

.....

Date: M/Yr.

Company Address:
.....
.....
.....
.....
.....

Issue & Revision Record:

Revision	Issue Date	Originator	Reviewer	Approver
0				

1.0 Background Information:

include description of the existing structure, environment and historical date including current capacity and reasons for strengthening/replacement.

2.0 Description of the Structure:

- *Description of proposed structure*
- *Elements of Sub/super structure designed by others*
- *Materials & finishes*
- *Waterproofing System*
- *Parapets & VRS*
- *Risks & Hazards*
- *Design Criteria*
- *Proposed method of analysis*

3.0 Constraints:

- *List authorities consulted*
- *Details of constraints to the proposed structure*

4.0 Loading:

Proposed loading and load models to Eurocodes
STGO vehicles & SV Loading models proposed

5.0 Environmental & Ecological Information:

Provide any available information/scoping surveys etc
List any concerns/constraints and appropriate authorities consulted....

6.0 Geotechnical Information or Assumptions:

provide Geological surveys/investigation reports or historical date available

7.0 List of Codes and Standards to be Referenced on the Certificate:

List of latest relevant standards and codes (from DMRB vol.0; sec. 1) are included below

Appendix H. Bus Stop Specification

Central Bedfordshire Council Bus Stop Specification - December 2021

This specification has been compiled to assist developers and other organisations to understand the requirements that Central Bedfordshire Council Public Transport Team expects when new bus stops are to be constructed as part of any new development. Bus stops that are to be constructed on the existing road network should meet these requirements as far as possible but it is appreciated that pre-existing constraints on space or utilities available may preclude full installation of all facilities, however we ask that we are consulted during the decision making process. The below specification is not exhaustive and full details should be discussed with the Public Transport Team at the time of design. The team can be contacted on public.transport@centralbedfordshire.gov.uk

ACCESS OF BUS SERVICES INTO A DEVELOPMENT

Roads to be used by buses within a proposed development to be constructed to between 6.50 and 7.00 metres width wherever possible, Consideration should be given to the potential bus route at this stage and identifying areas of the development where parking measures may need to be considered in order to allow buses free access through the development at all times of day both during and after completion of construction.

Consideration should also be given to the stages of the development and potential routing for bus services during the construction period to not conflict with building works and to maximise the availability of the service to customers.

LOCATION OF BUS STOPS WITHIN OR ADJACENT TO A DEVELOPMENT

Consideration should be given to the proximity of new bus stops to existing bus stops outside a development to ensure that an even distance is retained between them. Discussion may be needed with Central Bedfordshire Council to examine the possibility of moving the existing stops in order that buses do not have to stop twice in a short stretch of road.

Within new developments the location of bus stops should follow the same principals and should be evenly spaced with a reasonable distance in between stops so buses are able to make progress through the development. Bus stops should be located so they do not cause issues with junctions or parking opposite / nearby allowing buses to have full and safe access into and out of bus stop locations with clear visibility for buses pulling out of the stop.

KERBING

Please see attached specification for agreed design of kerb upstand which should be installed at all new or rebuilt stops unless there are clear reasons why this should not be the case. The attached drawing can be sent as a separate pdf file if required.

BUS STOP LAYBY AND LINING

Any single bus stop layby should be able to accommodate one bus of 12 metres in length with approx. 30 degree splay at either end (up to 45 degrees may be acceptable depending on width of road). Where a frequent bus service is expected, any stop layby should be able to accommodate two buses of 12 metre length each at any one time with a 30 degree splay.

Surfacing of the bus stop layby should be in an appropriate hard-wearing tarmac, concrete or block finish and the sub-surface constructed to such a standard to withstand long-term heavy usage by larger vehicles which will not collapse or form into ruts over time under this very regular usage.

Bus stop laybys should be lined in yellow with bus stop lettering, clearway markings and legal agreements for appropriate enforcement unless specifically agreed otherwise.

ELECTRICAL POWER FEEDS

A power source should be installed to a feeder pillar close to the site of the bus shelter. Appropriate measures should be taken to ensure that the link from the feeder pillar to the bus shelter is available for connection when the shelter is installed in order that shelter lighting and RTPI can function immediately on installation. Alternatively a solar powered shelter and solar / battery realtime installation is also acceptable.

REALTIME PASSENGER INFORMATION SCREEN (RTPI)

Realtime screens should be installed at all stops sited within or adjacent to new developments. Where a stop is being installed in an existing town or village for reasons other than a new development then discussions should take place with Central Bedfordshire Council and Town / Parish council to ascertain the need or otherwise for a Realtime installation. Different types of screens will be appropriate for different types of locations and as such it is not possible to define within this document exactly what the requirement would be for each development so this should be decided on a case by case basis in discussion with the authority.

The authority's standard Realtime screen is the Axentia three line battery powered display which we would expect to be installed at all new stops unless the location is extremely rural (one bus a day or less). Where a stop is served by several services, or is likely to be well used, we would expect an Axentia five line display to be installed. These screens can be mounted in a shelter or post mounted as appropriate. Batteries in the displays are guaranteed for three years and we would expect any display to be procured with at least one additional set of batteries, and a financial contribution be made for maintenance costs of the new screens for a five year period following installation. Battery packs would not be supplied until required for replacement to ensure longevity of the cells.

If a Realtime screen is to be installed, full details can be acquired from the Council's Realtime suppliers, VIX Technology via Matthew Wilks matthew.wilks@vixtechnology.com

BUS STOP POST, FLAG AND TIMETABLE CASE

Where a shelter or post mounted Realtime screen is not being installed, a standard metal bar bus stop post fitted into a NAL socket and Central Bedfordshire Council branded bus stop flag should be installed. A Bissell 'Little Samson' 227x745 timetable case should also be installed, painted in the CBC corporate green colour (RAL codes available on request). Branded flag and timetable case supplies are held on behalf of the Council by Externiture (details below).

SHELTER

Externiture 'Mono' cantilever or traditional four leg shelter (dependant on space available) to the following specification:

2 or 3 bay (depending on likely amount of passengers using stop)
Solid lower back panels with 6mm Clear polycarbonate upper back panels
Solid Roof
6mm Clear polycarbonate end panels (upper and lower)
Mid rails
2 No. Half end panels
RTPI ready – through wired with brackets
LED Mains Lighting
2 bay Aluminium perch seat unit with handles
DRU unit on solid back panel (portrait) in CBC green colour
Bus stop flag bracket
Polyester powder coated to agreed standard colour – black with green waist rail and seat as per below photograph (Externiture have CBC RAL codes for painting).



There are also Green Roof shelter options available through Externiture called the Mono for areas that wish to have a shelter that helps reduce pollutants and encourages wildlife.



To discuss shelter requirements please contact Karen Stagg directly at:

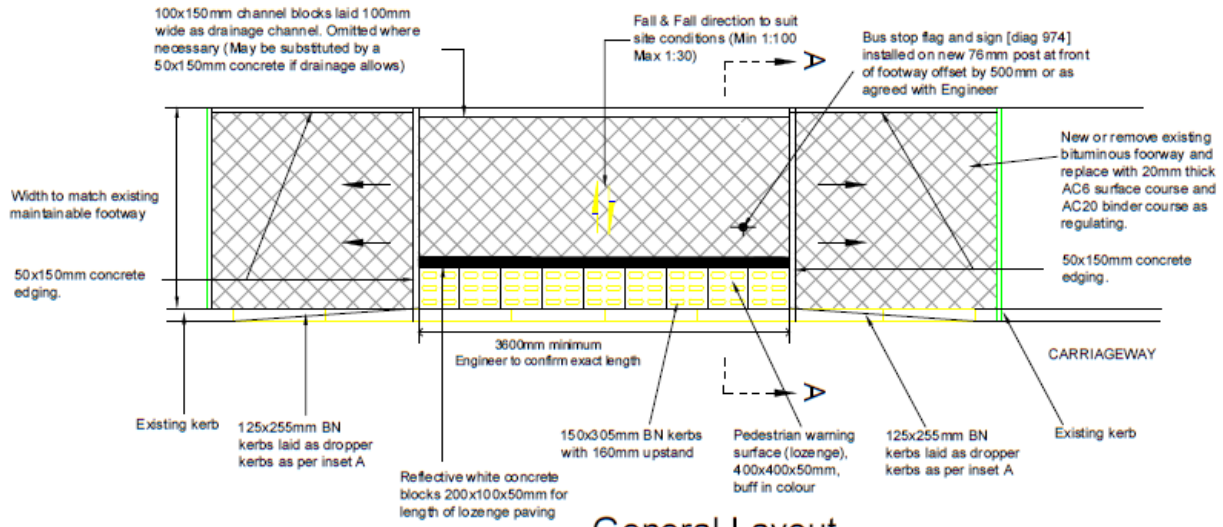
Unit 3, Daytona Drive, Thatcham, Berkshire RG19 4ZD

Tel: 01635 862100

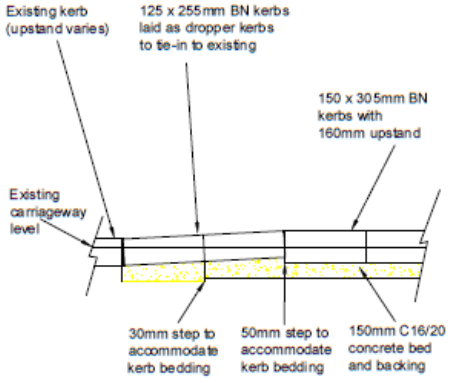
Web: www.externiture.com

Email: karen.stagg@externiture.com

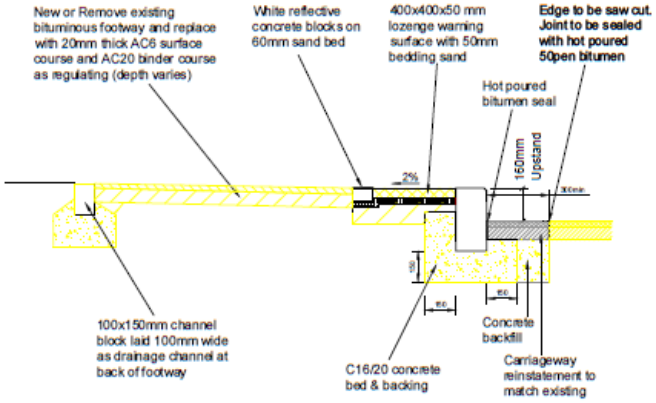
File ref - I:\bedfordshire highways\engineering\standard detail drawings\bh standard details june 2015\roads standard details dwg\1100-07 bus border kerb details.dwg



General Layout



Inset A: Dropper Kerb Details



Section A - A

NOTES
1. Maximum long-fall for dropper kerbs should not exceed 1:16
2. Setting out to be agreed on-site with the Engineer
3. Care should be taken to tie-in to existing threshold levels.
4. All dimensions are in millimetres unless otherwise shown.
5. Reflective white concrete blocks to be Marshals "Keybloc" or similar approved.
6. Edging at back of footway can be omitted if required.

Rev	Revision details	Chkd	Appd	Date

Drawn: FK		Preliminary	
Design: FK		For comment	
Chkd: PS		For tender	
Appd: PS		For construction	✓
Date: 13/04/2014		As constructed	
		Other	

amey
www.amey.co.uk

Client

Project Name

Standard Details

Drawing Title

Bus Border Kerb Details: Bituminous Footway

Original Drg Size : A4	Dimensions : -
Scale : NTS	Copyright © Amey

Drawing No	Rev
BH/STD/1100/07	-

Appendix I. Design of Highway Infiltration Drainage

Central Bedfordshire Council

Central Bedfordshire Council

Highway Construction Standards & Specifications Guidance

Adoptable Highway Infiltration Drainage

Design and Technical Submission Requirements

In association with:

JACOBS

&

RINGWAY JACOBS

integrated expertise

First Draft
August 2019

CBC Adoptable Highway Infiltration Drainage

Design and Technical Submission Requirements

Project No:	BRJ10530
Document Title:	Adoptable Highway Infiltration Drainage – Design and Technical Submission Requirements
Document No.:	
Revision:	First Draft
Date:	August 2019
Client Name:	Central Bedfordshire Council
Client No:	
Project Manager:	Sanjay Patel
Author:	Ross Goodchild
File Name:	

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Document history and status

Revision	Date	Description	By	Review	Approved
First Draft	11/09/2019	First Draft for Review/Comment	Ross Goodchild	Neil Jones	Matt Bloor

1.0 Introduction

Central Bedfordshire Council (CBC) has a desire and obligation to promote the application of sustainable urban drainage (SuDS) solutions by Developers across the borough area. This includes the use of SuDS features within future Local Authority adoptable schemes, such as adoptable highway surface water drainage.

Infiltration drainage, where ground conditions permit, is recognised as an efficient, sustainable and cost effective surface water drainage solution, providing opportunities for local runoff management and returning water to natural drainage systems, typically, close to the original source.

This guide seeks to provide Developers and Designers with an understanding of the minimum technical design requirements and standards that CBC expect to be met when offering adoptable highway drainage infiltration solutions to the Authority for adoption as part of S278 or S38 agreements.

It is crucial that Designers and Developers understand and adhere to the technical design standards in development of their drainage design strategies where adoptable infiltration drainage is proposed, and make adequate spatial provisions when masterplanning development layouts to accommodate such solutions. Failure to do so may result in any technical approval submission being rejected by CBC, and potentially jeopardise S278 or S38 processes.

2.0 Compliance

In addition to this guide, Designers and Developers should also comply with the following third-party and National infiltration design guidance before developing drainage strategies where adoptable highway infiltration drainage solutions will feature;

- CIRIA C753F ‘The SuDS Manual’ 2015 – Part B Chapter 3 ‘Designing for Water Quality’
- CIRIA C753F ‘The SuDS Manual’ 2015 – Part D Chapter 13 ‘Infiltration Systems’
- CIRIA C753F ‘The SuDS Manual’ 2015 – Part E Chapter 25 ‘Infiltration Design Methods’
- CIRIA C768 ‘Guidance on the Construction of SuDS’ 2017
- CIRIA Report 156 ‘Infiltration Drainage – Manual of Good Practice’ 1996
- BRE DG 365 – 2016 ‘Soakaway Design’

3.0 Determining the Feasibility and Suitability of Infiltration Drainage Application

3.1 Ground Conditions

Ground conditions need to be assessed by the Developer/Designer to determine the suitability of a sites underlying strata to employ highway drainage infiltration solutions, via the commissioning of a ground investigation. The extent of investigations should look to achieve a simple but robust conceptual model of the site geology and groundwater levels, which CBC will need to see demonstrated satisfactorily as part of any adoptable infiltration drainage technical submission. Notwithstanding recommendations of how ground investigations should be carried out, detailed within the third party resources listed in 2.0, generally:

- Where made ground, clays, silts or shallow groundwater is encountered, such locations are unlikely to suitable for the application of infiltration drainage techniques;
- The groundwater level will need to be a minimum of 1m below the invert of any proposed adoptable infiltration drainage solution (taking account of seasonal variations in levels and underlying trends, see C753 paragraph 25.2.2.). Where encountered, monitoring should be arranged to determine seasonal level fluctuations (typically a monitoring period with groundwater levels logged between October and April should reflect the full range of levels);
- Sand with a very small particle size can prove to have poor infiltration properties due to low void space between particles;
- Sites underlain by rock will require the identification of suitable fissures with which to provide a pathway for infiltration opportunities;

- Sites underlain by chalk can often prove suitable for infiltration, however the extent of weathering and chalk density needs examination in detail by suitably experienced geotechnical experts.

It is also important to understand and demonstrate to CBC;

- The site proximity to groundwater extraction points and associated aquafers, in the interests of ensuring any infiltration to ground proposals do not present a risk to local water quality;
- Historic local flooding issues to ensure any contributions to groundwater from infiltration drainage do not increase flood risk;
- Proposed site topography to understand and manage (through design) overland flowpaths in the event of any infiltration solution flooding;
- Historic mapping for the site area to check if there are any historic site features that would not be favourable locations to position infiltration drainage solutions (such as where old ponds were sited).

If Developers and/or Designers make pre-application enquiries, geological information and borehole logs from the BGS website should be provided if ground investigation data is not yet available.

3.2 Infiltration Testing

Infiltration testing is the key investigatory component that determines the feasibility of applying infiltration drainage solutions on any site. Generally, infiltration testing is commissioned as part of a sitewide ground investigation, in positions and depths that look to furnish Developers and Designers with a basic overview of underling site ground permeability and provide an initial view as to the suitability for infiltration drainage. This approach to infiltration testing often does not provide the level of data required to design infiltration drainage satisfactorily, nor provide sufficient data to support technical approval submissions, leading to further testing being required once conceptual infiltration drainage design has been completed. **Developers must recognise the level of data required to support a technical approval submission, and this potential additional testing requirement, and apply appropriate scrutiny to the scope of works when commissioning preliminary ground investigations in order to maximise outputs.**

Infiltration testing fully in accordance with BRE DG365 is considered to be the minimum acceptable testing benchmark by CBC, and Developers/Designers will be expected to demonstrate that BRE DG365 has been followed satisfactorily when making S38 and S278 highway infiltration drainage technical approval submissions. In particular, it is important for those commissioning and undertaking infiltration tests to ensure:

- A minimum of 3 tests per test location are undertaken, to simulate ground saturation/impact of repeat storm events on infiltration performance;
- Tests completed at the effective depth of the proposed infiltration solution. Note that it is critical to ensure the effective depth criterion is met, even if this means reduced level excavation to facilitate undertaking the infiltration tests. Testing undertaken at levels above the proposed soakaway depths will not generally be considered satisfactory without further supporting information as it does not take adequate account of possible changes in ground conditions with depth or areas of high ground water;
- The horizontal spacing of the infiltration tests will depend on the site layout and the degree of variation encountered in ground conditions across the site. The aim should be to locate a test within 20m of any proposed infiltration feature location. Where ground conditions are variable, test locations should be in much closer proximity (<20m) to the proposed feature (although spacing specific to each development will need to be determined by the Designers/Developers geotechnical designers). Where a large infiltration feature is proposed, such as a geocellular system, several test locations within the proposed feature footprint are required.

Generally, infiltration rates lower than 1×10^{-6} would be classed as unsuitable for adoptable highway infiltration drainage solutions by Central Bedfordshire Council.

4.0 Permitted Types of Adoptable Highway Infiltration Drainage Solutions

4.1 Pre-cast perforated concrete ring soakaway structures

A pre-cast perforated concrete ring soakaway structure comprises of a cylindrical chamber into which the surface water run-off from the adoptable highway catchment area is collected typically, via direct gully connections. (Typical precast concrete ring arrangement is shown in CIRIA C753). The chamber is formed from precast cylindrical rings typically between 0.5m and 1m high which are stacked upon each other to produce the required height to achieve the effective storage volume demanded (see section 5.2). The surface run-off discharges into the surrounding strata suitable for infiltration drainage application through perforations in the rings. Water is prevented to seep into unsuitable soils, typically at the highest point of the structure, by installing non-perforated rings in the region of these strata. Sealing of the joints in the rings and sealing of any perforations such as lifting hook openings are also required in these nonperforated rings. Precast cylindrical rings are constructed on a concrete base to prevent the soil being washed away and eventually undermining the bottom rings. The excavation in which the soakaway is located is backfilled with a suitable free draining granular material. This disperses the concentrated flows of water passing through the perforations and allows the soakage medium to be fully utilised.

Should a series of linked pre-cast perforated concrete ring soakaway structures be proposed, a minimum of 5m distance between structures will be required and suitable consideration given to the impact of siltation within chambers in setting the invert level of link pipework.

4.2 Infiltration Pits/Trenches

Infiltration pits and trenches are typically shallow excavations filled with stone that provide temporary below ground storage of surface water runoff. Stored surface water infiltrates into the surrounding soils from both the bottom and sides of the pit/trench. The design of infiltration pits and trenches should be in accordance with guidance provided in CIRIA C753 and Report 156.

Application of such solutions is typically not acceptable for sites with fine particled soils in upstream catchments due to the potential for clogging, and in all instances effective surface water pre-treatment should be considered to reduce silt migration into the stone filled void.

4.3 Infiltration Basins

Infiltration basins are typically shallow artificial ponds used at the terminus of a surface water drainage system, providing attenuation and storm water disposal via infiltration within the basin footprint. Detention ponds/features are often required immediately upstream of infiltration basins to provide surface water pre-treatment, primarily to remove sediment. When designing such features, consideration must be given to operational maintenance access and associated activities, and sufficient space provided to undertake tasks such as desilting and vegetation/grass management. Given infiltration basins can hold a significant volume of water following storm events, particular design attention should be given to flood and drowning risk - typically features of this type will be required to demonstrate no flooding in a 100 year return period storm event (+ climate change allowance). The design of infiltration basins should be in accordance with guidance provided in CIRIA C753.

4.4 Swales

Whilst swales are primarily used to convey and control surface water flow, if underling soils permit, they can also be utilised as effective infiltration features as part of an integrated highway drainage network solution. Highway surface water can discharge into swales via piped outfalls, or side inlets along kerb and channel lines where the features run parallel to the highway alignment. The design of swales should be in accordance with guidance provided in CIRIA C753. Consideration should be given to the potential transfer of infiltrated water migrating into the underlying highway construction layers when developing the design, which may influence swale design depths, positions or pavement protection measure requirements.

4.5 Permeable pavements

Permeable pavements typically comprise of specialist block paviours which interlock to provide a void space between units that allows the infiltration of surface water runoff to ground, within the block paviour pavement footprint. Block paviours are bedded on a sand, a permeable geotextile liner then a high void ration sub base material, the latter's depth sized to provide a degree of surface water runoff storage and is dependent on the measured underlying natural strata (capping and below) infiltration performance and strength (CBR). A macadam layer, cored at suitable intervals to provide connectivity to the sub base, can also be used between the sand bedding and sub base layer to increase pavement strength. Check dams should be utilised to break up lengths of permeable pavements into 'infiltration sections' where there are seep gradients.

The application of adoptable permeable pavement solutions requires early engagement with Planners, as there are visual compliance issues adoptable highways must adhere to in their design, related to CBC acceptable materials pallets for hard landscaping, dependant on the type of development and its location – the limited permeable pavement products available on the market may not comply with available hard landscaping finish options available to the Designer.

4.6 Geocellular systems

Geocellular infiltration drainage systems are typically large infiltration structures into which a piped surface water drainage network discharges to. Generally, the structures are formed of modular plastic geocellular units and located (buried) in large open areas due to high storage volume demands. Collected surface water runoff discharges through the base and sides of the structure, which is normally bedded on sand and wrapped with a porous geotextile. Sediment forebays should be incorporated into the structures design, as well as numerous inspection and access shafts, to allow efficient future maintenance and performance monitoring.

Specialist geocellular infiltration structures can also incorporate tree pits and rain gardens, which can be advantageous where available space is a premium. Where such solutions are proposed, pre-submission discussions with CBC Planners and Highway Services are imperative to ensure performance, aesthetic and maintainability factors of proposed solutions are acceptable for adoption.

Designers of such structures should adhere to the relevant sections of CIRIA C737 'Structural and Geotechnical Design of Modular Drainage Systems', when undertaking their design.

5.0 Infiltration Drainage Design

5.1 Position

Adequate spatial provision for SuDS features should be made at the development masterplanning stage.

Adoptable highway infiltration drainage structures **should not** be located under adoptable highway pavements or footways. Typically, infiltration structures require regular maintenance throughout their design life and reasonable uncompromised and unconstrained access to all component parts is needed by the adopting authority.

Structures **should be located in adoptable verge areas, visibility splays or public open spaces**. Where located on private lands (not a preferred option, and prior approval by CBC needed), easement agreements will be required. Easements shall be sized to provide suitable and sufficient access to maintain and replace adoptable infiltration drainage structures without encroaching into private development or compromising the adoptable highway.

Maintenance access to all adoptable highway infiltration drainage structures and connected components must be considered and demonstrated within site development plans. This must include providing suitable and sufficient safe access to cleansing plant without compromising adoptable highway function or the need for extensive traffic management.

CBC typically will not adopt highway infiltration structures that are positioned under Multi Use Games Areas (MUGA) or Local Equipped Area for Play (LEAP) unless suitable reinstatement liability arrangements are agreed (CBC will not accept any liability to reinstate any part of the MUGA or LEAP in the event of undertaking maintenance or component replacement activities) and formalised legally.

Tree and shrub planting should not be within 5m of any adoptable highway infiltration structure, and root protection measures should be employed to prevent root ingress, unless as part of an integrated SuDS solution (such as tree pits).

The provisions of the SuDS Manual CIRIA C753, section 25.2.3 shall apply and should be considered when locating highway infiltration drainage structures. Any geotechnical assessment undertaken to justify infiltration within 5m of a building or road should be provided as part of any technical approval submission.

5.2 Design

Microdrainage (or similar) inputs for each type of soakaway designed are required to be completed. The inputs should adopt the following recommended design parameters, in accordance with HA 118/06, CIRIA Report 156 “Infiltration Drainage – Manual of Good Practice”, CIRIA Report C753 “The SUDs Manual” and BRE Digest 365.

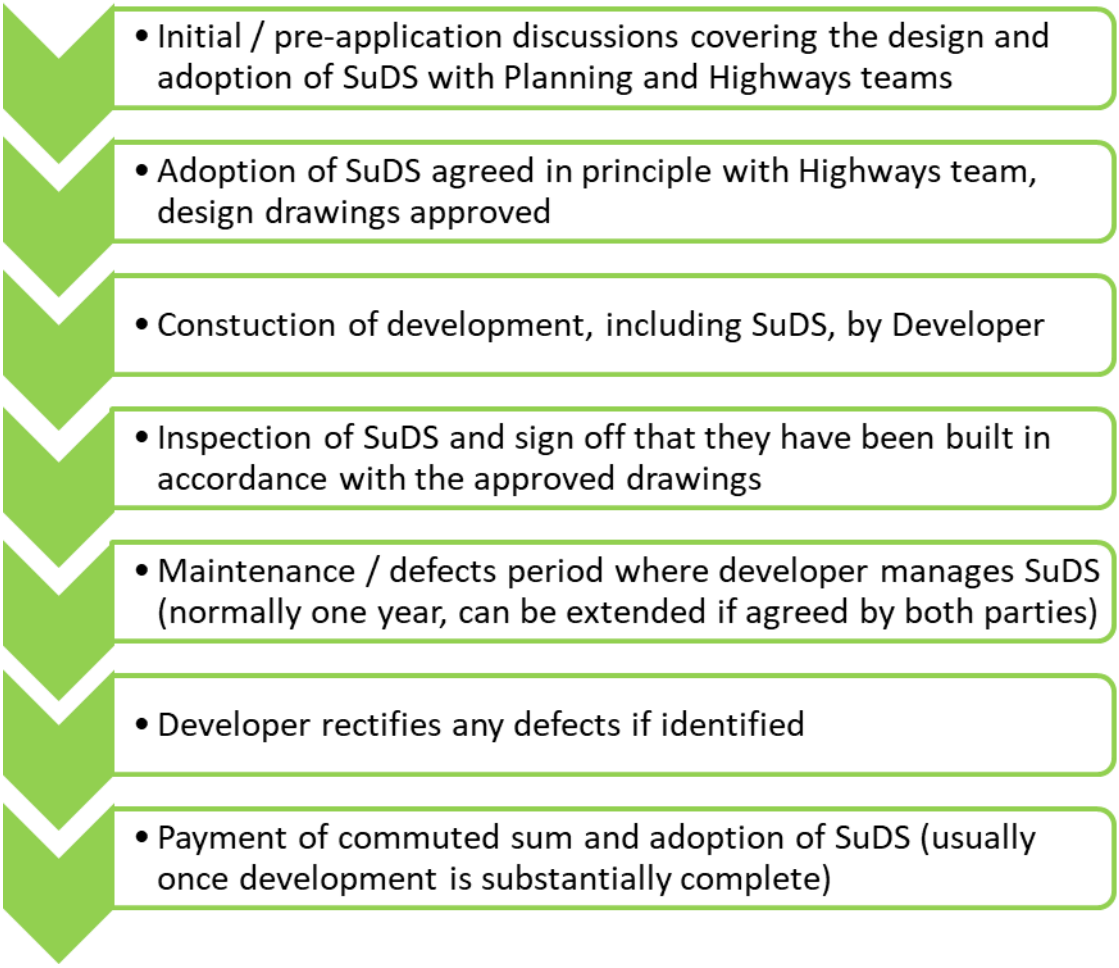
Designs should ensure the following design parameters are met:

- The Infiltration Coefficients used shall be derived from on-site testing (see 3.2);
- Calculation of the catchment area of each infiltration feature if these are individually designed / sized or, for the largest catchment area served for each type of “standard” infiltration feature. Consideration should be given to contributions from both permeable and impermeable surfaces within adoptable highway catchments.
- Factor of safety shall be 2.0 for catchments less than 100m²; 3.0 for catchments 100 to 1,000m² and 5.0 for catchments > 1,000m² [ref. CIRIA Report 156 Table 4.6/SuDS Manual 2015 Table 25.2];
- Porosity values of 0.40 for clean single sized stone; 0.30 for uniform gravel and 0.20 for graded sand or gravel should be adopted unless justification is included for the use of higher values (e.g. materials testing certificates for porosity, and drawings including a corresponding materials specification).

Microdrainage (preferred) outputs should be produced demonstrating that each infiltration feature is suitably sized. These outputs should show that the half drain time is less than 24 hours and that no flooding occurs in any flood event with a duration between 15 minutes and 1440 minutes (24 hours) and a return period of 10 years, applying an appropriate allowance for climate change (40% is considered suitable for most infiltration features with a 50 year design life, although this can vary dependant on the type of development the feature is sited within and requirements should be confirmed via Central Bedforshire Council). In addition, the network upstream of the soakaway must comply with normal highway drainage design parameters.

Consideration should be given to flood routing for the 100 year return period critical event (including allowance for urban creep and climate change) if the flooding volumes are unlikely to be contained within kerbs and on the site.. This could be achieved by providing additional storage within the infiltration features, however this approach is generally only practicable on sites with highly permeable ground conditions.

6.0 Technical Approval Process



7.0 Fees and Commuted Sums

Technical Assessment of adoptable infiltration features is subject to a separate fee and not included with Local Authority S278 and S38 development control assessment and inspection fees. Fee value is dependant on the type, size and number of adoptable infiltration features proposed to drain the S278 or S38 footprint.

All adoptable infiltration features are subject to commuted sum payments, at a value dependant on type, size, and assessment of anticipated future maintenance liabilities. Please contact CBC to ascertain the level of likely commuted sum payment, which is determined via a in-house commuted sum tool – it is advised that this is actioned prior to commencing any preliminary design work.

Developers must also note;

- They will have full responsibility for the maintenance and operation of the adoptable infiltration feature until the end of the S278/S38 maintenance period, and are also responsible for all costs incurred associated with this responsibility;
- Prior to handover (upon expiry of the S278/S38 maintenance period), adoptable infiltration features will require a thorough cleanse and any siltation removed, at their own expense;
- At CBC request, Developers will arrange and fund an inspection demonstrating the condition of any adoptable infiltration features prior to handover, and provide a suitably detailed report. This may require the

commissioning of a CCTV survey. Where any defects are found, the Developer will be responsible for undertaking and the cost of remedial works to the satisfaction of CBC.

In exceptional circumstances, CBC, at their discretion may demand extended maintenance periods or other Developer funded actions. Developers will typically be made aware of such demands during any pre-application consultations or during the Technical Review process period.

Early engagement with CBC is advised, not only so fees and commuted sums can be discussed and fixed, but also to allow the provision of brief, high level feedback to Developers and Designers on outline adoptable infiltration proposals, which can often reduce the risk significantly of abortive design progression.

8.0 Technical Approval Checklist

	Adoptable Highway Infiltration Drainage **Technical Approval Submission Requirements Checklist**	**Tick Box**
	Survey Drawing	
1.1	Topographic survey of existing site including water levels (and the date they were taken) in any water features that are present. Areas of marshy or boggy ground should also be clearly marked, with levels.	
	Design Drawings	
2.1	Proposed site layout including carriageway levels and contours, surface finishes and all proposed highway drainage.	
2.2	Adoptable infiltration drainage design drawings. Details must include: • Plan and cross sections of proposed design; • Proposed construction levels and materials; • Proposed maintenance access and easements (where applicable).	
2.3	Highway drainage longitudinal sections and manhole schedules.	
2.4	S104 drawings (to assess interaction between highway and development drainage)	
	Ground Conditions	
3.1	Ground investigation information including all development area trial pit/borehole logs and groundwater levels.	
3.2	Infiltration test details including locations, depths and rates.	
	Calculations	
4.1	Calculations of the catchment area of each infiltration features if these are individually designed / sized or for the largest catchment area served for each type of “standard” infiltration feature. The submission shall demonstrate how run-off is treated to ensure that the risk of pollutants being infiltrated to groundwater is minimised.	
4.2	Microdrainage (or similar) inputs for each type of soakaway designed. The inputs should adopt the recommended design parameters, in HA 118/06, CIRIA Report 156 “Infiltration Drainage – Manual of Good Practice”, CIRIA Report C753 “The SUDs Manual” and BRE DG365.	
4.3	Microdrainage (or similar) outputs demonstrating that each infiltration feature is suitably sized. These outputs should show that the half drain time is less than 24 hours and that no flooding occurs in any flood event with a duration between 15 minutes and 1440 minutes (24 hours) and a return period of 10 years, applying an appropriate allowance for climate change (20% is considered suitable for most infiltration features with a 50 year design life). In addition any network upstream of the soakaway must comply with normal highway drainage design parameters (no surcharge in the 1 year return period critical event).	
4.4	Details, where applicable, of flood routing for the 100 year return period critical event (including allowance for urban creep and climate change).	

Appendix J. Street Lighting Specification and Lighting Design Brief Guidelines

Central Bedfordshire Council

STREET LIGHTING SPECIFICATION AND LIGHTING DESIGN BRIEF GUIDELINES

In association with:

Jacobs

RINGWAY JACOBS
integrated expertise

Revision 3


To Kettering
A6
To Peterborough
& the north
A1
A428
To Cambridge
& East Anglia
River Great Ouse
To Northampton
A421
A428
Bedford
A421
A1
A422
A603
Sandy
Potton
To Milton Keynes
Kempston
A6
Biggleswade
A600
To Birmingham
& the north
A1
A421
Central Bedfordshire Council
Shefford
Clophill
Ampthill
A507
A507
Stotfold
A421
A507
To Milton Keynes
Flitwick
A600
Arlesey
To London
& the south
Woburn
Barton-le-Clay
A6
Toddington
A4012
M1
Heath
and
Reach
A505
A5120
Houghton Regis
Leighton Buzzard
A5
To Aylesbury
A505
Luton
Dunstable
Luton Airport
Central Bedfordshire Council
Dunstable office
Luton
Hoo
Whipsnade
M1
Crown Copyright. All rights reserved.
Central Bedfordshire Council.
Licence No 100049029 (2009)
To London & the south

1.0 Introduction

1.1.1 Please note this lighting brief is valid only for the designs submitted and approved within 6 months from the date of issue.

1.1.2 All figures are based on available data and should be used for guidance only. It is the responsibility of the Designer to notify Central Bedfordshire Council where deviation from the recommended lighting class may be considered preferential to the final design criteria.

1.1.3 Approval can only be provided if all necessary documents mentioned below are submitted.

1.1.4 Street lighting works cannot start until complete technical approval is provided.

1.1.5 Notwithstanding the following specification, Central Bedfordshire Council also has a purchasing policy formulated to achieve standardisation and best value. Contractors are free to propose materials of equivalent or better performance, but they must demonstrate to the council this this will be achieved.

1.1.6 All materials equipment shall be manufactured such that they are fully compliant with the appropriate standards and directives, including WEEE and RoHS 3 EU directive 2015/863

1.1.7 All Installation works shall be carried out by an accredited Contractors operative in accordance with the National Sector Scheme for Quality Management in Highway Works Section 8,9a & 10. Operatives should hold an appropriate CSCS card and the appropriate G39

1.1.8 Central Bedfordshire Council are currently improving their network by converting existing asset stick to LED on the Road network, Residential Areas, Industrial Estates, Town Centres, and Footways and cycleways.

1.1.9 Central Bedfordshire Council are implementing a Central Management System (CMS) to control is assets By Lucy Zodion using both the Ki.2 node and the Tektelic Kona Gateway.

1.1.10 Specific Lighting designs shall be carried out by a competent designer and in accordance with BS EN 5489-2020 and BS EN 13201 2105. A risk-based assessment is required, and this will be outlined within the lighting report along with any ecological concerns that may have been highlighted in the ecological impact report and how those factors have been mitigated if any.

1.1.11 Reality Calculations will be submitted in both. rtma, rtmr and pdf format for the road and footways.

1.1.12 Areas with ecological/environmental impact should be highlighted to the Lighting Authority and possible colour temperature of lighting shall be agreed.

1.1.13 Any deviation from the Design Brief without prior consent from CBC may result in no adoption of roadways

1.1.14 Design Brief have a one-year life, any scheme being considered/built after this time has lapsed should request a new Design Brief.

2.0 Required Documents

2.1.1 Below is a list of required documents for Section 38 and Section 278 works (Table 1):

Documents	S38	S278	Documents	S38	S278
Design Considerations	✓	✓	Column / DNO Schedule (if applicable)	✓	✓
Relevant Survey Pictures	✓	✓	Designers Risk Assessments	✓	✓
Contract Drawings (200,1300 & 1400 [if applicable]	✓	✓	Passive safety risk assessment	✓	✓
Lighting Calculations (in both pdf and Lighting Reality formats)	✓	✓	Details of illuminated signing layout	✓	✓

Electrical Cable Calculations (if applicable)	✓	✓	Environmental Considerations and are in date (1yr to 3yr Max)	✓	✓
Equipment Specifications – 200,1300, 1400 & 1900	✓	✓			

Table 1

3.0 Lighting Class Selection

3.1.1 The lighting class selection should be based on the guidance of BS5489-1-2020 and BS EN 13201 - 2015 Lighting of roads for motor and pedestrian traffic. A matrix should be produced including the parameter, options, speed and weighting and the selected value for each section of road with a different lighting class. The lighting class selected should provide enough light for the category of road whilst not providing excess light which leads to light pollution and wasted energy, and conflict areas, see Table 2 & 3.

Upon completion of the lighting class selection, this must be submitted to CBC for approval.

	Lighting Class Selection For Traffic Routes: BS5489						
	Parameter		Set Limits			Weighting Value	Selected Weighting Value
Section 1 – BS5489 – Selection Criteria	Speed	Very High	≥ 60 mph			2	
		High	40 < v < 60 mph			1	
		Moderate	≤ 40 mph			0	
				Motorways,	Two lane routes		
	Traffic Volume	Very High	≥ 40,000	> 65% of maximum capacity	> 45% of maximum capacity	2	
		Moderate	7000 - 40,000	35% - 65% of maximum capacity	15% - 45% of maximum capacity	1	
		Very Low	< 7,000	< 35% of maximum capacity	< 15% of maximum capacity	0	
	Road Type / Intersection Density	Single Carriageway / Dual Carriageway - High			≤ 3 miles	1	
		Dual Carriageway - Low			≥ 3 miles	0	
Section 2 – BS5489 – Risk Assessment	Traffic Composition	Mixed with high percentage of non-motorized				0.4	
		Mixed				0	
		Motorized Only				-0.4	
	Driving Task - Parked vehicles, bus stops and pedestrian crossings	Present				0.4	
		Not Present				0	
	Ambient Luminance	High				0.4	
		Moderate				0	
		Low				-0.4	
	Visual Guidance/Traffic Control	Very Poor				1.4	
		Poor				0.4	
		Moderate or Good				0	
	Section two Class selection details						
						M Lighting Class Selection	
	Lighting Class Selection For Conflict Areas						
Class	Signalised	Yes				0	
		No				1	
						C Lighting Class Selection	

Table 2

	Lighting Class Selection For Traffic Routes: BS5489		Speed of Road:		
	Parameter	Options	Limits	Weighting Value Vw	Vw Selected
Selection Criteria	Speed	Low	v ≤ 30 mph	1	
		Very Low	≥ 20mph	0	
	Traffic Flow	Busy - local amenities such as clubs, shopping facilities, public houses, etc.		1	
		Normal - equivalent to a housing estate access road.		0	
		Quiet - equivalent to a residential road and mainly associated with the adjacent properties or properties on other equivalent roads accessed from this road.		-1	
	Ambient Luminance	High - Shopping Windows, advertisements, station areas, sports fie		1	
		Moderate - Normal - E3 or E4		0	
		Low - Rural - E1 or E2		-1	
		Extra Low - E0		-2	
Risk Assessment	Traffic Composition	Pedestrians, motorized traffic and medium - high number of cyclists, evidence such as cycle lanes		2	
		Pedestrians and motorized traffic (low number of Cyclists)		1	
		Pedestrians and cyclists only		1	
		Pedestrians only		0	
		Cyclists only		0	
	Complexity of task	High Risk - parked cars, school entrances, traffic calming features		2	
		Medium Risk - parked cars, school entrances, traffic calming features		1	
		Low Risk - low number parked cars not causing a visibility issue		0	
	Crime Risk / Facial Recognition	**Necessary** If facial recognition is important then an ES lighting class from BS EN 13201-2:2015, Table 5, or an ESC lighting class from CIE 115:2010 [N1], Table 7, can be selected as an additional criterion. Good colour rendering contributes to better facial recognition. (The ES lighting class in BS EN 13201-2:2015 is expected to be replaced by SC upon publication of the revised edition.)		1 if crime risk with no facial recognition requirement	
		Not Necessary		0	
	Designers Comments			Adjustment	
				P Lighting Class Selection	

Table 3

4.0 Existing Street Lighting Equipment

4.1.1 A lighting survey must be carried out for all S278 schemes before carrying out a design. A survey is not required for a S38 scheme if new, but a survey of lighting of adjacent schemes will be required to establish the lighting class and any tie ins.

5.0 New Equipment

5.1.1 New equipment specified will vary depending on the street hierarchy. Refer to the CBC Highway Construction Standards Specification Guidance Issue 5 (2019) for more information on the street hierarchy. Table 4

Equipment Description	Specification		
	Shared Minor Street / Minor Street	**Access Street**	**Main Street / Collector Street**
Recommended Lighting Class	P	P	P or M/C
Recommended column height	6m (light source)	6m (light source)	8m (light source)
Column profile	CU Phosco Tubular galvanised steel / raise and lower near overhead lines or maintenance access is restricted / passively safe columns	CU Phosco Tubular galvanised steel / raise and lower near overhead lines or maintenance access is restricted / passively safe columns	CU Phosco Tubular galvanised steel / raise and lower near overhead lines or maintenance access is restricted / passively safe columns
Projection bracket	Post Top	Post Top	Post Top
Lantern inclination	0°	0°	0°
Lantern Paint colour / RAL no.	Grey RAL 7035 if no site-specific colour is specified	Grey RAL 7035 if no site-specific colour is specified	Grey RAL 7035 if no site-specific colour is specified
Lantern type (e.g. - Aluminium Canopy)	CU Phosco	CU Phosco	CU Phosco
Colour Temperature	4000k	4000k	4000k
Photo-electric control unit (PECU)	Lucy Zodion Ki 2 node with Sim to CBC specification1-Part Electronic NEMA (7 pin)	Lucy Zodion Ki 2 node with Sim to CBC specification1-Part Electronic NEMA (7 pin)	Lucy Zodion Ki 2 node with Sim to CBC specification1-Part Electronic NEMA (7 pin)
Switching Regime	20/20 lux or 100/100 lux for pedestrian crossing lanterns	35/35 lux 100/100 lux for pedestrian crossing lanterns	35/35 lux 100/100 lux for pedestrian crossing lanterns
Overall maintenance factor (MF)	0.76	0.76	0.76
Glare class (EN13201-2) / Obtrusive light control	See table below	See table below	See table below
Light source	LED	LED	LED
Column Siting	In accordance to BS5489-1:2013 Table 2 where practicable	In accordance to BS5489-1:2013 Table 2 where practicable	In accordance to BS5489-1:2013 Table 2 where practicable
Secondary Isolation (Columns)	Lockable 32A double pole switch isolator (6A BS88 Fuse) – Tofco to CBC spec	Lockable 32A double pole switch isolator (6A BS88 Fuse) Tofco to CBC spec	Lockable 32A double pole switch isolator (6A BS88 Fuse) Tofco to CBC spec -
Secondary Isolation (Signs and bollards)	Lockable 25A double pole cut-out (4A BS88 Fuse) Tofco to CBC spec	Lockable 25A double pole cut-out (4A BS88 Fuse) Tofco to CBC spec	Lockable 25A double pole cut-out (4A BS88 Fuse) – Tofco to CBC spec
Secondary Isolation (other powered equipment)	Tofco to CBC spec	Tofco to CBC spec	Tofco to CBC spec
Preferred electrical supply	DNO (UKPN Energy)	DNO (UKPN Energy)	DNO (UKPN Energy)
Feeder Pillar	Pudsey Diamond Engineering Ltd	Pudsey Diamond Engineering Ltd	Pudsey Diamond Engineering Ltd
Sign Lantern	Simmonsigns LED LUA or LUB	Simmonsigns LED LUA or LUB	Simmonsigns LED LUA or LUB
Bollard	Flexabol Pudsey Diamond retro-reflective and reboundable, with Orange backing with NAL socket retention	Flexabol Pudsey Diamond retro-reflective and reboundable, with Orange backing with NAL socket retention	Flexabol Pudsey Diamond retro-reflective and reboundable, with Orange backing with NAL socket retention

Table 4

5.1.2 For illuminance designs (P and C classes) the luminaries are to conform to the glare classification class as described in *BS EN 13201-2, Table A.1* to provide adequate control of glare.

The following lighting control shall be applied for environmental zones: Table 5

Environmental Zone	G Class	Additional requirement
E0	G6	
E1 & E2	G4	
E3 & E4	G2	Lighting intensity above 90° to be 0.0 cd

Table 5

5.1.3 All lighting designs must take account of the environment that they are located within and maintain light spill within ILP Guidance Note for the Reduction of Obtrusive Light**.**

6.0 Design Considerations

6.1.1 Once the scheme has been installed the Contractor shall supply copies of the Electrical Installation Test certificates with schedule of inspections and schedule of test results.

6.1.2 The Designer must take into consideration main highways works contract requirements.

6.1.3 Electrical construction drawing shall also show the locations of existing and proposed trees.

6.1.4 The Lighting design must show existing trees and proposed trees to highlight any issues

6.1.5 Conflict areas shall be as defined in the Institution of Lighting Professionals Professional Lighting Guide PLG 02.

6.1.6 Preferred CU Phosco Lanterns are, including the Zebra version L/H & R/H (Zebra Lanterns RAL: 9005)

a. E950
b. P852 & P852K
c. P860
d. P861
e. P862
f. P863

6.1.7 Illuminated signs shall have a private cable network, supplied from the nearest adjacent column or feeder pillar. The cable shall be ducted with draw pits where it involves road crossing or length of the duct is more than 30m. See section 10 for details on depths of draw pits.

6.1.8 If the bus shelter is proposed to have real time display unit, a feeder pillar near the bus shelter is required with DNO feed or a private feed from the nearest column. The feeder pillar for the real time display unit should also be installed with RCD**.**

6.1.9 Notes to be included in the drawing:

i. All columns to be fitted with double pole isolator switch.
ii. All lighting units to be fused at 6A (BS88).
iii. All columns to have 10sq.mm main earth bond.
iv. Columns shall:
v. Comply with BS EN 40 using the design parameters from PD6547 for Bedfordshire, road signs Class B and the fatigue requirements of BD94/17.

vi. Be numbered with a Z prefix; each road must also be numbered individually starting from Z001 etc. Similarly signs with an S prefix and Bollard with a B prefix. Central Bedfordshire Council will re-number once the scheme is adopted.
vii. Be located as follows:
viii. Where a footway or cycle path is adjacent to the carriageway – Back of footway or cycle path
ix. In verge a minimum 0.8m setback from kerb for 30mph road.
x. In verge a minimum 1.0m setback from kerb for 40mph road.
xi. In verge a minimum 1.5m setback from kerb for speed limits greater than 40mph subject to passive safety Risk Assessment
xii. In service strip – Back of service strip (but not less than above)
xiii. For junctions and conflict areas, in accordance with the Institution of Lighting Professionals Professional Lighting Guide PLG 02.
xiv. Be located Highway adopted land.
xv. Not be located in a shared surface
xvi. In general, be located away from house frontages or on the party boundary between properties.
xvii. Not be located on junction of turning head radii.
xviii. Have DNO services (unless otherwise agreed).
xix. Areas of ecological/ environmental impact (e.g., Bat flight/roosting/foraging areas shall be highlighted. Colour temperature (K) of lighting may change to warmer white options, amber or red in extreme cases.

6.1.10 Be Raise and lower columns where vehicular access is restricted or where overhead lines may be in close proximity. (These must be mid-hinged).

6.1.11 All 5m columns will be an Aluminium Hardie 4 position raise and lower unit

6.1.12 Where raise and lower columns are installed due to the proximity of overhead lines they shall be orientated to fold away from the overhead lines.

6.1.13 Refer to Avoiding danger from overhead power lines - Guidance Note GS6 (Fourth edition).

7.0 Control System and CMS Systems

7.1.1 Each lantern will have a 7 pin NEMA photocell fitted as standards to CBC specification

7.1.2 For schemes of 20 lanterns or more the CBC CMS system with Lucy Zodion Ki. Node 2 with GPS sim card to CBC specification is to be used and replace the NEMA cell. Kona Enterprise Gateway to CBC specification is to be installed at height, the higher the gateway the better, but within the scope of the design brief. Number of gateways can be reduced at the discretion of the CBC Street lighting manager.

7.1.3 The scheme will be commissioned by the installer and checked by CBC on completion and before adoption.

7.1.4 On sites of multiply phases of differing numbers of lanterns per individual scheme, with the same developer, the whole scheme can be fitted with the Ki 2 node through-out phases of the site with 20 lanterns per Kona gateways at height to achieve the CBC specification, Number of gateways can be reduced at the discretion of the CBC Street lighting manager

7.1.5 On sites of multiply phases of differing numbers of lanterns per individual scheme, but with different developers the positioning of the gateway will be one per 20 lantern positions in the development, the number of gateways can be reduced at the discretion of the CBC Street lighting manager.

8.0 Design Submissions

Design Check Guidelines – Information Required from the Designer

For Central Bedfordshire Council Street Lighting team to carry out a full and comprehensive technical design check the design submission should contain:

8.1.1 Documents required for Approval

i. Shall have a location Plan
ii. An adoption Plan
iii. Drawing and planning for all phases for tie purposes
iv. DNO and column schedule
v. Scheme drawing with min and average lux ISO contour in DWG and PDF format
vi. Ecology Report/ Environmental considerations
vii. Lighting Calculations in both PDF and Reality formats
viii. Passive Risk Assessments if applicable
ix. Designer Risk Assessment
x. Contract Appendices 200,1200, 1300, 1400 & 1900 series
xi. Layouts for illuminated signs, bollards, and powered street furniture
xii. CMS system layout if over 20 lanterns

8.1.2 Lighting Calculations

i. The lighting design shall be prepared, and calculations provided in accordance with BSEN13201-2015 and BS5489 - 2020 unless otherwise previously agreed with Central Bedfordshire Council Electrical and Lighting Team. The preferred software is Lighting Reality. A lighting contour drawing is also required to provide a clear illustration of the lighting levels for the proposed development including contours for the minimum average and minimum for the lighting class. Road calculations for minimum and maximum spacings for each M/P class of road and width shall be provided. Calculation files to be provided in both pdf and Lighting Reality formats
ii. Lighting calculation extents to include both the road and footway/cycleway adjacent to or remote to main highway.
iii. Have the correct Maintenance factors
iv. Be mounted as post top
v. Be set with zero^{o} tilt

8.1.3 Risk Assessment

Under CDM Regulations the Designer must:

i. Eliminate hazards & reduce risks from start of design process.
ii. Designs should be safe to build, clean and maintain, and demolish.
iii. Inform others of significant or unusual risks which remain.
iv. Amount of effort put into risk reduction should be proportionate to the risk

8.1.4 Contract Appendices

The designer shall provide the following specification appendices based on the Manual of Contract Documents for Highway Works Volume 2 - Notes for Guidance on the Specification for Highway Works:

i. 200 Site Clearance
ii. 1200 Traffic Signs (if required)
iii. 1300 Road Lighting Columns and Brackets, CCTV Masts and Cantilever Masts, CMS Kona Gateways.
iv. 1400 Electrical Work for Road Lighting and Traffic Signs (If required)
v. 1900 Protection of Steelwork Against Corrosion

The Designer is only required to provide information relevant to the scheme.

8.1.5 Layout Drawings for Lighting, Illuminated Signs, Bollards and Powered Street Furniture

All drawings shall be prepared using AutoCAD, with the following elements detailed:

i. Location of existing lighting columns and other electrically fed street furniture effected by the scheme to be removed under site clearance
ii. Location of proposed lighting columns
iii. Location of existing and proposed trees
iv. Column and any street furniture number
v. Location of proposed illuminated signs, bollards, and other electrically powered street furniture
vi. Scale shall be at 1:500 or less
vii. Be no larger than A1
viii. Have cut lines where required
ix. Key specification for materials, e.g., column types, heights, lantern types, wattage etc
x. Supply details
xi. Trenching, ducting and cable route
xii. Show overhead lines (LV, HV & BT), and major services (egg HV cables High/Medium pressure Gas, fibre optic cables etc)
xiii. Highlight significant hazards that the installer of street lighting furniture and Lighting Authority shall have to allow for.
xiv. Known hazards – statutory plant, ecological, schools, protected animal species etc
xv. Schematic drawing (if private supply)
xvi. Title
xvii. Issue and revision references and dates
xviii. Drawing number

8.1.6 Environmental Considerations

Evidence that environmental considerations have been considered and any detrimental effects due to the proposed works have been removed or mitigated.

9.0 Initial Testing and Inspection Certificates

9.1.1 Initial Testing and Inspection Certificate in accordance with NIC EIC (National Inspection Council for Electrical Installation Contracting) or HEA to be submitted once the columns are energised.

10.0 Cable calculations

10.1.1 Columns, illuminated signs, bollards and other illuminated street furniture privately fed will require calculations for volt drop and fault clearance to be submitted for checking except for 12V, 24V. (Circuits not required)

11.0 Cable, Ducting and Trenching details

11.1.1 Private cables to be laid in 100mm diameter orange UPVC duct laid at a minimum cover depth of 450mm in footway and 750mm in carriageway. Any runs over 30m will require a draw pit for aid of pulling cables

11.1.2 Orange duct should be marked 'STREET LIGHTING' as appropriate white letters 9mm high at intervals of not more than 1.2metres.

11.1.3 Fully ducted system shall be used when specified.

11.1.4 Where access chambers or joint boxes are required, Centurion HDPE access chambers shall be specified.

12.0 Guidance

12.1.1 60mph and 50mph limits will require a passive safe risk assessment to determine type and setback of lighting columns.

12.1.2 The Proposed lighting should tie in with the existing lighting. Existing columns should be modelled on calculations to show how they contribute to the lighting of the scheme.

12.1.3 The approach to the conflict area shall be lit for the distance that would be travelled in five seconds when travelling at the speed limit in accordance with PLG02.

12.1.4 The Minimum distance between unlit sections of road shall be as per table 6. The travelling speed shall be determined using the 85th percentile or speed limit, dependent on the information available. If a section of road is to be left unlit then the category of road shall be agreed with the Lighting Authority. Road safety review will need to be undertaken prior agreement of unlit section; Police consultation may also be required.

Travelling Speed (MPH	Category 1- Road with no footpaths	Category 2 – Residential routes with footpaths	Category 3 – Traffic routes with footpaths
	5 seconds	10 seconds	20 seconds
30	67	134	268
40	89	178	356
50	111	222	444
60	133	266	532
70	156	312	624

Table 6 from TD9/93

13.0 Other

13.1.1 Pedestrian Crossings

i. Pedestrian crossings should be lit in accordance with TR12.
ii. Use Simmonsigns Modupost with Extension (MODUSR2M8/EXT6)

13.1.2 Raised table crossing point

i. Raised table crossings should be lit in accordance with TR23.

13.1.3 Bollard

i. Flexabol Pudsey Diamond retro-reflective and rebound able, with Orange back for NAL socket installation

13.1.4 Signage

i. Simmonsigns LED LUA with 7Pin Nema and Lucy Zodion Ki 2 node to CBC specification

13.1.5 Passive safety

i. A passively safe risk assessment should be carried out for each scheme in accordance with TR30. Schemes 30mph or less are unlikely to require passively safe columns.
ii. 50mph and 60mph limits will require a passive safe risk assessment to determine type and setback of lighting columns
iii. Where the designer has specified passively safe columns, these must be in accordance with BS EN 12767:2019.
iv. NAL SIS system shall be used with passive safety columns or similar approved to enable compliance with BS EN 12767. Shall be installed using a retention socket.
v. CBC specification dictates that the safe electrical disconnection unit are housed in the feeder pillar and NOT a chamber below ground level to avoid water ingress.

13.1.6 Overhead Lines

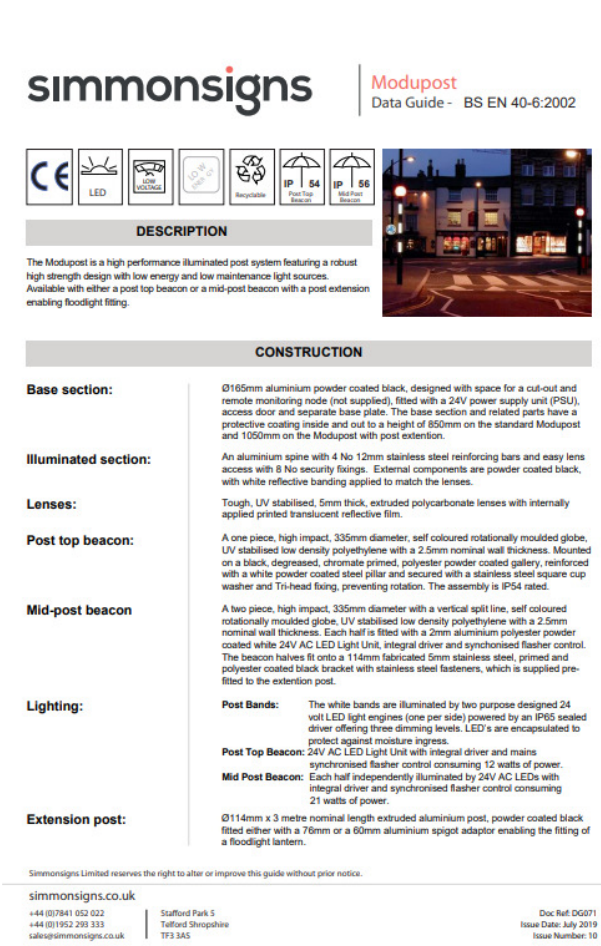
i. Where columns are position near overhead lines, these should be positioned outside the vicinity zone where possible. Where this is not possible, then the designer should follow the guidance in GP10. All Columns should be hinging and hinge away from the OHL and safety from traffic.

13.1.7 Cycleways

i. Cycleways shall be designed in accordance with the principal laid out in TR23, but with lighting classes to BS5489 as defined in the design brief

13.1.8 Belisha Beacons

i. Belisha Beacons shall be designed in accordance with the requirements of the Local Authority Traffic Engineer
ii. The Simmonsigns Modupost with Mid Post Beacon and Extension section for Lantern must be used. Figure 1 & 2 (MODUSR2M8/EXT6)
iii. Belisha Beacons shall comply with the requirements of Schedule 14 of the statutory instruments 2016 # 362, the Traffic Signs Regulations and General Directions 2016, and Standard Details Drawings
iv. Yellow or fluorescent polyethylene globe with a diameter of not less than 275mm or more than 335mm mounted 3100mm above ground level- via Simmonsigns
v. Lighting source shall be LED flashing at intervals in accordance with Traffic Signs and General Directions
vi. Where required appropriate tunnel, half tunnel shields or halo boards shall be installed around the beacon.
vii. If a Halo style Beacon is specified, then use Modustar/ Midustar option fig3



simmonsigns | Modupost
Data Guide - BS EN 40-6:2002

DESCRIPTION

The Modupost is a high performance illuminated post system featuring a robust high strength design with low energy and low maintenance light sources. Available with either a post top beacon or a mid-post beacon with a post extension enabling floodlight fitting.

CONSTRUCTION

Base section: Ø165mm aluminium powder coated black, designed with space for a cut-out and remote monitoring node (not supplied), fitted with a 24V power supply unit (PSU), access door and separate base plate. The base section and related parts have a protective coating inside and out to a height of 850mm on the standard Modupost and 1050mm on the Modupost with post extention.

Illuminated section: An aluminium spine with 4 No 12mm stainless steel reinforcing bars and easy lens access with 8 No security fixings. External components are powder coated black, with white reflective banding applied to match the lenses.

Lenses: Tough, UV stabilised, 5mm thick, extruded polycarbonate lenses with internally applied printed translucent reflective film.

Post top beacon: A one piece, high impact, 335mm diameter, self coloured rotationally moulded globe, UV stabilised low density polyethylene with a 2.5mm nominal wall thickness. Mounted on a black, degreased, chromate primed, polyester powder coated gallery, reinforced with a white powder coated steel pillar and secured with a stainless steel square cup washer and Tri-head fixing, preventing rotation. The assembly is IP54 rated.

Mid-post beacon A two piece, high impact, 335mm diameter with a vertical split line, self coloured rotationally moulded globe, UV stabilised low density polyethylene with a 2.5mm nominal wall thickness. Each half is fitted with a 2mm aluminium polyester powder coated white 24V AC LED Light Unit, integral driver and synchonised flasher control. The beacon halves fit onto a 114mm fabricated 5mm stainless steel, primed and polyester coated black bracket with stainless steel fasteners, which is supplied pre-fitted to the extention post.

Lighting:
- **Post Bands:** The white bands are illuminated by two purpose designed 24 volt LED light engines (one per side) powered by an IP65 sealed driver offering three dimming levels. LED's are encapsulated to protect against moisture ingress.
- **Post Top Beacon:** 24V AC LED Light Unit with integral driver and mains synchronised flasher control consuming 12 watts of power.
- **Mid Post Beacon:** Each half independently illuminated by 24V AC LEDs with integral driver and synchronised flasher control consuming 21 watts of power.

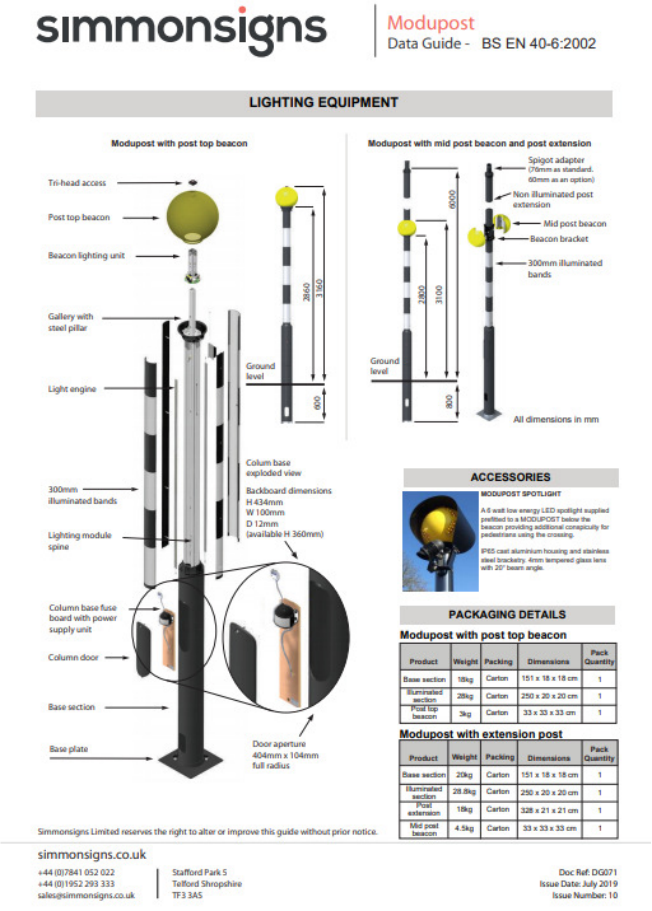
Extension post: Ø114mm x 3 metre nominal length extruded aluminium post, powder coated black fitted either with a 76mm or a 60mm aluminium spigot adaptor enabling the fitting of a floodlight lantern.

Simmonsigns Limited reserves the right to alter or improve this guide without prior notice.

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Issue Date: July 2019
Issue Number: 10

Figure 1



simmonsigns | Modupost
Data Guide - BS EN 40-6:2002

LIGHTING EQUIPMENT

Modupost with post top beacon

Modupost with mid post beacon and post extension

ACCESSORIES

PACKAGING DETAILS

Modupost with post top beacon

Product	Weight	Packing	Dimensions	Pack Quantity
Base section	18kg	Carton	151 x 18 x 18 cm	1
Illuminated section	28kg	Carton	250 x 20 x 20 cm	1
Post top beacon	3kg	Carton	33 x 33 x 33 cm	1

Modupost with extension post

Product	Weight	Packing	Dimensions	Pack Quantity
Base section	20kg	Carton	151 x 18 x 18 cm	1
Illuminated section	28.8kg	Carton	250 x 20 x 20 cm	1
Post extension	18kg	Carton	328 x 21 x 21 cm	1
Mid post beacon	4.5kg	Carton	33 x 33 x 33 cm	1

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Figure 2



simmonsigns | Modustar & Midustar
Data Guide

DESCRIPTION

The first truly 360° aspect Belisha beacon with high intensity LED arrays giving better visibility on sunny days to approaching vehicles and pedestrians.

Based on the highly successful Modubel and Midubel, this new offering raises safety to an even higher level by improving visibility.

Both beacons are a tough, high visibility retro-fit for Belisha beacon assembly for standard tubular beacon posts. It is also possible to retrofit to existing Simmonsigns amber beacon installations with ease.

All beacons have high quality LED lighting units driven at 24 Volts AC for significantly reduced maintenance and improved safety.

ModuStar

MiduStar

Full Shroud option

Half Shroud option

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Figure 3

14.0 Columns and Brackets

14.1.1 Columns shall generally be galvanised steel and meet the requirements of BS EN 40 and PD 6547:2004.

14.1.2 The appropriate terrain category for lighting column shall

a) Category I for all columns

14.1.3 The Ground factor shall be taken as Poor unless confirmed otherwise on site

14.1.4 Column of 5m and 6m mounting height shall be designed to support a road sign class A as per table 3 PD6547:2004

14.1.5 Column greater than 6m mounting height shall be designed to support a road sign class B as per table 3 PD6547:2004

14.1.6 Rational Wind loading factor shall be taken from PD6547:2004 table A.1

14.1.7 The Maximum altitude shall be taken from PD6547:2004 table A.1

14.1.8 The Mean hourly wind velocity shall be taken from PD6547:2004 table A.1

14.1.9 The luminaire windage shall be obtained for the proposed scheme luminaire

14.1.10 The luminaire weight shall be obtained for the proposed scheme luminaire this information will be passed to the manufacturer.

14.1.11 Partial load factor shall be taken from table 1 EN 40-3-3: 2003 as recommended by PD 6547:2004 – 5.2. Deflection class B.

14.1.12 Deflection class shall be taken from table 3 EN 40 -3-3 2003 class 3 as recommended by PD6547:2004- 5.3 Deflection class 3.

14.1.13 Fatigue requirements for columns of 8m and above shall comply to the requirements of BD94/07.

14.1.14 Street lighting column shall be free from irregularities and burrs.

14.1.15 All columns and brackets must be constructed, and quality records maintained, to comply with BS EN 40 and BS 729.

14.1.16 Bracket arms shall be so designed that when assembled with the column shaft the arm and spigot shall give the required angle and tilt required by the design

14.1.17 Each column shaft shall be suitable for use with the projection required by the design. Each column shaft has a base compartment large enough to off easy access to the equipment housed therein, A baseboard of non- hydroscopic material. Minimum thickness 15mm, 90mm wide shall be securely fixed in each compartment and shall be of sufficient size to accommodate the cable terminations and isolator

14.1.18 The base compartment shall have a weatherproof access door fitted with tamperproof and corrosion resistant locks of similar patterns. The door arrangement shall be such as that it can only be opened by releasing a single equilateral triangular headed (with 10mm diameter rounded corners) captive stainless steel bolt screwing into the door locking bar. When the door is secured the bolt head shall be completely recessed into a 26mm diameter access hole. Door shall be interchangeable for similar columns without adaptions.

14.1.19 The lock will be greased to aid opening on inspection/maintenance dates.

14.1.20 An 8mm diameter 30mm long brass earth terminal complete with two brass washers and 2 brass full nuts and locknut shall be provided in the base compartment, and therefore the requirement of BS EN 40 part 5 shall apply. The terminal shall be positioned so as to be readily accessible though the door opening, the brass Earthing terminals shall be provided on the column size M8x 30mm long complete with two brass hexagon full nuts and two plain brass washers, These shall be welded or brazed to the access door and inside walls of the base

compartment and shall be fitted with a distinctly and durable marked metal or plastic label marked – **SAFTY ELECTRICAL CONNECTION -DO NOT REMOVE.**

14.1.21 Spare column door keys shall be provided on the basis of one per 10 columns

14.1.22 Columns shall have door openings arranged so that when the column is in the erected position an operative facing the door opening will also normally be facing oncoming traffic

14.1.23 Columns located on the centre reserve shall have their door openings facing in a consistent direction

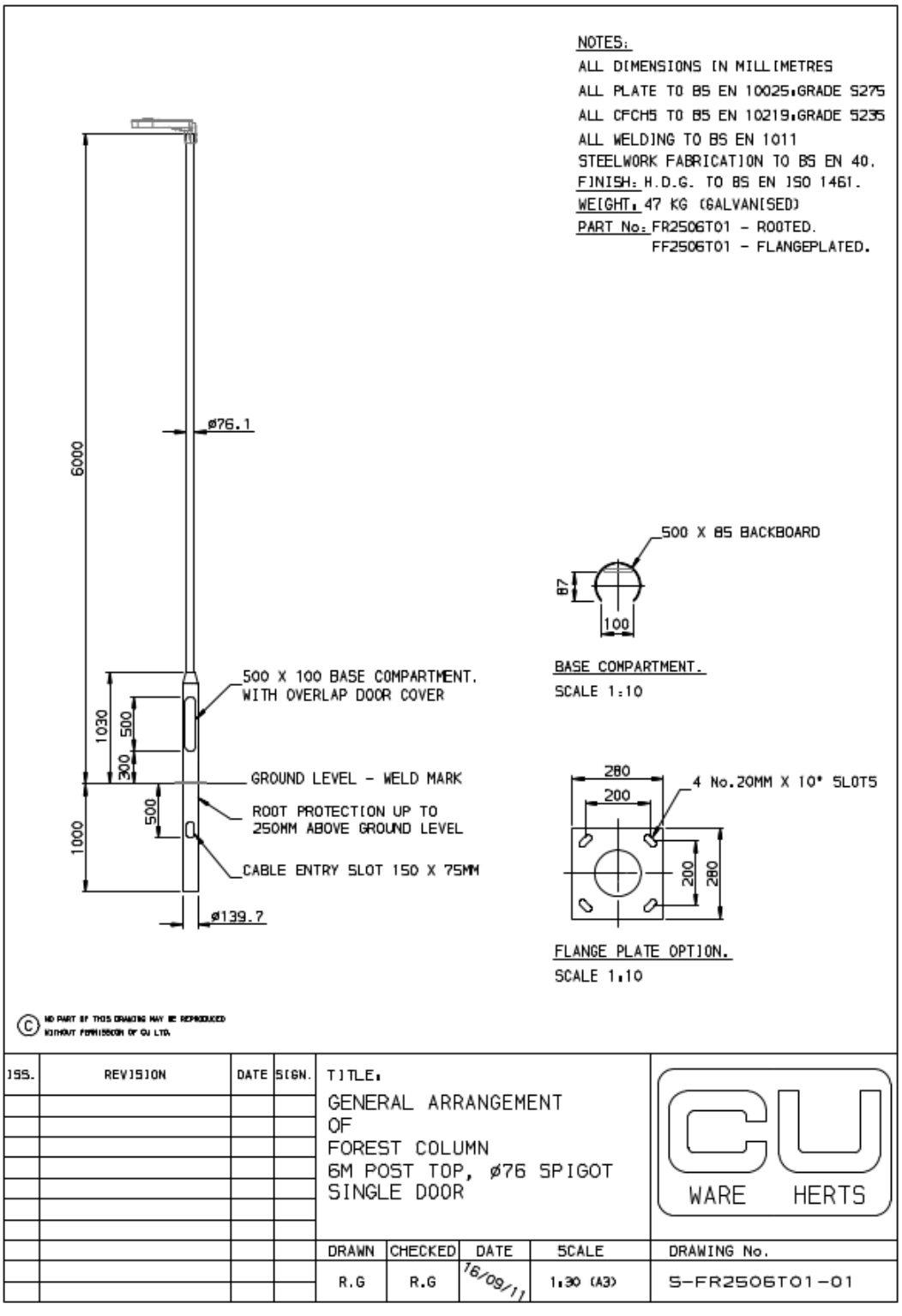
14.1.24 Column located on a bridge parapet shall have the door opening facing away from the drop so that operators working on the column will be facing the drop.

14.1.25 Column located at the rear of the footway with boundary walls and hedges shall have the door openings facing away form the obstruction so that operatives working on the column will have a clear unobstructed working area.

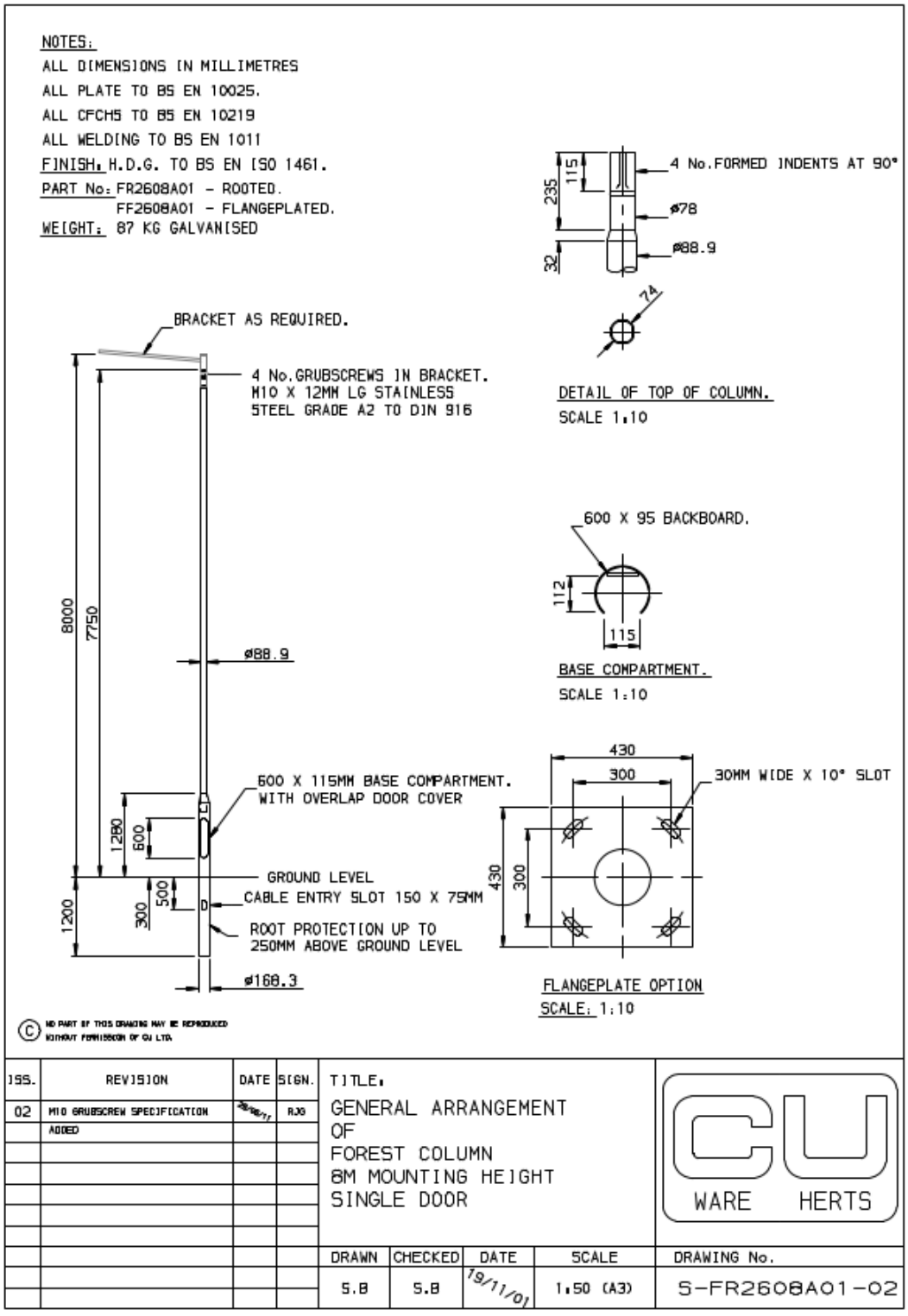
14.1.26 The cable entry slot shall be positioned directly below the door opening and have a minimum dimension of 75mm x 150mm and the lower edge of the slot shall be 500mm below ground level, the slot shall be free from sharp edges and burrs

15.0 Standard Detail Drawings

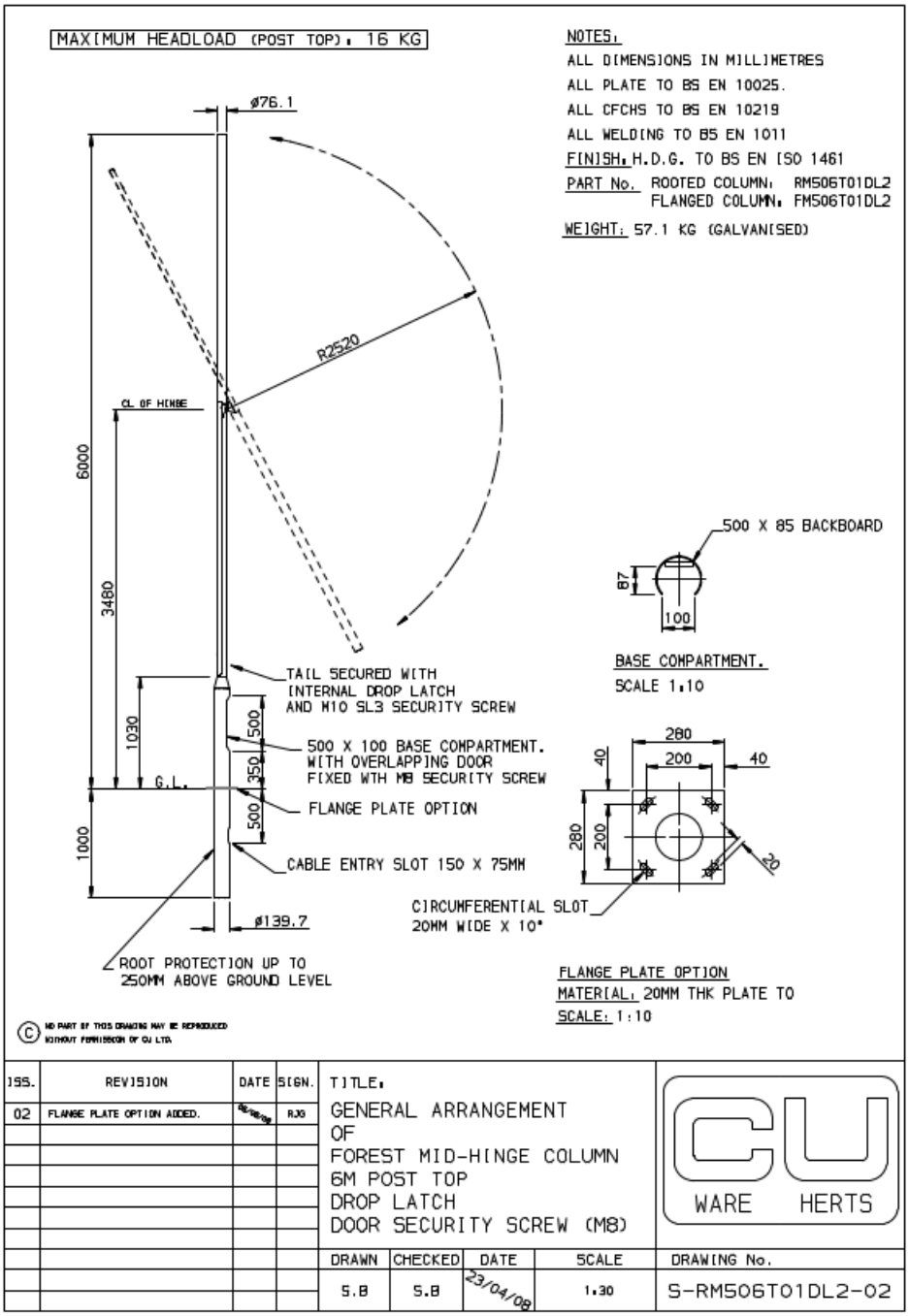
15.1.1 Standard 6m Tubular Base Compartment Lighting Column for both Mallatite and CU Phosco for use with S38 schemes

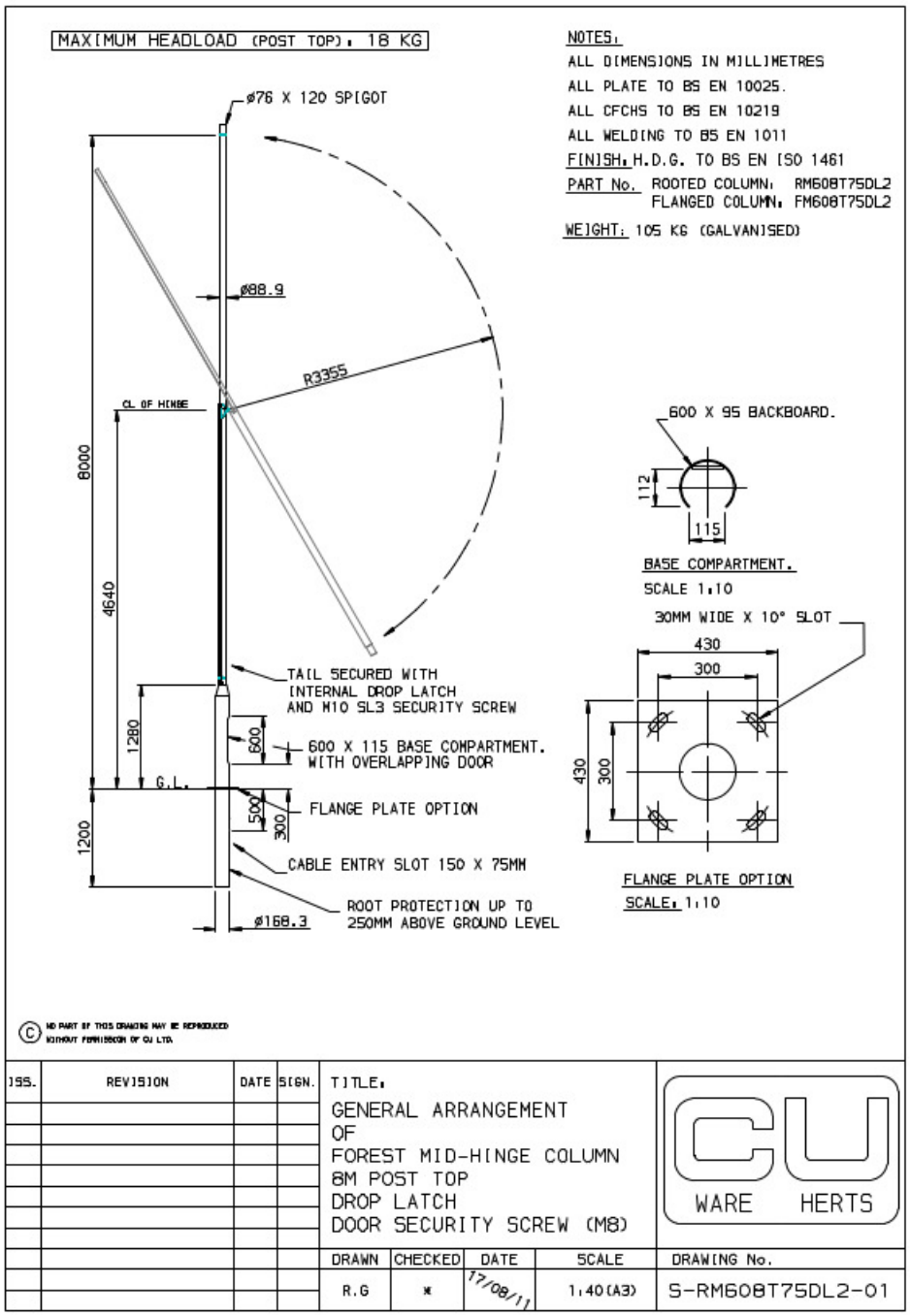


15.1.2 Standard 8m Tubular Base Compartment Lighting Column, Mallatite and CU Phosco for use with S278 schemes

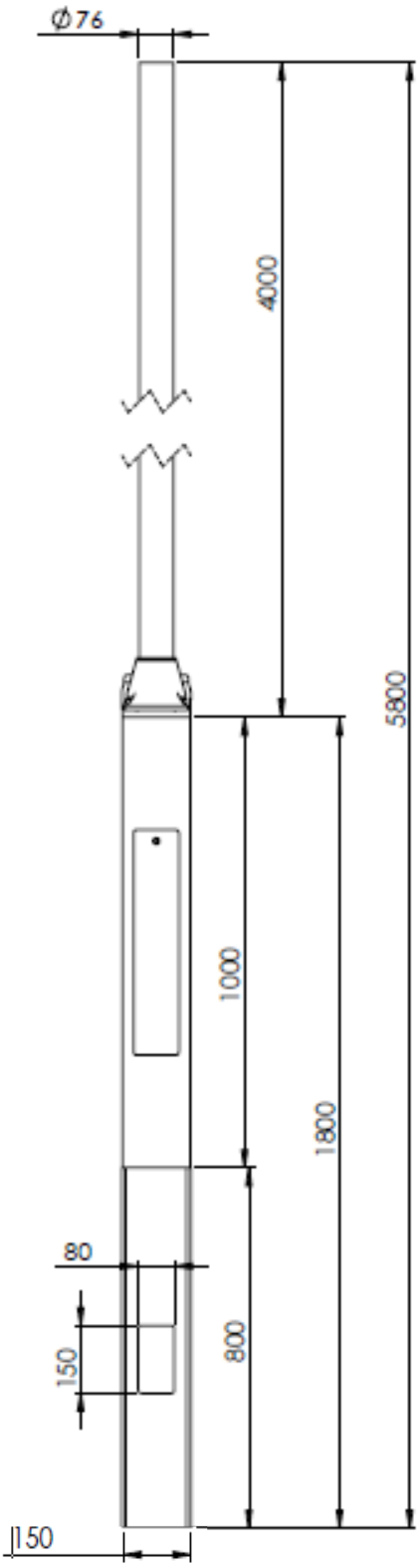


15.1.3 Standard Hinging lighting Column, 6m and 8m CU Phosco




MAXIMUM HEADLOAD (POST TOP): 18 KG
NOTES:
ALL DIMENSIONS IN MILLIMETRES
ALL PLATE TO BS EN 10025.
ALL CFCHS TO BS EN 10219
ALL WELDING TO BS EN 1011
FINISH: H.D.G. TO BS EN ISO 1461
PART No. ROOTED COLUMN: RM608T75DL2
FLANGED COLUMN: FM608T75DL2
WEIGHT: 105 KG (GALVANISED)
ø76 X 120 SPIGOT
ø88.9
R3355
CL OF HINGE
8000
4640
1280
600
G.L.
500
300
1200
TAIL SECURED WITH INTERNAL DROP LATCH AND M10 SL3 SECURITY SCREW
600 X 115 BASE COMPARTMENT. WITH OVERLAPPING DOOR
FLANGE PLATE OPTION
CABLE ENTRY SLOT 150 X 75MM
ROOT PROTECTION UP TO 250MM ABOVE GROUND LEVEL
ø168.3
600 X 95 BACKBOARD.
112
115
BASE COMPARTMENT.
SCALE 1:10
30MM WIDE X 10° SLOT
430
300
430
300
FLANGE PLATE OPTION
SCALE: 1:10
NO PART OF THIS DRAWING MAY BE REPRODUCED WITHOUT PERMISSION OF CU LTD
ISS. REVISION DATE SIGN.
TITLE:
GENERAL ARRANGEMENT
OF
FOREST MID-HINGE COLUMN
8M POST TOP
DROP LATCH
DOOR SECURITY SCREW (M8)
CU WARE HERTS
DRAWN CHECKED DATE SCALE DRAWING No.
R.G * 17/08/11 1:40(A3) S-RM608T75DL2-01

15.1.4 5m Hinging Columns Hardie Aluminium style



HARDIE STREET LIGHTING

5.0m Raise & lower column lighting column

16.0 Typical cable to column cut-outs, termination from ducting to column.

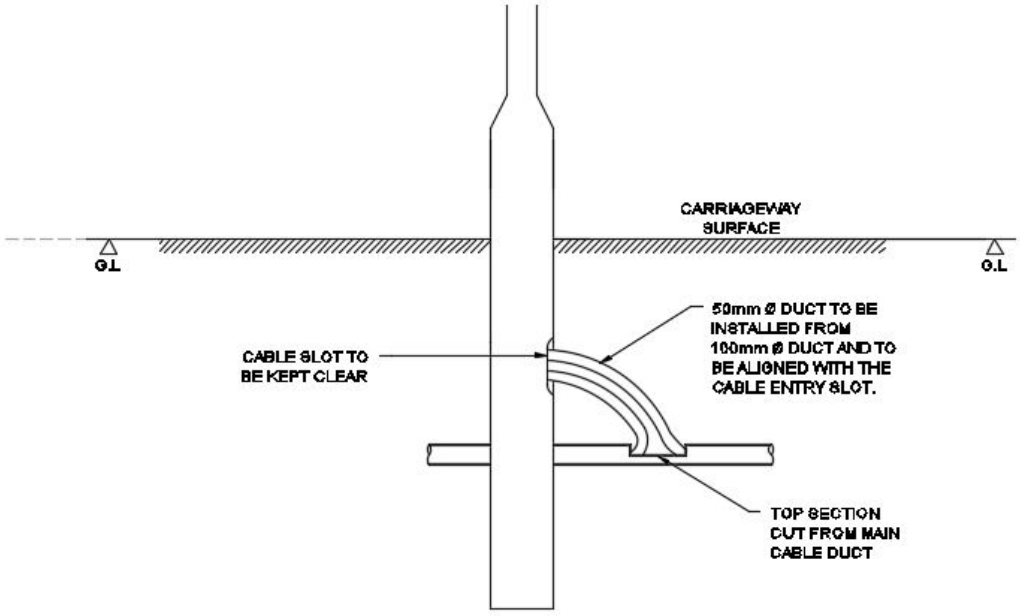


Figure 9

Sealing compound to be used to prevent water ingress into main duct

17.0 Standard detail Cut-Out Boxes/Isolators

17.1.1 Typical Isolator Specification for CBC Lighting columns.

Column base termination units shall be double pole switch-fuse disconnector type and shall comply with BS EN 60947-3.

Column base termination units shall be integrated with the fuse/disconnector holders and have material moulded drip-proof housings to IP42 or above. Third party verification is required prior to supply.
The enclosure shall incorporate a lockable hinged clear cover and when in the open position shall allow access to the switch disconnector and fuse. This clear cover shall have the facility to be padlocked and shall be held in the closed position with a single captive brass fixing screw into a brass insert.

A safety device shall be incorporated into the switch disconnector that prevents the fuse from being withdrawn under load until the switch disconnector is in the off position. The safety device should have marks indicating the “on” and “off” positions.

The fuse carrier and switch disconnector shall be mounted on standard zinc plated mild steel DIN rail and blanking plates shall be provided for unused ways.

The enclosure shall have the facility for Line and Neutral probe testing and be colour coded in accordance with core colours of the revision to the European Harmonisation document HD 308:2001 and to align with BS EN 60446:2000.

The column base termination unit shall be pre-wired from the load side of the switch disconnector to the supply side of the BS88 fuse carrier in 2.5mm tri-rated cable sheathed in the above HD and BS EN colours.

All fixing screws holding down top covers shall be retained into the base sections via captive brass screws into brass inserts.

As per BS 5901 the comparative tracking index (C.T.I.) shall not be less than 500.

Fuse links shall comply with the requirements of BS EN 60296: BS646 and BS88 and be of high breaking capacity and have dimensions of 29mm length and 12.7 mm depth.

Each luminaire on a column shall be supplied from a separate fuse in the column base termination unit.

TOFCO BEDS TYPE 3 (fig 10)
32amp double pole **3-module isolator** c/w 1 x 32amp double pole switch & 1 x BS88 fuse, pre-wired for one upward circuit, earth block and ABS gland plate 2 x 20mm grommet. Test probe facility.
Pre-wired Cable tails – fitted to the above unit.

- 2 No. 2.5mm sq. double insulated colour coded Live and Neutral cable tails x 350mm long.
- 1 No. 10mm sq. tri-rated **Cleveland Cables** earth cable x 400mm.

NB – this unit has the capacity for an extra fuse carrier to be added once blank plate has been removed.

TOFCO BEDS TYPE 4 (fig 11)
32amp double pole **3-module isolator** c/w 1 x 32amp double pole switch & 2 x BS88 fuses, pre-wired for two upward circuits, earth block and ABS gland plate 2 x 20mm grommet. Test probe facility.
Pre-wired Cable tails – fitted to the above unit.

- 2 No. 2.5mm sq. double insulated colour coded Live and Neutral cable tails x 350mm long.
- 1 No. 10mm sq. tri-rated **Cleveland Cables** earth cable x 400mm.

NB – this unit has the capacity for an extra fuse carrier to be added once blank plate has been removed.

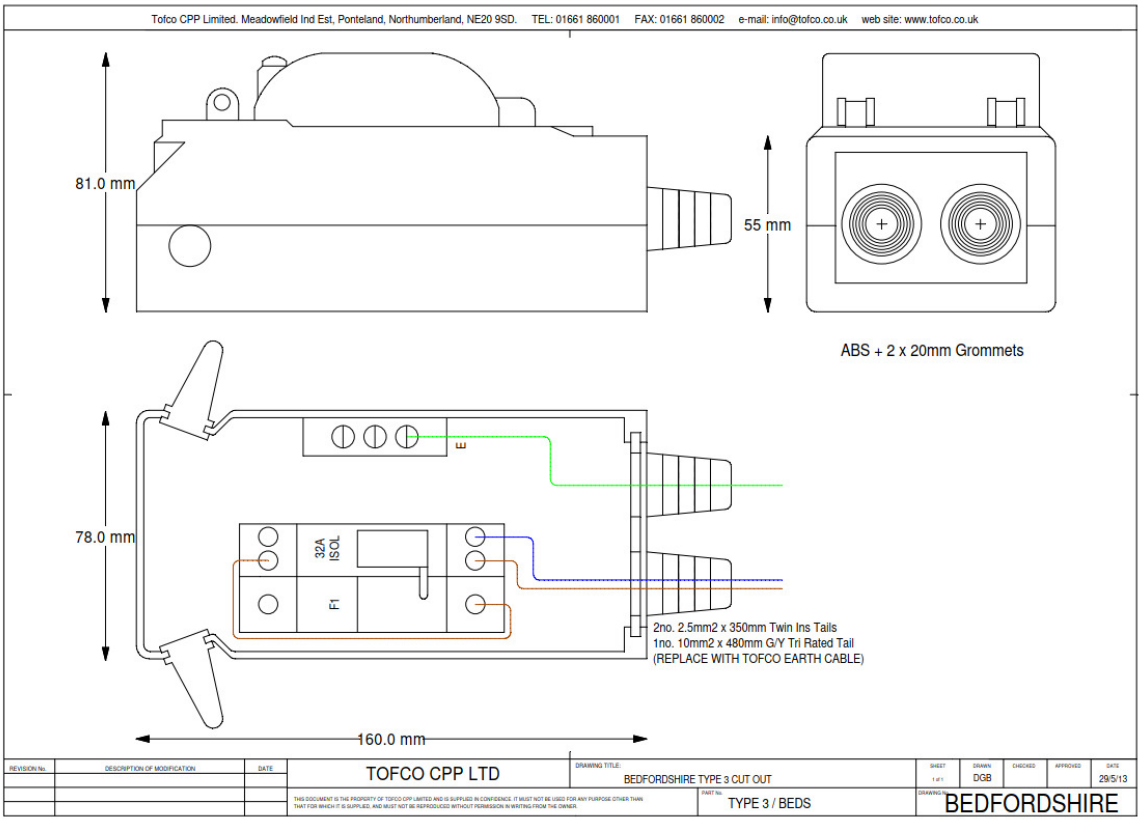


Figure 10

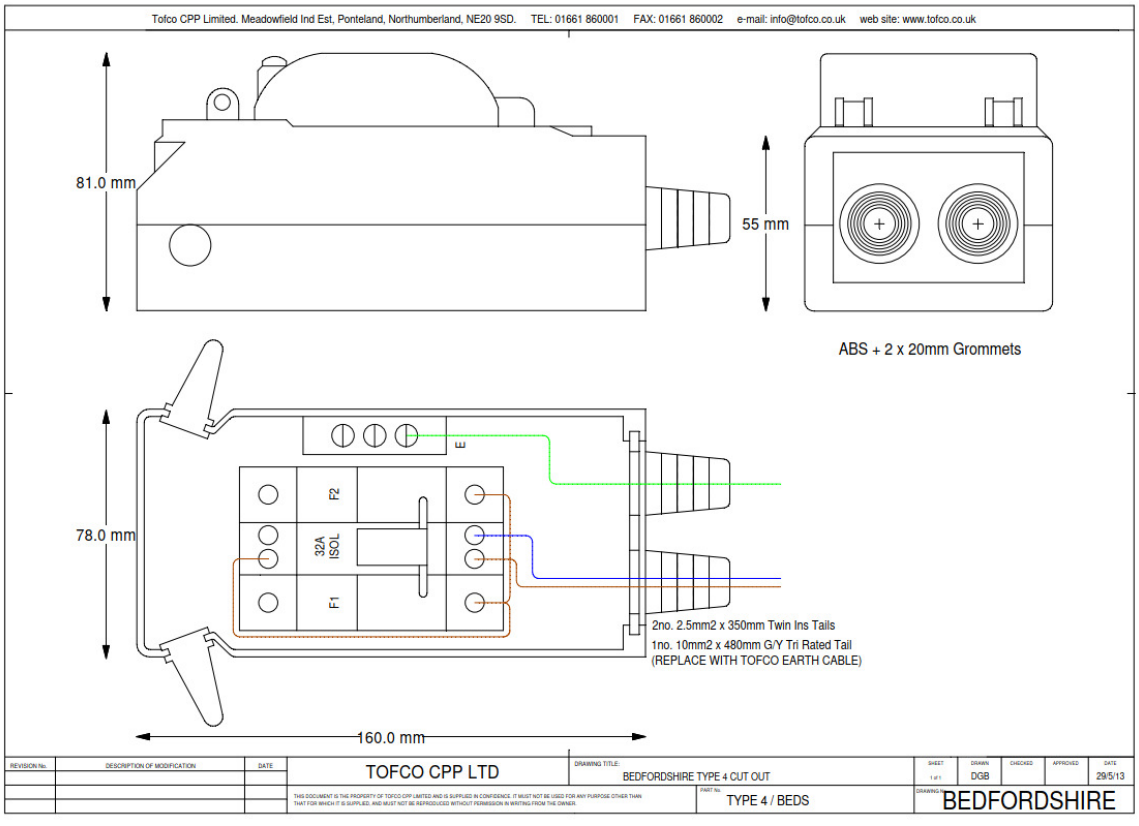
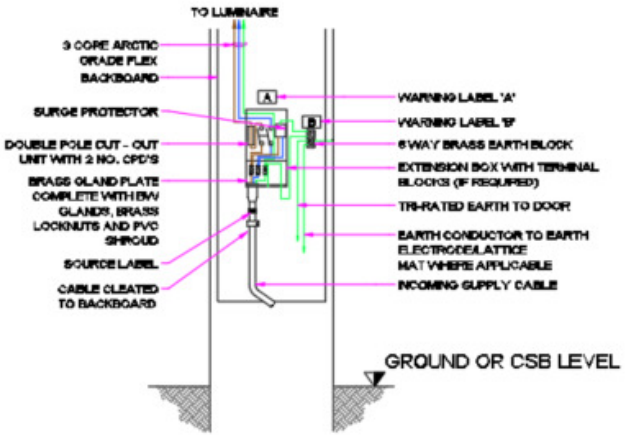


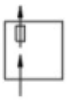
Figure 11

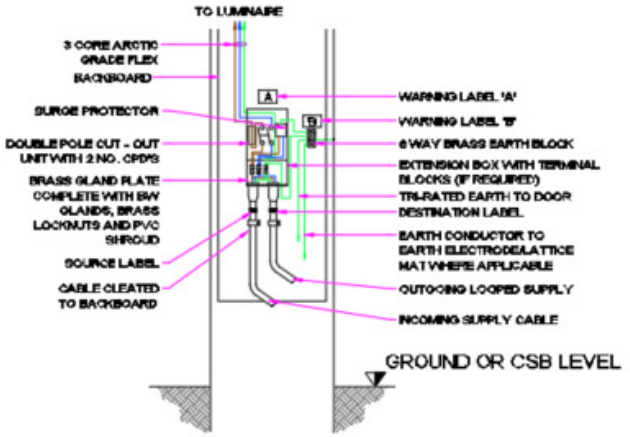
17.1.2 Typical Termination Details for Lighting columns.



CABLE TERMINATION TYPE T1

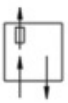
SINGLE LUMINAIRE - END OF LINE

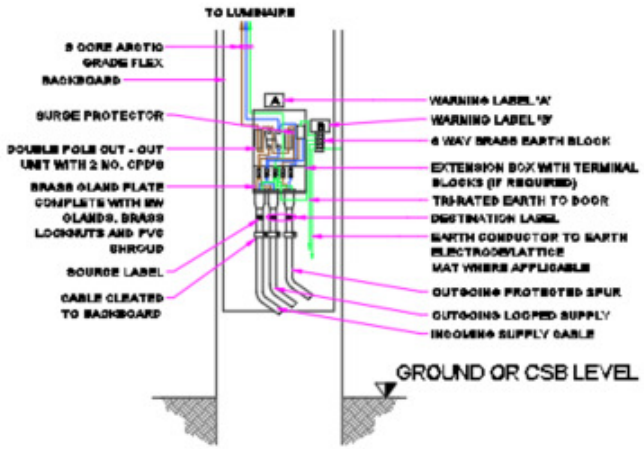




CABLE TERMINATION TYPE T2

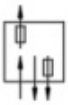
SINGLE LUMINAIRE - LOOP IN / OUT

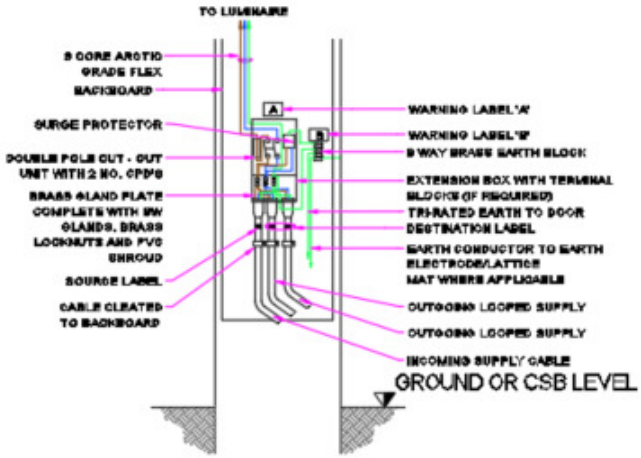




CABLE TERMINATION TYPE T4

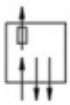
SINGLE LUMINAIRE - LOOP IN / OUT & PROTECTED SPUR





CABLE TERMINATION TYPE T5

SINGLE LUMINAIRE - LOOP IN / OUT & UNPROTECTED SPUR



18.0 Standard Detail for Central Bedfordshire Central Management System.

The Central Bedfordshire Council Central Management Systems allow the council to monitor all lighting assets on each S278 and S38 scheme under its control, allowing it to monitor the power consumption, dimming regimes, outage problems over the whole network, so making bale to response quicker to issues quicker making for a safer environment.

18.1.1 CBC CMS Specification documents

Ki. Node details.



Interoperable Smart Node

The Ki. Node is a smart device that can be installed on new and existing street lighting infrastructure throughout the city.

Each Ki. Node transforms the lamppost into a wireless communication point and connects to an interoperable ecosystem, creating a virtual flow of data within your smart city. This is possible via an internal antenna, enabling the Ki. Node to connect with other assets in the ecosystem, via LoRaWAN, creating a two-way digital data flow.

Connect with Ki.

Ki. Nodes are interoperable, making your smart city ecosystem scalable, traceable and manageable from a single open IoT platform. This enables you to connect Ki. with other intelligent assets so you can manage, control and monitor a number of variables at once.

Available with a 5/7 pin NEMA connection on the base of the unit (ANSI C136.41), the Ki. Node is easy to install on LED luminaires with a twist-lock socket. A Conduit version is also available for luminaires that require a wired connection point, as well as Zhaga, to complement modern luminaire designs.

GPS and Bluetooth are also available (Node Two), for enhanced asset management and alternative connectivity, respectively. Additionally, hot weather versions are available in all variants.

TDSKiNode-206.01.20 - V8

Control beyond street lighting

Fundamentally equipped to control streetlight dimming profiles and switching schedules, with an integrated photocell, the Ki.Node captures a plethora of other critical data, such as:

- Energy consumption
- GPS
- Burning hours
- Voltage
- Column integrity
- Power outage warning
- Many more variables

The Ki. Node can also identify and communicate issues concerning the lamp, physical changes to the column or electrical anomalies, as well as operating as normal and logging activity even when disconnected from the communication network – so data is always captured.

In the unlikely instance of a lost connection from the network, Ki. Nodes continue to control streetlights against the profiles assigned via the Ki. City platform.

Features

- **Interoperable** – Uses open protocol (TALQ v2) to communicate, making it interoperable with other systems
- **Scalable** - Additional Ki. Nodes can be integrated within street lighting scheme at any time, growing with the needs of your smart city
- **Intuitive** – Equipped with a number of features to ensure you are notified of events that may affect performance, before they happen
- **Robust** – Operates normally and logs activity even when disconnected from the network. Uses LoRaWAN to optimise continuous connectivity and ensure system is always covered by multiple gateways

www.ki.community

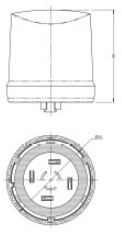
Ki. A brand of Lucy Zodion Ltd.



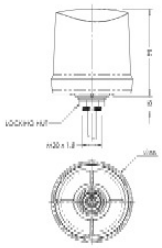
Technical Specification

Technical Spec	Ki. Node Two	
	NEMA	CONDUIT
	EU868	EU868
Bluetooth	✓	✓
GPS	✓	✓
Luminaire DALI	✓	✓
Luminaire 0 -10V	✓	✓
Luminaire 1 -10V	✓	✓
Luminaire Switched	✓	✓
Frequency band	EU868	EU868
Vin	+85V to +265V	+85V to +265V
Frequency (Hz)	50/60Hz	50/60Hz
Weight (g)	250g	250g
Temp ambient (Ta)	-30 to +50°C	-30 to +50°C
Temp storage	-40 to +85°C	-40 to +85°C
Temp - Rated	-30 to +45°C	-30 to +45°C
Luminaire Power	Up to 1kW	Up to 1kW
Connections	NEMA 5/7 Pin	Flying 5 leads
IP	IP66	IP66
Tilt / Accelerometer	As Standard	As Standard

NEMA



CONDUIT



TALQ

LoRaWAN

Please contact our sales office for further details

Lucy Zodion Ltd,
Station Road,
Sowerby Bridge,
HX6 3AF, United Kingdom

Tel +44 (0)1422 317337
Fax +44 (0)1422 836717
ki.enquiries@lucyzodion.com
www.ki.community

TDSKiNode-206.01.20 - V8

Kona Enterprise Gateway

TEKTELIC communications

LoRa Alliance Member

KONA Enterprise Gateway

Highly Optimized Cost-Effective Gateway for Enterprise Deployments

The KONA Enterprise LoRaWAN® is very compact and lightweight, comes with integrated Cat-6 3G/4G modem and Ethernet backhaul. The LoRaWAN, 3G/4G and GPS antennas are integrated within the enclosure. For remote applications and extra flexibility it also supports optional external LoRaWAN and 3G/4G Antennas.

- Outdoor Network Coverage
- In-building Networks
- Warehouses
- Commercial Farming
- University Campuses
- Multi-building Complex
- Parkades
- Medium Sized Private Developments



Key Software Features

- Access Control Management
- Cellular Parameter Configuration
- Radio Configuration and Control
- Remote Software Upgrades
- Active and Passive Image Management
- DHCP v4 Client
- TFTP Server
- HTTP Server
- Firewall and Access Lists

Key Hardware Features

- Time Duplex 8 Rx / 1 Tx
- 3G / 4G Cat-6 Modem
- IEEE 802.3af PoE or Passive PoE at 37 to 57 VDC
- IP67 Outdoor Design
- Built-in LoRaWAN, 3G/4G & GPS Antennas
- Optional external LoRaWAN and 3G/4G Antennas
- Pole, Wall, Tower Building DIN Rail Mounting Options

INFO@TEKTELIC.COM +1.403.338.6900 WWW.TEKTELIC.COM

KONA Enterprise Gateway

Highly Optimized Cost-Effective Gateway for Enterprise Deployments

Technical and Functional System Specifications

Mechanical Parameters

MTBF	450,000 hours
DC Power Consumption	< 7 W
Operational Temperature	-40°C to +60°C
Operational Humidity	10% to 100% Condensing
Ingress Protection	IP67
Size	145.81 x 178.78 x 79.5 mm
Weight	1.2 kg

LoRa Radio Parameters

ISM Bands	All Global Bands
Tx Power	14 dBm to 27 dBm
Rx Sensitivity	-139.5 dBm (SF12, 293 bits/sec)
Rx Noise Figure	2.5 dB
Rx Linearity	-5 dBm
Rx Dynamic Range	70 dB Analog, 100+ dB Digital

Interfaces

Ethernet Backhaul	RJ-45 (10/100 BaseT)
Cellular Backhaul (3G/4G)	Internal with optional External
LoRa Antenna	N-Type
Power	802.3af PoE or Passive PoE at 37 to 57 VDC

Regulatory Compliance

Safety	IEC 62368-1 (CE)
Environmental	ETSI EN 300 019-2
Regulatory	ETSI EN 55022 Class B
	ETSI EN 55024
	ETSI EN 300 489-1/-3



TEKTELIC Communications is a premier supplier of best-in-class LoRaWAN® IoT Gateways, Sensors, and custom applications. These elements combined provide a powerful end-to-end solution that can be easily, quickly, and cost effectively deployed to address the most demanding IoT challenges.

For more information please visit www.tektelic.com

Appendix K. Furniture and Surfacing on Public Right of Way

DRAFT

Central Bedfordshire Council

Specification Guide: Furniture and Surfacing on Public Rights of Way

Guidance for Developers

Introduction

This brief guide sets out the standards that are expected for any new path with public access or a public right of way that is set out as part of any new development. The guide should be read in conjunction with the Central Bedfordshire Council document *"Public Rights of Way: Standards and Guidance for Development"* which sets out the type of paths and the widths that should be provided in different settings. This *Specification Guide* provides information on how these paths should be constructed and furnished and should be read in conjunction with the Council's *Planning Design Guide* which gives more information for developers.

British and User Standards and CBC Policy

The British Standard BS5709.2018[1] Standard for Gates, Gaps and Stiles will apply to all new items of furniture installed. Where applicable on bridleways and cycleways, the promoted standards of the British Horse Society and Sustrans should also be adhered to as these are supported by Central Bedfordshire Council where there is no conflict with the aims of the Council. Any new furniture will need to comply with the Council's policy on stiles and gates, called *"Structures Policy: achieving least restrictive access on Central Bedfordshire's Rights of Way"*.

Definitions

In this document, the term:

Furniture	refers to any access control structure such as a stile or gate or steps and also includes steps, signposting and (for completeness) a gap.
Structure	refers to any bridge, culvert, boardwalk, wall, bank or revetment.
Surface	refers to the surface of the path or way and can be natural (e.g. grassed or earth), unbound (e.g. road planings, MoT type 1, propriety mixes of fines and gravel, etc.) or bound surfaces (e.g. asphalt, resin-bound gravel, concrete, etc.).
Footpath	refers to a public right of way on foot or with a mobility vehicle

[1] Or latest BS5709 revision at time of furniture installation.

Cyclepath/cycleway refers to a route that has had some level of public access for cyclists granted or offered - potentially on a permissive basis

Cycle track refers to a public right of way on bicycles, normally with a right to walk and use a mobility vehicle

Bridleway refers to a public right of way on foot, on horseback or on a bicycle

Restricted byway refers to a public right of way for walkers, riders, mobility vehicles and users of non-mechanically propelled vehicles (e.g. horse and cart).

Byway open to all traffic ("BOAT") refers to a public right of way available for anybody to use, including road-legal motor vehicles.

Furniture

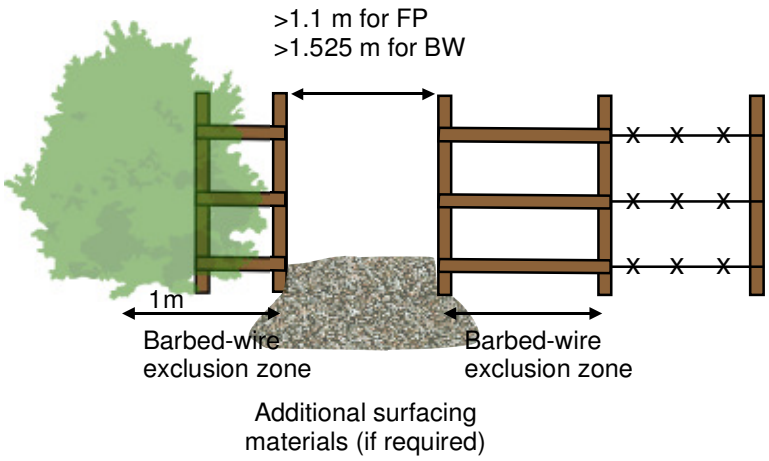
All furniture must comply with the latest version of BS5709 available at the time of installation. The Council is phasing stiles out and will not authorise new ones under its least restrictive access policy. New furniture should adhere to the following general principles:

- Where there is no requirement for animal control a **gap** should be provided.
- Where non-critical animal control is needed a **gate** can be provided.
- Where critical animal control is needed a mobility-friendly **kissing gate** (or an air lock for bridleways) can be provided.
- Horse "step-over" gates and "horse styles" should be accompanied by gaps or a medium or large mobility kissing gate.
- Furniture should be set back from roads and should include a corral for horses.

Gaps

Where possible the gap should be greater than the surfaced width of the path and must be greater than the minimum width for the class of right of way[2] (>1.1 m for a footpath and >1.525 m for a bridleway).

Any surfacing within the gap must be suitable for its level of use and drainage conditions to avoid becoming waterlogged. Where a hedge has been cut through ideally this cut should be wide enough to enable post and rail fencing to be installed to either side.

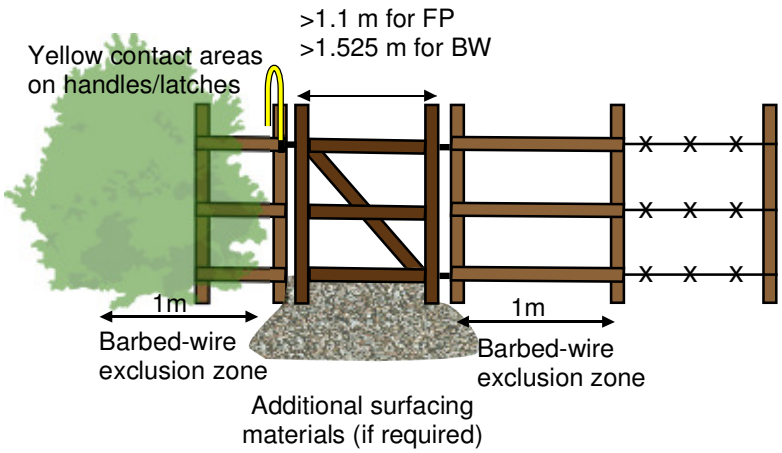


[2] Please contact Central Bedfordshire Council Highway Assets for information on gaps for restricted byways and BOATS.

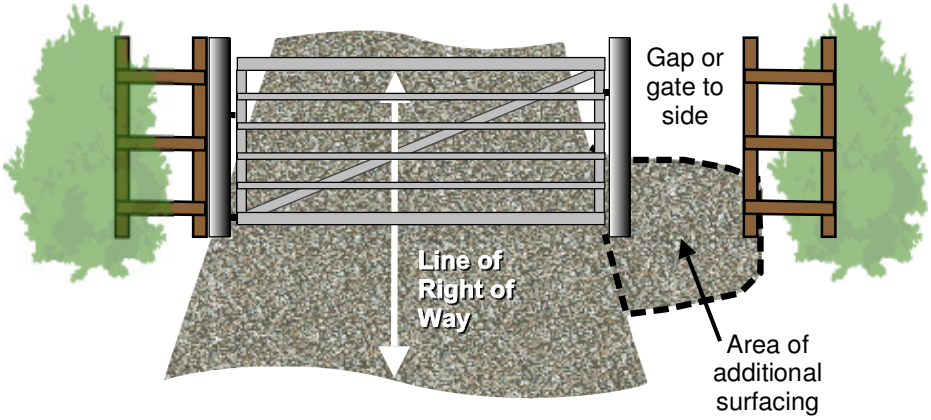
Gates

Where a gate is required for stock control purposes this can be installed following authorisation [3]by the Council. Gates can either be wooden or metal and must comply with BS5709 and must provide a **clear** gap of >1.1 m for a footpath or >1.525 m for a bridleway[4]. Central Bedfordshire Council's preferred suppliers are Centrewire and Secure-a-Field and supply both wooden and metal gates/kissing gates with openings of >1.2 metres. Any gate should be:

- centred on the path
- have adequate manoeuvring space around it
- be away from barbed-wire or electric fencing
- be set back from a carriageway and in line with any fencing for a footpath or within a corral area for a bridleway (see Corrals below)
- two-way opening with a self-closing mechanism



Where a gate or gap is off set from the rights of way's centreline to accommodate a larger vehicle access gate, the surfacing of the track must extend to accommodate the gap or gate as below.



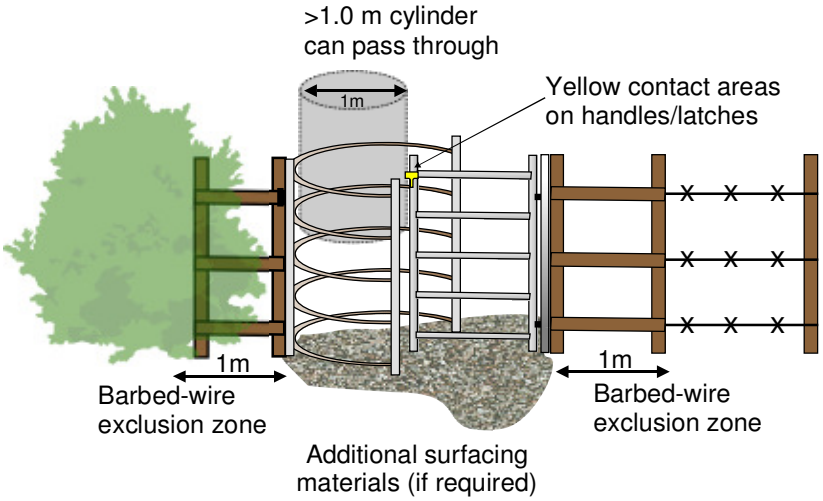
[3] Gates can be authorised under Section 147 of the Highways Act 1980 to prevent the ingress or egress of animals from agricultural land. The person responsible for the gate must apply in advance for authorisation stating the type of gate and why it is needed and will be responsible for the gate's installation and future maintenance. See *"Structures Policy: achieving least restrictive access on Central Bedfordshire's Rights of Way"*. For more details.

[4] Please contact Central Bedfordshire Council's Highway Assets Team for information on gates for restricted byways and BOATS.

Kissing Gates

Kissing gates should be installed where there is a need for a gate for stock control purposes and the escape of an animal could cause a hazard (e.g. on a nearby road). Kissing gates (whether with metal hoops or wooden corrals) must be suitable for mobility needs. Large mobility gates or RADAR scheme gates should be considered where there is a likelihood that mobility vehicles and pushchairs could be used on the path.

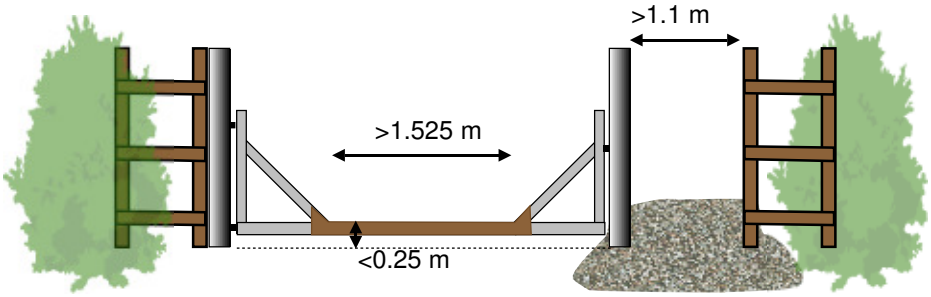
Because of the increased surface wear within hoops, this area should be surfaced with aggregate.



Kissing gate hoops should be set that they lie on the outside of a livestock fence-line with the gate self-closing flush with the fence. Alternatively, where the kissing gate exits onto a farm track or road, the hoops should either be set on the non-traffic side to avoid damage from vehicles or the entire gate recessed back from the track/road.

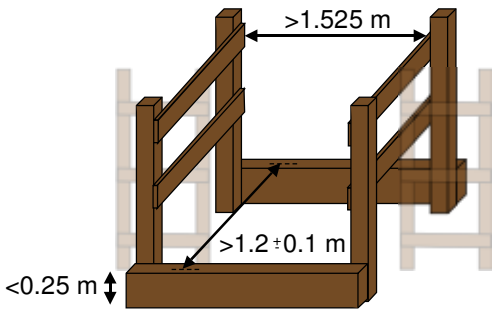
Step-over gates

Where the control of vehicles is needed on a track used as a bridleway a step-over gate can be installed. This requires enough space to one side for a1.1 m wide pedestrian gap that can also be used by bicycles. The key features of a step-over gate are that the “step” must be no more than 0.25 m (and ideally 0.19 m ±6 cm) high and at least 1.525 m wide. The step should be faced with wood or other noise-deadening material.



Horse stiles

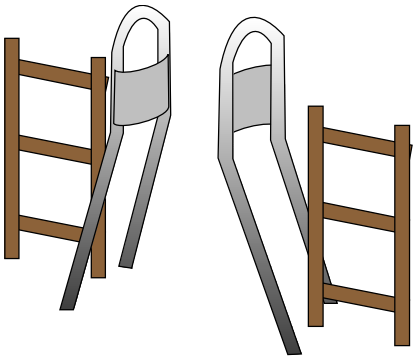
Where restriction of access for motor vehicles (primarily motorcycles) to a bridleway is important in the reduction of anti-social behaviour a “horse stile” can be installed as per the requirements in BS5709. A kissing gate (preferably with a RADAR key) should be installed to the side to enable mobility vehicles



to use the bridleway.

Anti-bike barriers

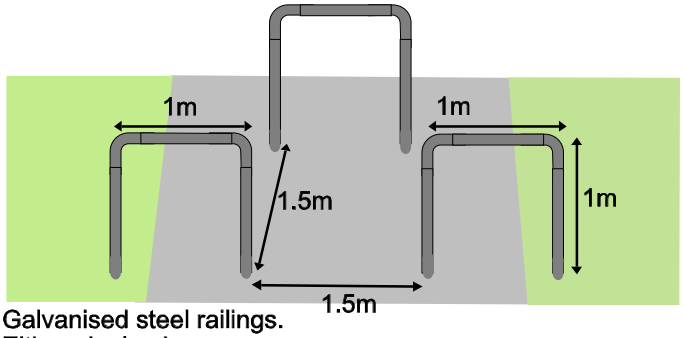
In a similar fashion, where motorcycling is deemed to be an anti-social behaviour issue on a footpath or cyclepath an “A” or “K” barrier can be installed. Proprietary barriers are available from Centrewire and K Barriers. The barriers permit mobility vehicles and most bicycles to pass between the “shoulders” of the barriers but prevent the wider handlebars of motorcycles and scooters passing through.



Staggered barriers

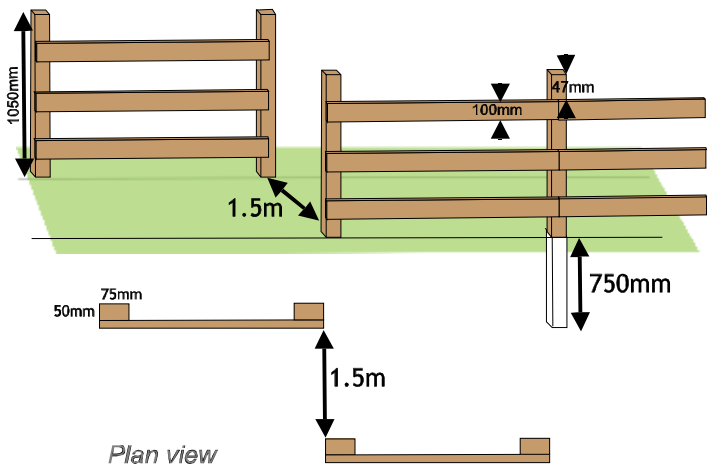
Occasionally developers will be requested to install staggered barriers where there is either a history or high risk of unauthorised motor vehicle (motorcycle) use or where a bridleway has a junction with a road and some degree of control is needed to be imposed on horses or cycles.

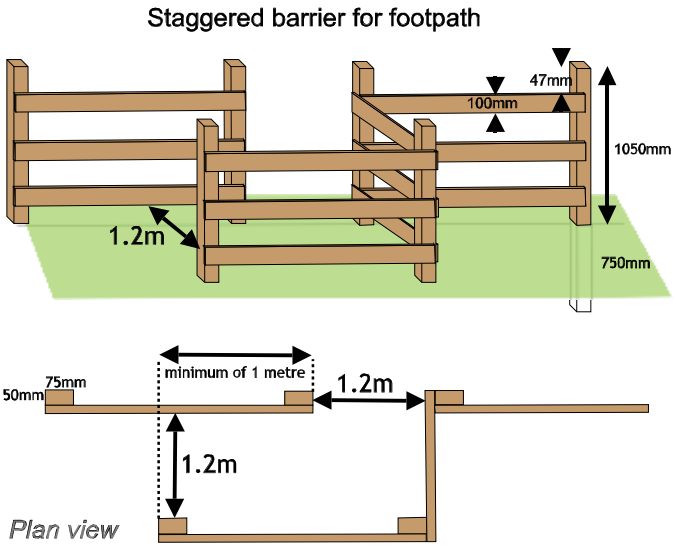
3-metre wide cycle track



Galvanised steel railings. Either single piece, welded joints or security AV fittings. Installed to supplier’s specifications

Staggered barrier for CT or BW





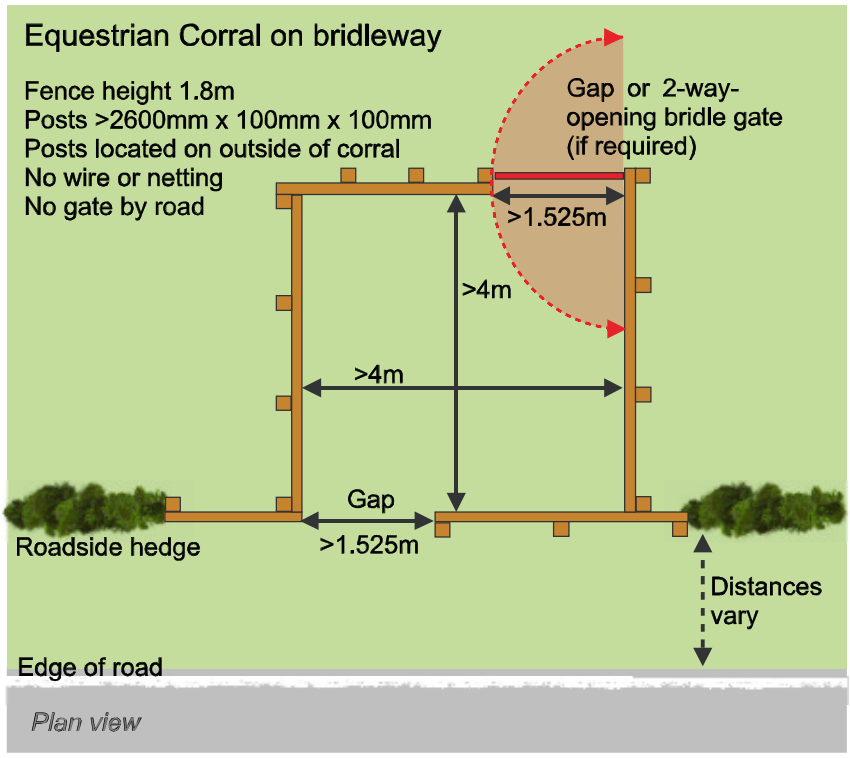
Equestrian Corrals

Occasionally developers will be requested to an equestrian corral where a bridleway has a junction with a road which is envisaged to have a lot of traffic or a nearby hazard. The British Horse Society guidance on enclosures/corrals states:

For any enclosed area it is recommended that:

- *Clear manoeuvring space of at least 4 metres by 4 metres is required within the pen.*
- *All fencing should be post and rail wooden fencing, no wire, wire netting or barbed wire.*
- *The ground throughout the structure should be firm, level and free from deep mud or vegetation that would reduce the useable area.*

Developers should consult with the relevant Planning and and Rights of Way Officers to establish whether there is a need for a corral and whether this would impinge on any other rights of access along the bridleway. If this is the case, an alternative control structure may be required.



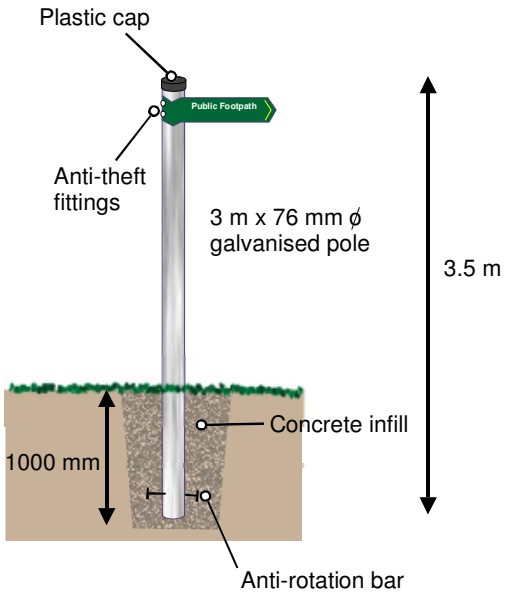
DRAFT DIAGRAM

Signposting

Public rights of way need to be signed. Metal signposts are located where the right of way leaves a metalled carriageway and wooden waymark posts are located at path junctions, field boundaries and where there is a need to mark the route of the path.

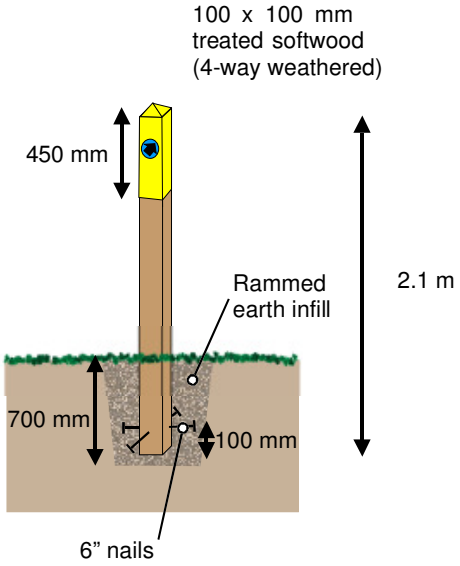
Roadside signpost

Revised 8-Nov 2021



Always check for underground cables/pipes

Waymark post



Always check for underground cables/pipes

Signposts and waymark posts should not obstruct access tracks and should be located where they are a) clearly visible, and b), where they are unlikely to be damaged by farming operations.

An additional safety requirement for roadside signposts is that they need to be set back from the edge of the carriageway to prevent being an immobile hazard to road users.

Roadside signpost arms are made to a particular Central Bedfordshire Council specification and may or may not include additional destination information depending on the specific location of proposed sign. Signage should therefore be discussed with the area's Rights of Way Officer.



Benches, tables and outdoor gyms

Ancillary furniture such as benches, picnic tables and outside gym equipment should not be placed within the width of the public right of way but should be offset from the right of way by >1.0 m on a footpath and >2.0 m on a bridleway or restricted byway.

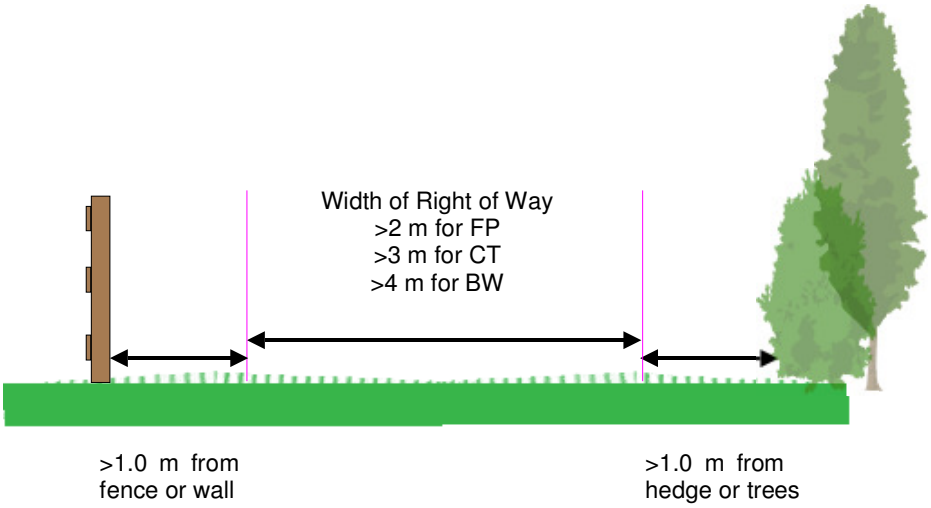
Surfacing of public rights of way

Surfacing of paths can either be natural, unbound or bound. Any walls or fencing should be more >1 m from the edge of the path. Trees and hedges should be planted >1 m from the edge of the path or, for a pre-existing hedge or wall, the path should be set out >1 m from the feature.

Any fences or walls adjoining a path should not have dog-legs or blind corners. This is to improve personal safety of users and to discourage anti-social behaviour.

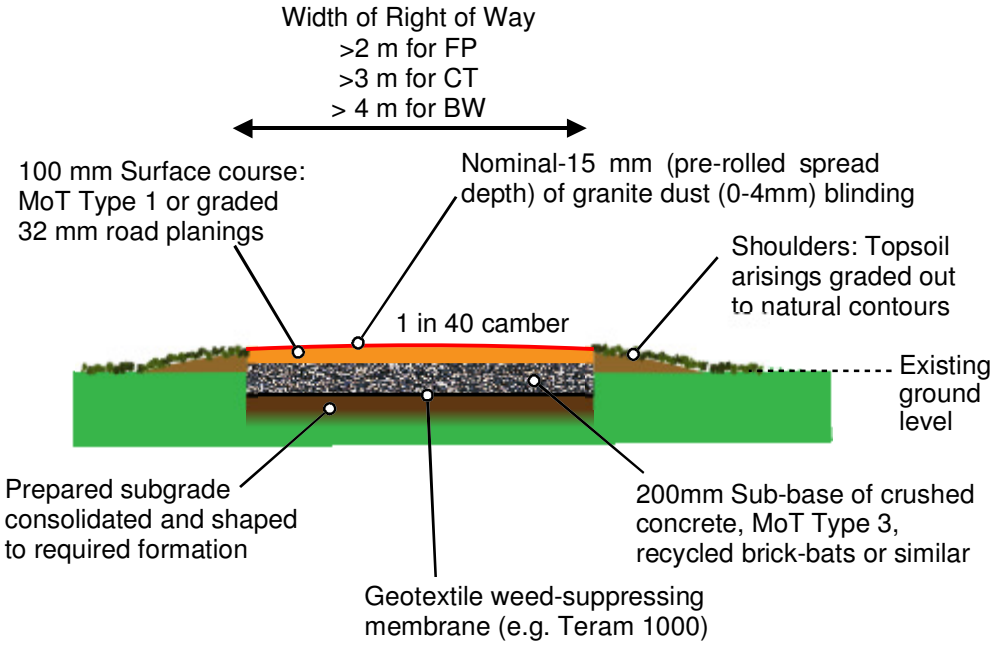
Natural Surface

Where a natural surface is being left, this should be level and free from coarse vegetation/stumps and free from wheelings, ruts or standing water.



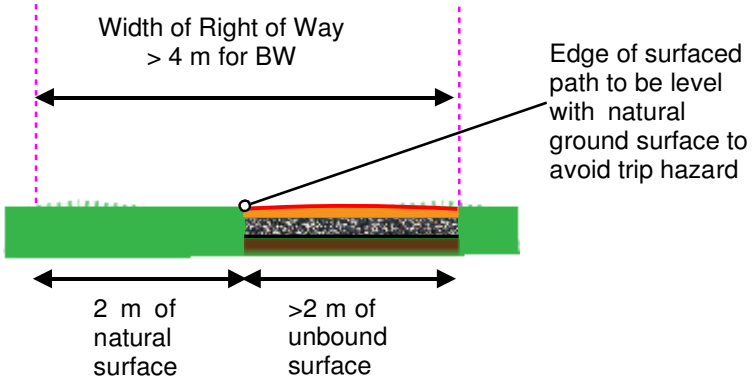
Unbound surface

Where an all-weather surface is needed in a rural or peri-urban environment an unbound surface is preferable to a bound surface to be in keeping with its surroundings. The surface consists of a basal geotextile, a coarse sub-base, a medium wearing course blinded with rolled in granite dust.



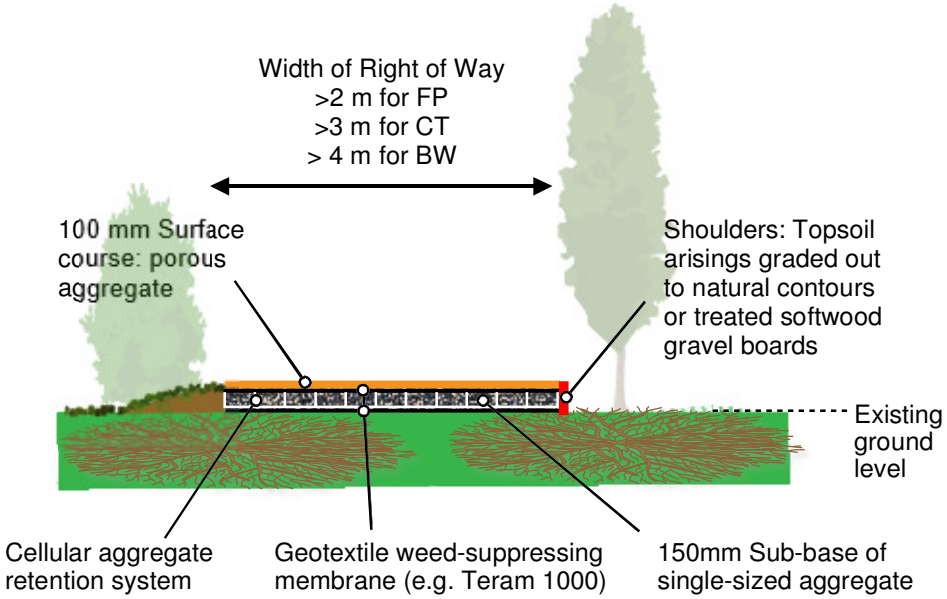
For bridleways, there is the option of dividing the width of the path into a natural strip for riding and a surfaced strip for cycling and walking.

This is suitable for where existing bridleway routes are re-used or diverted in areas close to residential developments or on commuter routes.



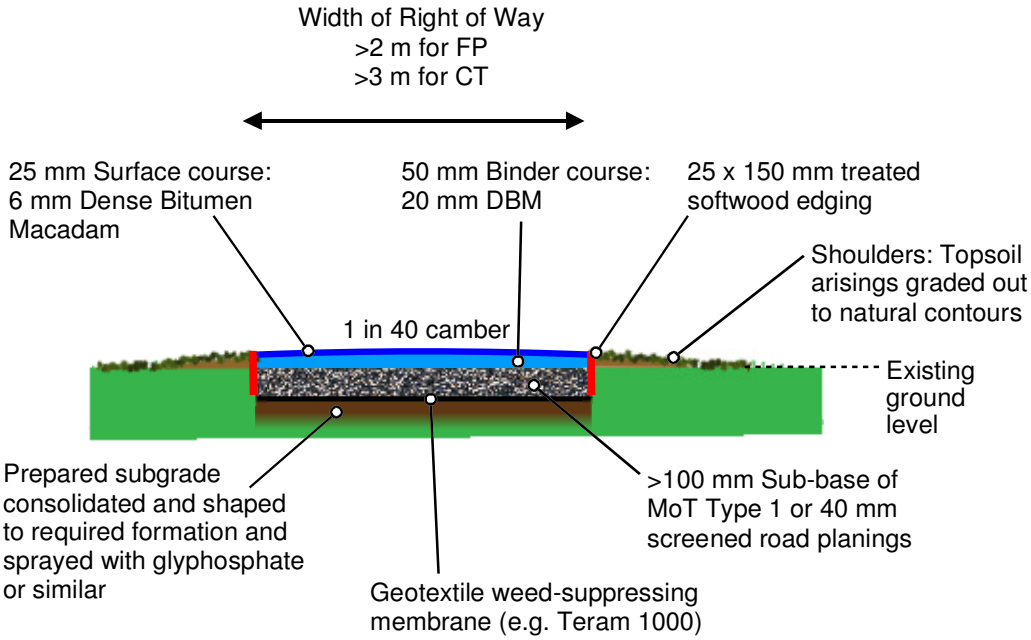
"No Dig" Paths

Where paths cross ground that is either archaeologically sensitive or where the proximity of trees means that excavations for the path's sub-base cannot be done, a "no-dig" solution should be used. This should utilise some form of web or mesh to contain the sub-base and a porous surface course. There are a number of proprietary solutions and the choice and use of these and the aggregate infill should be discussed with the Council before any works are planned.



Bound Surfaces

Rights of way with bound surfaces (i.e. asphalt) are most appropriate in an urban setting with new developments unless a more natural look is required, e.g. through an area of public open space where an unbound path is aesthetically desirable.



Paths should be edged and have a 1 in 40 camber. Where the surfaced path is to be shared with vehicles (e.g. a maintenance access track) the surfacing specifications should be highway grade to the maximum weight of the vehicles using the path.

Further information and Advice

Further information and advice can be sought from the Area Rights of Way Officers and the Contracts Officer within Central Bedfordshire Council's Highways Team at:

Adam Maciejewski mIPROW
Senior Definitive Map Officer
Asset Intelligence Team
CBC Highways

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