Telford & Wrekin Council

Highways Design Guide

July 2019

apT.

a co-operative council

Telford & Wrekin COUNCIL

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1 Introduction

1 Introduction

1 Introduction

Over the coming years, there are excellent opportunities for Telford residents, businesses and visitors to benefit from significant levels of investment planned in key projects across the Borough.

Partners across Telford are working together to maximise these benefits and to enhance and promote the Borough as a great place for business innovation and enterprise with a world-class environment, landscape and quality of life on offer.

Telford and Wrekin Council are committed to playing a key role in delivering the best possible services for the people of Telford. As a Highways Authority and with its other responsibilities the Council, alongside the planning authority, developers, landowners, and other partners, play a key role in the delivery of infrastructure and services to support communities.

As new housing and commercial sites are developed across the Borough, the aim of this guide is to ensure the design of new roads meet the needs of future residents, visitors and users, whilst retaining the local distinctiveness of the area. The highway network serving new residential and commercial developments in Telford should strive for excellence in design quality, be beneficial to all and improve the quality of life for all those that have an interaction within the Borough.

Well designed developments add economic, environmental, social and cultural value and helps communities flourish. This guide will help everyone involved in new developments to achieve good design and supports an effective and efficient planning application process.

The purpose of this guide

This guide is for:

- Developers
- Landowners and property managers
- Architects
- Engineers
- Surveyors and designers
- Local Planning Authority
- All others involved in the design and construction of new residential and commercial developments

This guide is to provide advice and guidance on the design elements that combine to create successful residential and commercial developments in Telford and Wrekin. This guide is not intended to give definitive or prescriptive design advice and is for guidance purposes only.

1 Introduction

This will be determined by:

- Safe movement for all within the development
- Improvement in quality of life
- Maintainable built environments
- Integration with and enhancement of the existing community
- Low traffic speeds

This new guide is to be used in partnership with Manual for Streets, Manual for Streets 2, Design Manual for Road and Bridges and The Specification for Highway Works. It is designed to be less prescriptive than traditional design guides and places greater emphasis on the development of low maintenance, innovative proposals by using new ways of thinking and different methods of approaching both design and construction.

Telford has seen some of the largest housing estate and commercial development in the UK. As a result, many lessons have been learnt in terms of what has been successful when delivering new development. This guide looks to build on these lessons to help ensure that new development designs and delivery terms are right first time in order to negate the additional time and cost implications of redesigns and possible abortive construction works.

This guide is very much a live document that will be open to revision and further development as new working methods, technologies and wider highway, and planning guidance change. However, the core principles for the development vision shall remain unchanged.

We look forward to working with you.

……Telford & Wrekin Highways Development Management Team….

2 Street Geometry

2 Street Geometry

2.1 Road Layout

This section sets out the acceptable specification and design guidance for adoptable roads. This contains guidance on public transport, pedestrian and cyclist provision.

We do not normally adopt developments of five or less dwellings. We encourage developers to create layouts that are in line with adoptable standards and to be offered for adoption.

2.1.1 General Geometry and Road Safety Audit Requirements

2.1.2 External Roads and Other Off Highway Works

These are roads that create a new link in the road network and serve a more general purpose than simply giving access to a development. Unless they fall outside the definition of a road (street), as set out in Table TWC1, you should normally design these with the appropriate parts of the Manual for Streets 1 and 2 along with our specification and standard drawings.

They should contain measures to control vehicle speeds and limit the impact on the environment, safety audits will be required in all cases. Consideration to permit direct frontage access from properties to such roads will be assessed on an individual basis and could be accepted in special circumstances providing that they are subject to a 40mph speed limit and 85th percentile speeds are 40mph or less.

2.1.3 Site Access to External Roads

Unless the external road falls outside the definition of a road (street), as set out in Table TWC1, you should normally design these in line with the appropriate parts of the Manual for streets 1 and 2, along with our specification and standard drawings. We will not normally accept mini-roundabouts, unless they form part of a more comprehensive traffic calming scheme, that is either required to minimise the developments impacts, or that has previously been identified. A mini-roundabout will not be acceptable where it is proposed simply because the necessary visibility for a priority junction cannot be achieved. We may be prepared to consider permitting direct frontage access from properties to the external road providing that they are subject to a 40mph speed limit and 85th percentile speeds are 40mph or less.

Site specific requirements will depend on the following factors:

- Location
- Safety considerations
- Traffic, pedestrian and cycle flows
- Public transport requirements

These requirements should be established and discussed with Telford and Wrekin Council in the early stages of the development proposals. Safety audits will be required in all cases.

2 Street Geometry

2.1.4 Internal Development Roads

These roads only serve the development. These roads should normally be designed in line with the sections below and our specification and standard drawings, which cover residential developments of around 1000 dwellings and employment and commercial developments. The design of development roads for sites of around 1000 dwellings will be considered on a site by site basis, along with developments that are not covered by the following guidance.

Safety audits will not normally be required for internal developments unless:

- The layout contains features which are not explicitly covered by this document

Table TWC1 gives general geometry for internal residential roads. Generally a residential access road is a conventional cross-section road with separate provision for vehicles and pedestrians. Users of residential access ways share a common surface.

Table TWC1: General Geometry of Residential Roads

	Major Residential access road	Residential access road	Residential access way
Type of use	Mainly vehicles (bus access likely)	Mainly vehicles	Mainly pedestrians and cyclists, not normally acceptable for use of a bus route.
Normal dwelling limits	1000 Normally - no more than 100 from a single access point.	400 Normally - no more than 100 from a single access point.	50 Normally - no more than 25 from a single access point.
Access to schools	Yes	Yes, but not as a cul-de-sac	No
85th %ile design speed	30mph	20mph	15mph
Shared surface	No	No	Yes
Widths for two way traffic. Note: Where a road is to be narrowed to help control vehicle speeds	Carriageway width 6.75m	Carriageway width 5m up to 50 dwellings; 5.5m for 50 to 400 dwellings. Except on a bus route where the carriageway should be a minimum of 6.5m wide or on a road servicing a school.	Overall corridor width of 7.5m.
Centre line radius	Defined by tracking	Defined by tracking	Defined by tracking

2 Street Geometry

Crossfall	1:40	1:40	1:40
Longitudinal gradient	Flexible surfacing minimum 1:100 Block surfacing minimum 1:80 In all cases maximum 1:20 In all cases at junctions, not to exceed 1:30 for the first 10m of the side road.	Flexible surfacing minimum 1:100 Block surfacing minimum 1:80 In all cases maximum 1:20 In all cases at junctions, not to exceed 1:30 for the first 10m of the side road.	Flexible surfacing minimum 1:100 Block surfacing minimum 1:80 In all cases maximum 1:20 In all cases at junctions, not to exceed 1:30 for the first 10m of the side road.
Vertical curves	See paragraph 2.17	See paragraph 2.17	See paragraph 2.17
Visibility distance at junctions, bends and vertical crests	43m	25m	Design speed of road as set out in the DMRB.
Verges	Grassed verges minimum 1m wide, minimum area of $10m^2$, otherwise hard paving required.		
Steps	Not normally acceptable in area to be adopted as public highway unless a suitable alternative ramp is provided in accordance with DDA requirements.		

2 Street Geometry

Table TWC2 gives the general geometry principles for internal employment and commercial development roads. Generally, major industrial and minor industrial roads are conventional cross-section roads with separated provision for vehicles and pedestrians. Design varies dependent upon likely levels of heavy-good vehicles.

Table TWC2: General Geometry of Employment and Commercial Development Roads		
	Type of internal development road	
	Major industrial access road	Minor industrial access road
Planning use class	B2 to B8	B1
Development limit	Normally, no more than 8 hectares for a single point of access	
85th %ile design speed	30mph	25mph
Shared surface	No	
Widths for two way traffic	Carriageway width 7.3m	Carriageway width 6m for offices, 7m for other B1 uses
Centre-line radius	55m minimum	Defined by tracking
Crossfall	1:40	
Longitudinal gradient	Minimum - 1:100 Maximum - 1:20 At junctions, do not exceed 1:30 for the first 10m of the side road.	
Vertical curves	See paragraph 2.17	
Visibility distance at junctions, bends and vertical crests	70m	45m
Verges	Grassed verges, minimum 1m wide, minimum area $10m^2$. Hard paving otherwise.	
Steps	Not normally acceptable in areas to be adopted as public highway unless a suitable alternative ramp is provided in accordance with DDA requirements.	

2 Street Geometry

2.1.5 Special Geometric Considerations

a) We will consider developments in excess of the single limits on a site by site basis.

b) Development designs close to schools and roads serving schools must be carefully considered. Especially the parking in and around schools which is a serious safety concern and can cause unwanted traffic congestion.

Any new school proposed on a new development must be considered carefully at the early stage of any process. The school is to be located to maximise the following opportunities:

- For children to walk and cycle to school
- To provide safe routes to school, and
- To minimise the risk of on street parking

A transport assessment will cover all of the above and a travel transport plan will also be required.

c) Shared surfaces are considered by the Manual for Streets

- in short lengths
- where they form a cul-de-sac
- where traffic is less than 100 vehicles per hour
- where parking is controlled

The developer's whole design should be considered when proposing shared surface layouts, including the building type and street furniture layouts. Due to the layout of a shared surface, vehicles should not dominate the layout and measures should be taken to establish it is not just a road with no footways.

Shared surfaces still need to be functional for visually impaired people and include alternative options for these users to navigate. It is expected you will consult with the relevant representative groups and access officers when designing your proposals.

Surfacing material should not be the primary feature in determining and designing a shared surface. It will not normally be sufficient to use only a change of surface to convey the nature of the area. Please refer to Part 3 - Materials and Construction.

d) We may be prepared to accept a narrower, single carriageway width of 3.7m between kerbs over short lengths as a speed control feature. A minimum lane width of 3.2m applies only where there are limiting restrictions such as where a pedestrian refuge is provided in the centre of the road.

e) Taking into consideration people with impaired mobility, we may be prepared to consider specific relaxations in areas of extreme difficult topography. However, these relaxations are not to form the starting point of any design. Financial cost of cut/fill is not a material consideration when assessing the ability to achieve gradients to aid walking and cycling.

f) Other use classes for employment and commercial developments such as leisure and shopping will be considered on a site by site basis and are dependent upon the likely number of HGV's.

g) We will recommend planning conditions to restrict the change of use from B1 to B2 - B8 developments unless the roads provided are to major industrial road standard.

2 Street Geometry

2.1.6 Street Networks and Emergency Access

New residential streets should be designed to form a well-connected street network, this design methodology has extensive advantages.

In regards to well-connected street networks, developments usually require a minimum of two access points to the highway network. The number of external connections will be derived from the nature of the developments surroundings. All access points should be designed and built to adoptable standards and fit for public use.

Where suitable access arrangements cannot be made, we may refuse adoption of the development roads.

2.1.7 Vehicles Tracking Design Considerations

Vehicle tracking must provide the required width for movement which must be contained within the overall road width only. Tracking can also help to establish an appropriate bend radii. Further information on tracking can be found in “Manual for Streets” documents, published by the Department of Transport.

When tracking large roads it is important that forward visibility is considered and provided for at bends in accordance with Part 2 Table TWC4 to ensure this to be achieved safely.

Carriageway widths and bend radii will then need to be checked, this is to ensure the various types of vehicles expected to use the road can manoeuvre sufficiently. This should be done using computer tracking software to generate swept path analysis for particular types of vehicles and to superimpose them onto proposed layouts.

Tracking assessments should be carried out with on-street parking in mind and should be able to take into account likely parking arrangements.

You should look to gain our agreement on a proposed layout prior to submitting a planning application. The layout will also have to comply with other design guidance for the type of road and road speed to create a safe environment for all road users including cyclists and pedestrians.

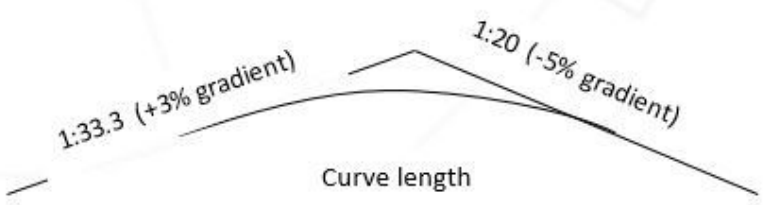
2.1.8 Vertical Curves

Where changes in gradient occur, vertical curves will be required at sags and crest, except where indicated in Table TWC3. Curve lengths should be either:

- The sum K x A, where K is given in Table TWC3 and A is the algebraic difference of gradients expressed as a percentage, or
- The minimum length for appearance given in Table TWC3

Whichever is higher

Please use the example calculation of vertical curve for reference:



For 20mph design speed K = 3

(from Table TWC3)

algebraic difference of gradients

= +3 – (-5)

expressed as a percentage = 8.0

curve length = 3x8

= 24m

Minimum length for appearance (from Table TWC3) = 20m

Gradients have been exaggerated for illustrative purposes

Table TWC3: Vertical Curves for all Internal Roads		
85th %ile design speed (mph)	Minimum length of vertical curve	
	K	Minimum length for appearance (m)
30	6.5	30
25	4	25
20	3	20
15	2	20

2 Street Geometry

- Early discussion with us is vital if you have a large, flat or steeply sloping site to ensure that the vertical alignment is acceptable.
- At crests, it may be necessary to increase the length of the vertical curve in order to achieve the visibility distance set out in Table TWC4.
- Shorter lengths of curve lengths may be accepted where exceptional circumstances prevent the length normally required.
- To avoid water gathering on roads, do not apply a minimum length where A is less than 5 on any sag curve. This results in a low point on the road and is not acceptable.
- Residential speeds should normally be restricted to 20mph or less.

2.1.9 Visibility Splays

Table TWC4 sets out the visibility splays normally required for junctions, bends and vertical crests. The starting point for calculating visibility splays should be the Manual for Streets. Internal development roads should normally base visibility splays on an assessed 85%ile vehicle speed. Existing roads should be based on measured speeds. We will normally request you carry out radar surveys to measure existing speeds and establish the 85%ile.

Table TWC4: Visibility Splays

Assessed likely vehicle 85%ile speed (mph)	Measured 85%ile vehicle speed (mph)	Visibility distance at junctions, bends and vertical crests (m) Light Vehicles	Visibility distance at junctions, bends and vertical crests (m) HGV
15	11 to 15	17	19
20	16 to 20	25	27
Speeds on new residential development roads should normally be controlled to 20mph or less	21 to 25	33	36
	26 to 30	43	47
	31 to 35	54	59
	36 to 40	65	73
	41 to 44	120	120
	45 to 53	160	160
	54 to 62	215	215
	63 to 75	295	295

Along with taking in to account Tables TWC1 and TWC2, we will assess visibility requirements based on likely vehicle speeds within a proposed development. If we are satisfied that speeds are, in practice, likely to be lower than design speeds, we will normally be prepared to consider shorter visibility splay distances. However, this is also true of the reverse.

(See Figure TWC1 for guidance on construction visibility splays)

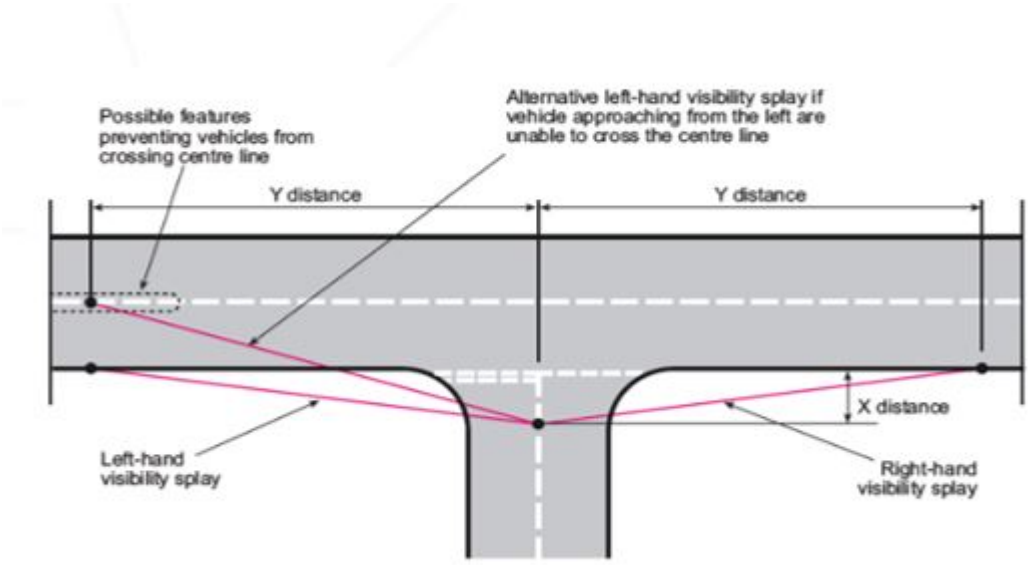


Figure TWC1: Setting Out Visibility Splays

Figure TWC1.a Junctions

		Main Road				
		Road (Street)	Residential access road	Residential access way	Major industrial road	Minor industrial road
Side road	Residential access road	2.4m	2.4m	2.4m		
	Residential access way	2.4m	2.4m	2.4m 2.4m		
	Major industrial road	4.5m			4.5m	4.5m 4.5m4
	Minor industrial road	4.5m - 2.4m			4.5m - 2.4m	4.5m - 2.4m

Note: On all development roads the visibility at junctions, bends or crests in the vertical plane should be measured at the driver's eye-line height of no less than 1.05m above the road level and to a point no less than 0.6m above the road level. This is a standard set out in "The Manual for Streets documents".

2 Street Geometry

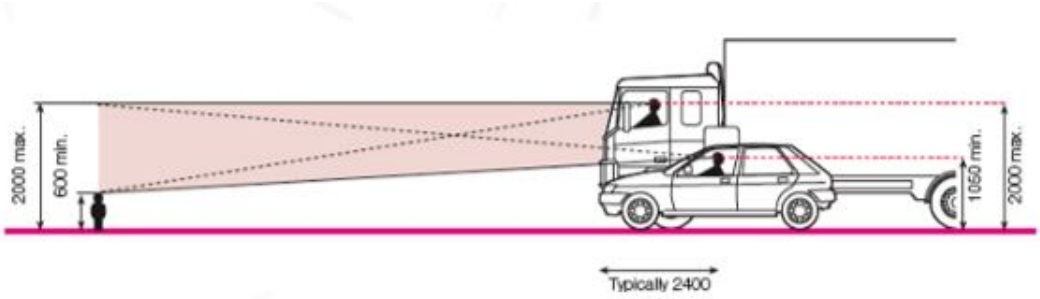


Figure TWC1.b Drivers eye-line heights

2.1.10 Junction Spacing within a Development

You should normally avoid priority controlled (Give Way) crossroads. When a crossroads cannot be avoided, every effort should be made to provide an appropriate form of traffic control such as a roundabout. Mini-roundabouts will not normally be accepted as a traffic control measure to development accesses unless they form part of a wider traffic calming scheme that is either required to reduce the developments impact or is a previously identified problem area.

Junctions that are on the same side of the road should be positioned so that a vehicle waiting to enter the main road at one junction does not interfere with the visibility of a vehicle waiting at the other.

2.1.11 Private Access Restrictions

There should normally be no accesses for vehicles:

- On to the corners (radii) of a junction
- At bus stops or lay-bys
- Close to pedestrian / cycle refuges
- Close to traffic calming features (access should not be situated on the ramp of a road hump or speed tables due to the risk of a vehicle grounding as it manoeuvres)
- Close to street furniture

Elsewhere, we will normally accept accesses providing they meet safety considerations and comply with the relevant guidance on the design of private accesses.

2.1.12 Turning Heads

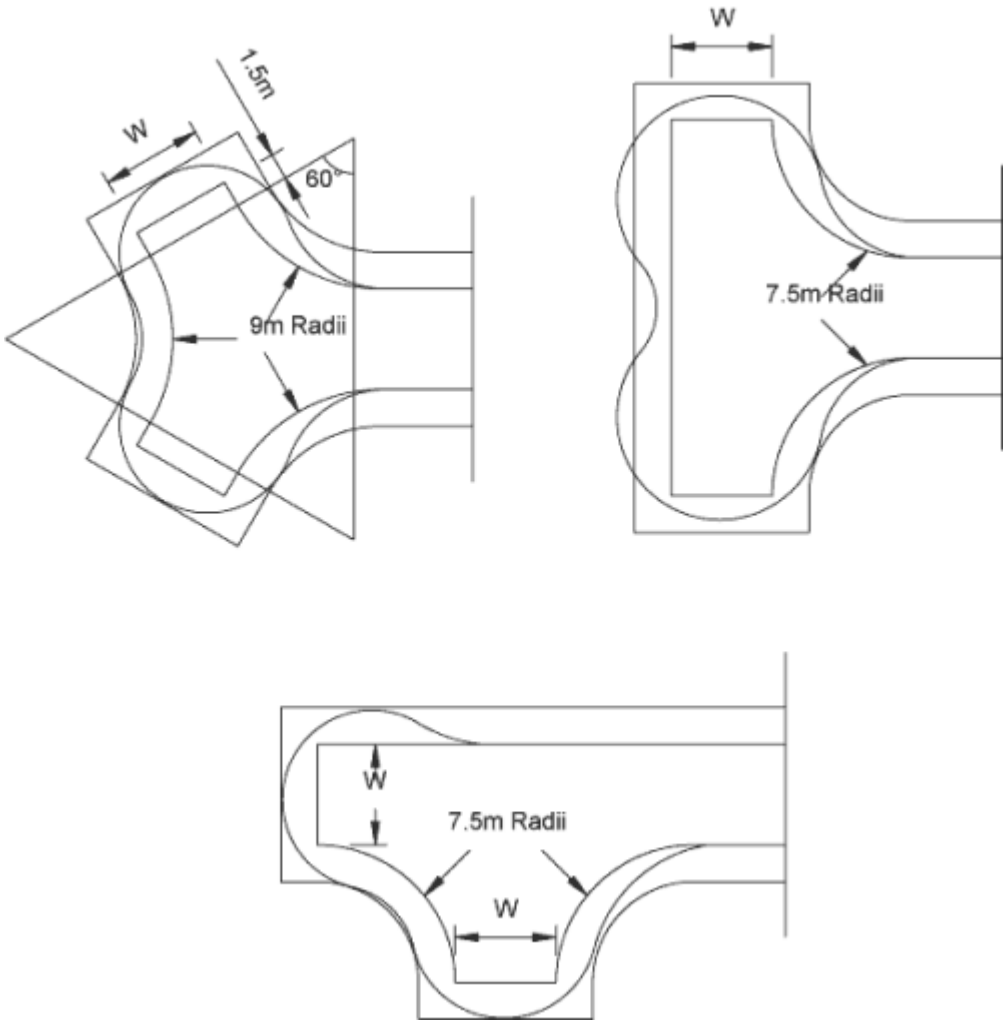
Turning heads should be provided at the end of cul-de-sacs or wherever vehicles would otherwise have to reverse over a long distance which is deemed to be over 25m. It is necessary to provide vehicle tracking at turning heads to satisfy that waste/recycle vehicles can negotiate a turning area satisfactorily.

Care should be taken when designing turning heads so that on street parking is not encouraged and thereby reducing the turning area. Where on street parking is likely to cause problems, it is expected you provide measures to control it.

Larger areas such as residential squares will be considered. However, they are required to satisfy the minimum turning dimension requirements, their ability to act as a turning head is not deemed to be affected by on street parking. Where it is deemed that we feel it necessary to adopt any additional areas, we may require a commuted sum for future maintenance purposes.

Figure TWC2 Example of a turning head within a 'square feature'

2 Street Geometry

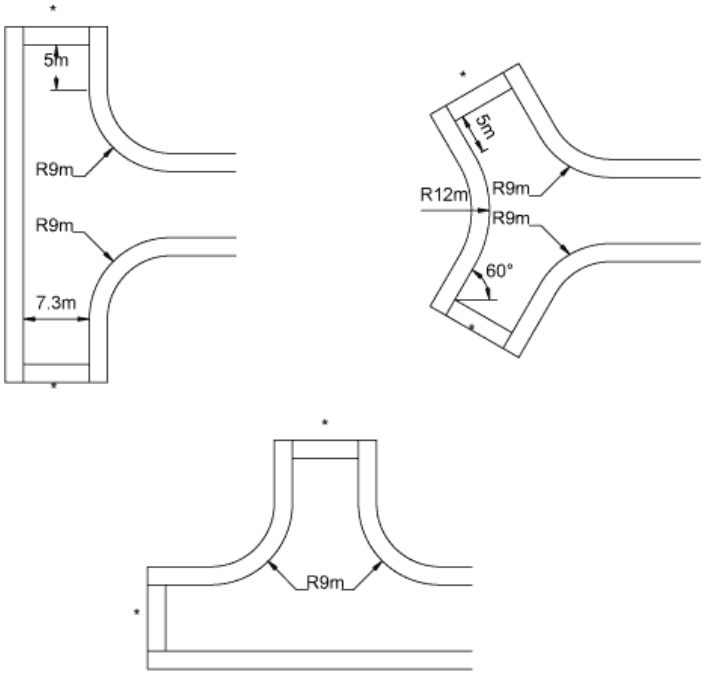


W = 5.0m up to 50 dwellings

W = 5.5m from 50 – 400 dwellings

W = 6m for B1 use class office developments

Figure TWC3 Turning heads for use on residential access roads and minor industrial access road serving offices



* Depending upon the type of vehicles likely to use the road, a footway may be required around the end of the turning head.

Figure TWC3a Turning heads for use on industrial / commercial estate roads

2.1.13 Materials and Construction

Please refer to Part 3.

The standard construction requirements and materials are based on national standards and advice generally used for constructing and maintaining highways throughout Telford and Wrekin. These requirements should normally be applied to all highway works. They have been specifically been chosen to ensure the highways function safely and can be maintained in a cost effective way. General principles of quality, durability, maintainability and sustainability have been considered in forming these standards.

2.1.14 Adopting New Roads

We will normally adopt a new road where:

- It serves more than 5 dwellings
- serves a multiple building
- multiple occupation industrial or commercial development
- where it serves a wider public benefit
- All highway works have been designed and built to our satisfaction

2 Street Geometry

- A S104 agreement of the Water Industry Act has been granted with the relevant water company for the foul/storm drainage to be adopted, or alternatively we are satisfied to adopt any highway drainage.
- The development served by the road is acceptable in all other highway and transportation respects, with parking provision being an example.

Commuted sums may be required. For example this will normally be for:

- Additional areas exceeding the normal highway design standards and which are not required for the safe functioning of the highway
- Any materials used outside of the specification
- Non-standard or additional street furniture
- Any highway landscaping associated with the highway including trees and,
- Sustainable Drainage Solution's (SUDs) for example, flow-attenuation devices, swales and storage areas for highway drainage.

Note: Where SUDs are proposed it is essential that discussions must be held with all relevant parties at an early stage and before any planning application to agree ownership and responsibility for the facility.

This is not an exhaustive list, and there are other occasions described throughout this document where we may require the payment of commuted sums, for example any vertical traffic calming.

2.2 Pedestrians and Cyclists

Walking and cycling has become a real alternative to journeys by car in particular when considering short distances. The sustainability of new developments must make appropriate, high quality provision for pedestrians and cyclists and where necessary to break the road link in order to actively discourage through traffic. It is important that links for cyclists and pedestrians are well maintained and should be designed with this in mind. This includes providing appropriate parking and supporting facilities for cyclists.

2.2.1 General Geometry

Table TWC 5 sets out the general geometry for pedestrian only routes, this is inclusive of footways and footpaths. Table TWC6 sets out the geometry for pedestrian and cyclists, or cyclists only. In both cases, surfaces used by pedestrians should be free from hazards that could cause a trip.

Table TWC5: Pedestrian Only Routes

Location	Width	Minimum width past obstacle	Longitudinal gradient	Cross fall
Normal residential, commercial and industrial sites	2m	1.2 Maximum length of an obstacle = 6m	Minimum 1:100 Maximum 1:20	1:35 Vehicular crossovers - max 1:12
Shopping areas	4m 4m			
Bus stops	3m			
Outside schools	3m			

Note: Obstacles include such things as, bollards, sign posts, guard railing, lamp columns and utility equipment. Liaison with utility providers is essential. Clearance should be increased to 2m where pedestrian flows are high (in the region of 500 an hour).

Taking in to account the needs of those with impaired mobility, we may be prepared to consider a relaxation of a gradient to 1:12 on sites with particularly difficult topography in short longitudinal sections. However, every effort should be taken to negate this.

Table TWC6: Cycle and Pedestrian Routes and Cycle Use Only

Type	Width	Centre-line radius	Forward visibility	Longitudinal gradient	Cross fall
Shared use with pedestrians	3.0m	6.0m	20m	Minimum 1:100 Maximum 1:20	1:35 (no adverse camber)
Cycle only	2m				

Note: Minimum width past obstacles is the same as that outlined in table TWC5.

For cycling design advice please directly contact the Authority.

2 Street Geometry

There should be no part of a building that does or potentially could over sail any footways at a height less than 2.6m, the headroom used over routes for cyclists should normally be 2.7m. If anything projects lower than this you will need to apply to us for a licence under Section 177/178 of the Highways Act before the road is considered for adoption. Where a route runs alongside a road, its rear edge should normally coincide with the rear of visibility splays at junctions and bends so that pedestrians and cyclists do not impede visibility for motorists. This should be achieved by either widening the footway or alternatively providing a grassed verge. If a grass verge is proposed, these should be a minimum of 1m wide for maintenance purposes with an overall area greater than $10m^2$, otherwise hard landscaping is required.

It is normally encouraged that routes are set to run separately from a road except in residential areas. The Manual for Streets sets out that cyclists should generally be accommodated on the carriageway in residential areas. However, where a separate route is justifiable, for example, where it is necessary to break a road link to discourage through traffic, or to give a more direct link to local amenities, care should be taken to minimise crime activities.

General guidance on safe routes and justified separate routes can be found below and should normally meet the following criteria:

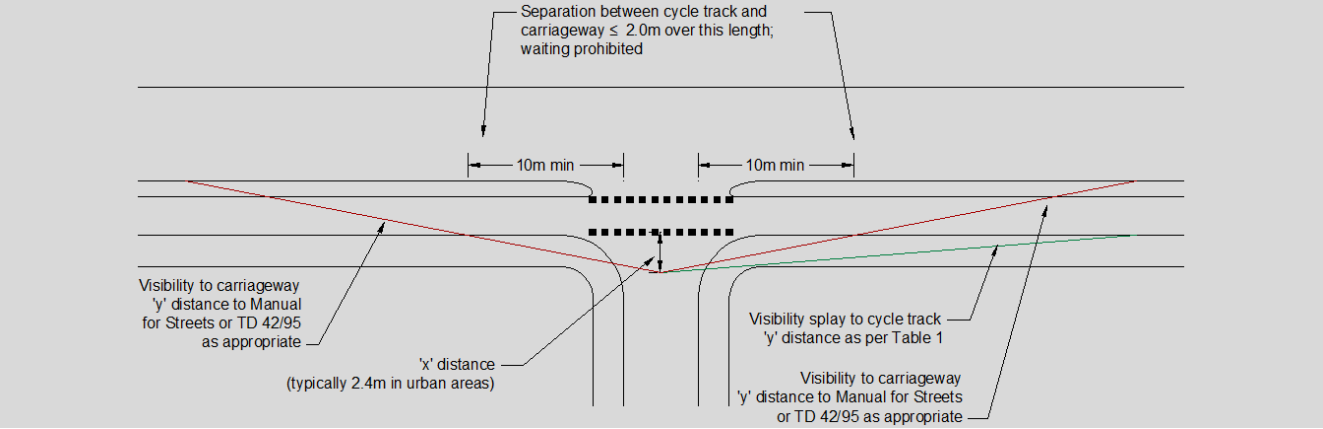
- Routes should be in the open where possible. Where this isn't possible, buildings should have windows facing and overlooking the route. Close-boarded fences and walls should be avoided in these areas.
- Routes should be as direct as possible and kept to a short length, ideally with each end being visible from the other.
- Routes should be well lit
- Any planting within a 2m width of a route should be kept at low level planting, plants should not have thorns.

Care should be taken when planting trees which could create an obstruction to light.

Where a separate route joins a pedestrian or cycle route which runs along a carriageway, the junction of the two should be designed within the road network:

- So the route joins at 90 degrees to the traffic flow
- To include barriers to prevent users in particular children from proceeding straight forward into the road and also to prevent the use by vehicles.
- To include visibility splays so that cyclists can see when approaching the junction from both routes. Visibility should be taken from the outlines in figure TWC4 below.

Figure TWC4 Visibility splays at junctions for cyclists



2.2.2 Road Crossings

Road crossing guidance applies to both cyclists and pedestrians when they are travelling:

- Across a road; or
- Along the road and they cross a side road junction, which includes any access more than a simple footway crossing.

In both cases, it is essential that appropriate crossing facilities are agreed for specific sites with us in the early stages of preparing your development proposals.

The normal basic requirement is the provision of dropped kerbs with buff coloured tactile paving. Where a refuge in the middle of a road is required, you should provide this with the following:

- A 2m width for pedestrian only use and 2.5m where it will be shared with cyclists and,
- A 3.2m clearance to the carriageway edge on either side

Please contact the authority directly for advice relating to cycling signage design.

Larger developments may require a light-controlled crossing such as a ZEBRA, PELICAN or TOUCAN, to provide a safe and attractive route for both pedestrians and cyclists.

Any guard railing deemed to be required should be high-visibility railing.

Where there is potential for cyclists and visually impaired pedestrians to meet, surfacing should be provided to guide visually impaired users along the correct pedestrian routes, in line with the Department for Transport's Guidance on the use of Tactile Paving Surfaces.

2 Street Geometry

2.2.3 Signing for Routes

Route signing can be advantageous for directing cyclists and help promoting a route. Care should be taken to not clutter the route and create visual disruption. Any specific signage should be identified and agreed with us at the early stages of preparing your development proposal. Any signing and lining provided should be in accordance to Chapter 5 of the Traffic Signs Manual.

2.2.4 Materials and Construction

Please refer to Part 3 of this document.

2.2.5 Adopting New Routes

New footways and cycleways that are located alongside roads that we are adopting will usually be adopted as publically maintained footways and cycleways providing they have been designed and constructed to our satisfaction.

Routes that form part of a wider network or provide a more direct link may also be considered for adoption. These could be links to a bus stop or public transport, schools or community facilities and employment or shopping centres. These routes will require street lighting lit to our satisfaction.

We will not normally adopt any routes where:

- They serve only private properties, public open spaces and so on,
- Where there is an existing satisfactory adopted route and,
- Where any adjacent routes they may link to are unsatisfactory and not adopted

Adoption issues should be discussed with us at the early stages of your development proposals.

2.2.6 Exisiting Rights of Way

Existing rights of way cannot be obstructed or diverted without obtaining the Rights of Way Authorities consent. You should accommodate an existing footpath on its existing right of way wherever possible. However, if the Rights of Way Authority agrees in principle to a diversion, this will require a diversion order. The Town and Country Planning Act 1990 usually gives the planning Authority powers to divert rights of way.

The route of existing rights of ways should be designed in accordance with this document, particular care should be taken when designing bridleways to prevent any misuse by vehicles.

Where a development requires the removal of highway rights, this would normally be done by the planning authority under the Town and Country Planning Act 1990. An agreement should be sought after a planning application is submitted.

2.2.7 Existing and cycle route network

As an authority promoting safe and convenient cycle networks, we work alongside organisations such as Sustrans and other highway authorities to enhance routes throughout the borough. Where a proposed development stands close to this network, you may be expected to contribute towards its completion where it is reasonable to ask you to do so.

2.3 Lining, Signing and Traffic Regulation Orders

It is normal for you to provide all road markings and traffic signs for both internal and surrounding networks (road networks) where necessary. It may be requested occasionally that this is required at some distance from a development, for example the routing of HGVs.

Site access signage at your developments should be provided in accordance with Traffic Signs Regulations and General Directions 2002 (TSRGD) for priority junctions within developments.

Lining and signing:

- Will not normally be required in developments of a residential nature
- Will not normally be required in B1 use class office developments, however
- They will be required in all other commercial developments, provided in accordance with TSRGD.

Note: Any other types of developments will be considered on a site by site basis.

Signing and lining should be in accordance with TSRGD and provided in the following scenarios:

- At road humps or tables
- At any entry ramps to side roads, and,
- And other traffic calming features

Note: Where parking bays are not clearly defined, markings will be required to segregate them from the carriageway

Where signing and road markings are required, illumination must also be considered. You should establish if signs require to be illuminated in the early stage of detailed design so that the appropriate measures are taken when considering where electrical supplies are installed during construction works.

Where a development requires the amendment or change of an existing Traffic Regulation Order (TRO), you will normally be required to cover all costs including consultation and legal costs. TRO's are subject to statutory consultations and procedures, they can be a lengthy process and a successful outcome is not guaranteed. Timescales should be a priority for submitting a TRO order or change in regards to your programme of proposals.

2 Street Geometry

2.4 Street Lighting

We normally require a suitable system of street lighting on all adoptable roads, which will be checked and there layouts approved by ourselves. Street lighting is important for both road safety and personal safety to minimise crime opportunities. It is important that the street lighting is designed at the same time as the road layout. It is provided to encourage pedestrians to use a route and to feel safe. It is therefore important that lighting levels are maintained at the same standard along a given route, whether it is to be adopted or not. When you consider your proposals you should take into consideration the wider design issues and consider the purpose of street lighting in its scale to the proposed width of the street and height of buildings.

2.5 Utility Equipment

The location and installation of utility equipment should be considered early in your planning process for both above and below ground apparatus. This is particularly required where surfaces are shared. Private equipment should not be in the highway, however, utility companies equipment is accepted. Where a shared surface layout is proposed without a separate service margin, or where a development is not explicitly covered by this guidance, early discussions should be held with the relevant utility providers and you should supply us with the details of the proposed layout for any utility equipment. This will then assist us in considering the layout for safety and accessibility.

Note: This can be difficult to achieve with layouts where houses are located close to the highway boundary. However if this matter is not dealt with it may lead to problems in the future with us adopting your road.

A separate service margin should be at least 1.8m wide, this is in line with the National Joint Utilities Group (NJUG) 7. Any utility equipment that is to be above ground such as cabinets, boxes, pillars etc. should be sited so that it:

- Its not a danger to the public or staff working on it,
- Does not obstruct motorists view and is clear of any visibility splays
- It should not obstruct pedestrians, wheelchair users, prams, pushchairs and so on. A distance of at least 1.2m clearance should be provided, increased to 2m in areas of high pedestrian flows (500 pedestrians per hour)
- It should not be located within 5m of any other street furniture that would create a potential double obstruction for pedestrians.
- Does not provide a means of illegal access to adjacent premises or properties.
- Does not offend visual amenity by restricting the outlook from windows of a house, intruding on areas of open plan front gardens or the line of low boundary walls,
- Does not spoil the view of Grade I or Grade II listed buildings
- Does not result in visual clutter by being located in an inappropriate place.

2 Street Geometry

All apparatus above ground should:

- Be positioned so that there is enough access for the equipment and the surrounding area of highway can be maintained and cleaned.
- Not be located within any tactile paving
- Allow space for associated jointing chambers
- Take account of known highway alterations
- Allow for future surfacing works
- Meet the licence requirements for listed buildings and conservation areas, special consideration will be required for cabinet design in conservation areas.

Where proposed equipment is to be within the adoptable highway, you should keep all cabinets and such like on the verge wherever possible. A distance of 1m should be kept between the cabinet and the edge of the carriageway in rural areas and 1.5m in urban areas. Access doors should always open onto the footway. If there is no verge you must position cabinets at the back of footways and keep:

- A minimum distance of 1.2m between the edge of an open access door and the edge of the carriageway where pedestrian flows are low, or
- In areas where pedestrian flows are high (500 pedestrians and hour) the distance should be increased to 2m.

We may consider adopting any additional small areas so above ground apparatus can meet national requirements. However, if you cannot meet the requirements within adoptable areas, you should locate cabinets etc. off the proposed adoptable highway. This may then require an easement to allow utility equipment providers future access for maintenance purposes.

All equipment below ground should be located in line with NJUG7. You should locate any access chambers that are on the surface to:

- Minimise any disruption to pedestrians along with providing adequate access for installing and maintaining equipment and recovery operations.
- Avoid expensive paving as far as possible, for example tactile paving
- Avoid other utility providers equipment
- Allow for the use of mechanical equipment during the construction phase, maintenance and recovery operations at the site,
- Take into account any known highway alterations

2 Street Geometry

- Make sure the type and construction of underground boxes will allow us to raise covers and frames when carrying out re-surfacing works,
- Avoid potential features, including foundations to listed buildings.

3 Materials and Construction

3 Materials and Construction

3 Materials and Construction

3.1 General

The standard construction requirements and materials set out in Part 3 are based on national standards. These requirements should normally be applied to all highway works. They have been specifically chosen to make sure the highways function safely and can be maintained in the most efficient cost-effective way.

This part should be read in conjunction with the relevant standard drawings and accompanying notes and specification.

3.1.1 The Use of Alternative Materials

It is recognised that applying strict standards for construction details and materials may not always be appropriate to certain street design layouts. In recognition and to overcome some of the inflexibility that results from using standard materials we are prepared for you to use some alternative materials. However, alternative materials must adhere to the following requirements:

- Comply to BS/EN Standard
- Maintenance friendly
- Durable
- Safe for purpose
- Sustainable
- Appropriate in the local area
- Provides a sustainable solution, including the ability to replace components to manage the life of the asset
- Consider the ‘Whole life cost’ value in terms of replacement and asset management, serviceability and maintenance regimes.
- Recycled material usage will be considered where appropriate, please see more on recycled materials in Part 4

3.1.2 The Use of New Materials and Contruction Methods

TWC are keen to consider new and innovative materials and construction methods and solutions. However, this is only where future maintenance costs are not increased by doing so, or they detract from the quality and sustainability of the environment.

3 Materials and Construction

3.1.3 Marking the Highway Boundary

Clear demarcation of the highway boundary is important to distinguish the difference between public and private areas. The highway boundary must comply with the information within this document and the most suitable solution will be accepted. Although it is considered a continuous 50mm x 150mm edging type EF is the most widely used. We will consider alternatives, however these will be considered on a site by site basis.

3.2 Specification

All highway works must normally be in accordance with:

- The Specification for Highway Works (SHW) as Volume 1 of the Highways England Manual of Contract Documents for Highway Works.
- You must comply with the 'Notes for Guidance on the Specification for Highway Works' as Volume 2 of the Highways England's Manual of Contract Documents for Highway Works, and
- Telford and Wrekin Council's 'Specification' in Part 4 of this document.

Note: You should make sure you use current copies of the document when you design any Section 278 or Section 38 agreements.

Where there are clauses in our Specification that contain additions to the SHW, you must comply with our specification to meet these requirements.

3.3 Standard Drawings

Please check you are using our current standard drawings as these get updated from time to time. A full inventory of our standard drawings can be found in Appendix B or online.

All standard drawings contain specific notes about construction and these are vital to supplement the drawings. Please make sure you read all notes associated with our standard drawings.

If your proposals are not covered in our standards drawings or covered within our specification then you will need to submit any scheme specific drawings to us for approval.

3 Materials and Construction

3.4 Site Surveys, Tests and Investigations

Any site tests and investigations and site surveys that you may require must be undertaken before you submit the design to us for checking. They must cover the following:

- Land surveys including features such as:

- Watercourses
- Ditches
- Existing drainage systems and outfalls
- Services and existing foundations

A survey of existing landscape features such as trees and including:

- The condition of each tree
- Size and form
- Any details surrounding Tree Preservation Orders

- Details of how surface water run off will be managed
- Any consultation with third parties like the Environment Agency
- The depth of water tables
- The impact of adjacent developments and land
- Any chemical contamination risks
- The presence of any hazardous materials
- The stability and acceptability of earthworks, the suitability of sub soils and the requirement of stabilization (if required)
- The re-cycling of onsite materials

All results must be submitted to a TWC Engineer before construction can begin, unless stated otherwise within planning conditions.

3.5 Material Sampling and Testing

Please refer to our specification in Part 4 of this document in regards to arranging and payment for testing and sampling of materials.

A TWC Engineer reserves the right to ask for any extra sampling or testing if they feel that it is required to confirm that the materials meet the correct specification. There are also able to request cores through pavement surfacing at any stage of construction to establish layer thicknesses, compaction and material types. If it is found that materials or the works do not meet the requirements within our specification, you will be required to pay for the associated cost to the authority if the material should need to be replaced. Please find a list of materials and testing requirements for which we may ask you to provide certification to check the specification is being met. This is also in Part 4 of this document.

3 Materials and Construction

3.6 Fences and Barriers

3.6.1 General

Highway fencing will not be adopted on the Highway Boundary unless the following is met:

- It is provided as a safety feature at the top of a retaining wall, in which the wall retains the highway.
- Provides a method of protection against hazards existing on adjacent land
- It serves as a noise barrier where required.

Note: In all other instances it will be necessary to decide who the owner of the fencing is in regards to maintenance, this should be decided at the early stages of design.

Please find details on acceptable adoptable fencing including railing and boundary markers, gates and stiles within Part 5 of this document 'Standard Drawings'.

3.6.2 Safety Fences and Barriers

Safety fencing should not normally be included within residential developments as the need should be designed out to provide safe living layouts. However, where safety barriers and fences are required they must comply with Section 2 of 'Highway Construction Details' as published in Volume 3 of the Highways England Manual of Contract Documents for Highway Works. Where it is unavoidable and safety fencing is needed then reference should be made to the RRRAP (Road Restraint Risk Assessment Process) within TD 19/06 where traffic flows are appropriate. An individual risk assessment may be required if the flows do not meet the requirements of a RRRAP assessment, this will be made in conjunction with Road safety audits. It is expected that any objects which cause a hazard to road users are re-located before the use of safety fencing is required.

3.6.3 Pedestrian Barriers

Where a footpath joins a road, staggered barriers must be provided to:

- Prevent pedestrians entering the road without stopping
- To reduce the likelihood of cyclist misusing the layout

Note: Details of pedestrian barriers can be found in Part 5 of this document 'Standard Drawings'.

You must provide an agreed length of pedestrian guardrail running parallel to the road with a 450mm clearance from the carriageway if a staggered barrier is not achievable, this may require footpath widening in this area to maintain the standard footway width.

3 Materials and Construction

3.6.4 Pedestrian Guardrails

Where pedestrian numbers dictate, guard railing will be required to channel pedestrians to the appropriate crossing point. These should be high visibility rails and care should be taken so that they do not interfere with the overall visibility.

3.6.5 Noise Fencing

Noise fencing should be treated as a highway structure unless agreed otherwise. The design should comply with the requirements for a structure and a design check will be required.

3.7 Drainage

3.7.1 General

Under the Highways Act 1980 TWC have a statutory legal duty to effectively drain the public highway. In order to ensure that the Council are able to fulfil this duty it is important that any highway put up for adoption includes an appropriately designed highway drainage network.

This section should be read in conjunction with the Councils Sustainable Drainage Systems Handbook (available on the council website) which has been produced by Telford & Wrekin Council acting as the Lead Local Flood Authority (LLFA) for the Borough.

Where possible a positive drainage system should be provided for all roads to be offered for adoption. TWC will permit the use of highway soakaways where they meet the following requirements. TWC will not permit the use of pumps to drain the public highway.

It is normal practice to provide highway gullies that discharge into a public surface water sewer, with any new connection being subject to a Section 104 agreement under the Water Industry Act (1991) with Severn Trent Water Ltd who are the Water and Sewerage Company serving the Borough.

Evidence of this agreement must be provided before we will agree to the Section 38 agreement, although this can be done in tandem. On developments where it is envisaged there could be complications it is encouraged that you seek the Section 104 approval at the early stages. Any system installed will not be adopted until the appropriate certification has been received from the water company.

If it is the case that a new highway system will rely on the existing highway network for an effective outfall, you will be required to prove its capacity to receive additional flows and it is in a satisfactory condition before any connection approval can take place. Any works that require the use of existing drainage systems will be subject to carrying out CCTV surveys along with the associated report. Improvement works will be required if it is deemed to be necessary at your expense.

Where a highway system discharges to a SuDS feature that serves the public highway only, this must also be put up for adoption. Any highway Suds features should be designed in line with the CIRIA SuDS Manual and the Councils Sustainable Drainage Systems Handbook. Where design specifications for highway features differ to the standards set out in the handbook these can be found below.

3 Materials and Construction

Due to the bespoke nature of SuDS systems the adoption of each feature is dependent on the agreement and provision of an appropriate commuted sum to secure the ongoing maintenance of the feature. The highways DC team should be contacted at the earliest opportunity to agree the principal of adoption of each feature.

The right to discharge water from a highway drain into any ditch or watercourse must be provided with written evidence that you have the right to discharge and there is no future liability on the Council. Evidence of an appropriate Environmental Permit from the EA, or Ordinary Watercourse Consent from the Lead Local Flood Authority (LLFA) should also be submitted.

Where a highway system discharges to a watercourse the connection should be made in line with the direction of flow at no less than 45 degrees to the bankside. A detailed design of the headwall should be submitted which should include appropriate erosion/scour protection for the bankside.

3.7.2 Network Design

The following criteria should be applied to the design of any highway drainage network being put up for adoption:

3.7.3 Design Criteria

The rate of discharge from a new highway scheme must not exceed the greenfield rate of 5 litres/second for all events up to the 1 in 100 year design storm plus an appropriate allowance for future climate change (+CC). Information on climate change allowances for new development can be found in the EA's Climate Change Allowances for Planning guidance document.

Any submissions for a stand alone highway system should include a microdrainage model of the proposed highway network. The modelling parameters for any microdrainage model should be in line with those found in the Councils Sustainable Drainage Systems Handbook.

If the new highway system is designed as part of a new housing development the rate of discharge and climate change allowance should be incorporated into the overall site design as set out in the drainage condition on the planning decision notice. Where no rate is specified the above greenfield rate of discharge should be applied.

3.7.4 Design for Exceedance

The use of highways for surface water conveyance for events that exceed the 1 in 100+CC event is permitted. However, details on how these exceedance flows will be directed away from properties and into appropriately designed POS within a development will be required. Where exceedance flows run off site onto land owned by a third party, evidence of approval from the relevant third party will be required as part of any submission.

The use of the highway for exceedance may not be suitable in all locations particularly in steeper catchments. Designers should consider the impacts of the velocity of exceedance flows on traffic, pedestrians and adjacent structures.

3 Materials and Construction

3.7.5 Highway Gully Specification

Gully gratings and frames shall be class D400 and installed to BS EN124 with a minimum width of 450mm, and a minimum waterway area of 900cm² in line with the requirements of BS 7903. The use of slot drains on the adoptable highway will not be permitted.

Gully pots should be specified as plastic or pre-cast concrete units with a minimum diameter of 450mm and a minimum depth of 900mm. All highway gullies should be installed in line with the manufacturer's specifications. Brick built gully pots will not normally be accepted unless it can be demonstrated that these are required due to engineering difficulties. The use of brick built gully pots should be agreed with TWC prior to the submission of a highway drainage scheme.

The minimum allowable pipe diameter for gully connections to either the public sewer or a main highway carrier drain is 150mm. Each gully should be connected directly to a catch pit where possible.

The drained area for road gullies should be designed in accordance with HA 102/00 - Spacing of Road Gullies. Calculations showing that the proposed system is capable of dealing with the 1 in 30 year event should be provided. Individual gullies should be spaced no more than 25m apart and not drain an area exceeding 120m².

Gullies shall be positioned away from areas of regular vehicle overrun, including driveways, footpath crossings, and potential informal desire lines. All road gully gratings are to be hinged and a minimum of 100mm deep on estate roads, 150mm deep in all locations of block paving.

Where it is not possible to meet the above requirements TWC will accept the use of kerb drainage in short stretches where it can be demonstrated that kerb drainage can be effectively maintained. The use of kerb drainage should be agreed with TWC prior to the submission of a highway drainage scheme.

Any highway to be put up for adoption should be designed to avoid the creation of flat spots. Where the development will utilise an existing highway where flat areas are already present, the introduction of false flats or the re-profiling of the existing highway to create a fall should be considered. A pair of gullies are required at all low points along a road channel, each with independent connections to the carrier drain.

3.7.6 Pipe and Catch Pit Specification

Desirable minimum cover to any highway pipework should be 1200mm where trenches are backfilled with suitable granular material. The absolute minimum cover should be 900mm, where this occurs all drains must be provided with concrete protection. Refer to the DMRB for further details on materials.

All pipework should be designed to be self-cleansing with a minimum velocity of 0.85m/sec when at full flow. Any main carrier drain running in the highway should have a minimum diameter of 225mm.

Catch pits should be constructed with a minimum sump of 300mm and should be located at every change of direction, at any change of diameter, and where any system joins the main line (Single gully connections may be permitted without the construction of a catch pit with agreement of the Highways Drainage Team).

3 Materials and Construction

Chambers will be required at a maximum spacing of 100m for systems that run for a long distance without any incoming connections to allow access for jetting. Changes of direction of more than 90 degrees in catch pits will not be permitted.

All chamber covers on the adoptable network are to be 150mm deep D400 ductile iron. Future maintenance and access to chambers must be considered, where possible chambers must not straddle centrelines/ lanelines/ kerblines in order to minimise disruption.

Sub□surface drainage will be required where the water table is within 300mm of the formation.

3.7.7 Water Quality

The adopted highway network has the potential to generate a significant volume of surface water flows during storm conditions. Due to vehicle traffic this water can often carry pollutants and have a high sediment loading. It is therefore important that highway surface water is properly attenuated and treated before it reaches a receiving watercourse or other water body.

Any new highway drainage system put up for adoption by TWC must therefore pass through a minimum of 2 levels of surface water treatment prior to discharging to any outfall. These levels of treatment can either be provided as part of the design of the highway drainage system or as part of the wider “site wide” drainage design.

Features such as highway gullies and catch pits are familiar to Highway Engineers and can provide some pre-treatment and form an effective method for sediment removal, however these do not have the capability to provide any treatment of dissolved pollutants meaning they will not be considered as a level or surface water treatment.

The design of SuDS can incorporate various mechanisms that retain pollutants or prevent the pollution of controlled waters through one or more of the following techniques:

- Sedimentation – whereby suspended solids are settled out of solution by reducing the velocity of flow through the SUDS component. The design should take into account the risk of re-suspension of solids during extreme rainfall events
- Filtration – where pollutants conveyed with sediment are trapped either within the soil or gravel media matrix, or on geotextile layers that form part of the SuDS construction
- Biodegradation – provides a biological process that allows the creation of microbial communities to be established within the soil or gravel media to degrade organic pollutants including hydrocarbons
- Adsorption – occurs when pollutants attach themselves or bind to soil, gravel media particles or to other media
- Uptake by vegetation – provides a mechanism for removal of nutrients such as phosphorous and nitrogen

Attenuation and treatment of highway water can be achieved through the use of filter strips, infiltration trenches/soakaways, swales, and other sustainable drainage features located in wide adoptable highway verges. Where larger highway SuDS features are required these should be

3 Materials and Construction

located in adoptable areas of public open space. The required number of treatment stages can be accommodated in site wide SuDS features if the highway is being designed as part of a wider residential or commercial development.

More information on the use of SuDS serving the public highway can be found below.

3.7.8 Flow Control Chambers

Chambers constructed to control surface water discharge to the existing drainage network should ideally be situated outside of the carriageway to be 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 flow control chamber cover slabs should be kitemarked. Where chamber cover slabs are bespoke, a structural design will need submission for approval. Whilst the use of a vortex control device is the preferred method of flow control on a highway system, TWC will permit the use of orifice plates with a minimum internal diameter of 75/100mm.

3.7.9 Highway SuDS Design Criteria

The design of SuDS features serving the public highway should comply with the requirements of both the CIRIA SuDS Manual and the Councils Sustainable Drainage Systems Handbook. Where the design standards of highway SuDS features differ information on:

3.7.10 Side Slope Gradients

The gradient of side slopes for swales and other attenuation features should not exceed 1 in 5 (20%) when constructed adjacent to high speed roads, with maximum depths of water not exceeding 200mm. Side slopes should not exceed 1 in 3 (33%) in residential areas, however more shallow gradients are preferred in all locations to permit easier maintenance.

3.7.11 Cellular Storage

The use of below ground cellular storage systems for surface water attenuation will not be permitted unless it can be demonstrated that all other options have been considered and dismissed for technical reasons. The construction of a cellular storage system directly under the public highway will not be permitted. Any system must be located in an adjacent area of adopted highway verge directly adjacent to the highway.

The approval of a cellular storage system will be subject to the submission and approval of a detailed design. All systems put up for adoption must be suitable for use in trafficked areas and certified accordingly.

The design of the specified system must allow jetting along the entire length of the feature. A plan identifying access arrangements for maintenance should be submitted. It must be demonstrated that the chosen system permits the inspection of the entire tank with conventional CCTV apparatus. Crates with solid internal walls will not be accepted.

3 Materials and Construction

Any storage tank must be appropriately vented and include a sump catch pit at the main inlet and adjacent to, or constructed as part of, the outfall/flow control structure to allow the jetting of the entire feature and the removal of sediment.

3.7.12 Highway Rain Gardens

Highway rain gardens can be used to treat and drain small areas of highway where larger highway swales are not feasible. Rain gardens have been implemented in several areas of the borough in areas of adopted public open space.

The sizing of rain gardens should be based on the storage volume required to appropriately drain the contributing area of highway up to the 1 in 100 year (1% AEP) event. Where a rain garden is proposed side slopes should be no greater than 1 in 4 (ideally 1 in 5) to allow the feature to be mown as part of the maintenance of the surrounding area.

Ideally rain gardens should utilise infiltration and test results undertaken in line with the requirements should be submitted with the design of any feature for approval. Where infiltration is not possible, a land drainage trench should be constructed in the base of the feature connected to an emergency overflow set 100mm below the proposed top water level.

Any highway rain gardens serving the public highway should be put up for adoption by TWC.

3 Materials and Construction

3.7.13 Adoptable Highway Soakaways

Where soakaways are the proposed method of highway drainage, and are being offered for adoption as part of the S38 Agreement, the design will need to be approved by Telford & Wrekin Council. Evidence that sufficient rates of infiltration are present to effectively drain the highway are required.

3.7.14 Infiltration Test Specification

In order to ensure that infiltration rates are representative of the site ground conditions, infiltration tests should undertaken on site as close as possible to the actual location of the proposed soakaway, and within the same depth range as the proposed soakaway. Where tests are taken more than 15m away from the final position of the soakaways then additional tests will be required at the location of the proposed soakaway.

The infiltration tests are to be carried out by a UKAS accredited laboratory in accordance with BRE365 'Soakaway Design'. All designs should take into consideration the requirements of HA118/06. Trial pit logs are to be provided with each test pit, logged in accordance with as EN 1997-2:2007.

A minimum of three fillings should be conducted in each test pit. Any submissions with less than 3 tests will be automatically refused. If it is not possible to carry out a full depth soakage test then the soil infiltration rate calculations should be based on the time of the fall of water from 75% to 25% of the actual maximum water depth achieved in the test.

3.7.15 Soakaway Design Criteria

The proposed soakaways should be designed using the slowest infiltration rate from one of the three tests in each pit. A minimum of a 1 in 100+CC year return period should be used for design purposes.

It is appreciated that a conventional highway drainage systems can only convey a limited volume of water and it may take some time to fill the storage required to attenuate the 1 in 100+CC year event. For this reason, the temporary flooding of the highway during storms above the 1 in 30 year event would be accepted, as long as it can be demonstrated that this exceedance volume will be completely contained within the adopted highway or other designated exceedance storage areas. The flooding of 3rd party land or property curtilages would not be permitted.

Adoptable soakaways should be constructed using either preformed plastic crates or perforated rings and installed in accordance with the manufactures instructions. All soakaways put up for adoption must be suitable for use in trafficked areas and certified accordingly. All soakaways and filter drains are to be lined in a suitable geotextile to prevent fines being washed away.

All soakaways should be designed with a suitable access point at each point of connection to allow future cleansing of the system. The design of this access point should follow the catch pit design guidance set out above.

If plastic crates are utilised, the design of the specified unit type must allow jetting along the entire length of the feature. Crates with solid internal walls will not be accepted and feature must be appropriately vented. On larger soakaways additional inspection chambers should be provided to allow future cleansing of the system.

3.7.16 Highway Soakaway Location

The position of the soakaways should be considered early in the design process and should be incorporated into the highway verge or an area of public open space put up for adoption by TWC. Designs where highway soakaways are proposed in inaccessible areas between plots will not be accepted.

They must not be located directly beneath the adopted highway and should be situated not less than 5m from any building, wall or retaining structure. A 3m easement from any property curtilage or the edge of the carriageway should also be provided.

No permanent structures, play equipment, steps or significant landscaping should be placed on or adjacent to the soakaway or within the easements. The bottom of the soakaway should not extend below a line drawn at 45 degrees from the edge of the carriageway.

When determining the location of the soakaway, due consideration should be given to future maintenance. Provision must be made for pedestrian and vehicular access from the adopted highway to the whole of the soakaway and associated drainage runs without significant changes in ground level. Gradients within the easements should not normally be steeper than 1:20 across grassed or landscaped areas without suitable reinforcement.

Easements are required for any drainage outside of the adoptable highway and these should be a minimum of 3m around a soakaway and 3m either side of the centre of any pipe. Additional areas for access may be required.

Soakaway Design Checklist

When submitting a soakaway design for approval the following information must be provided to ensure that the design can be promptly checked and subsequently approved:

- Impermeable drainage area assumed in the calculations.
- Infiltration rate assumed for design purposes
- Confirmation that a 30 year +30% return storm period has been used in the calculations.
- BRE356 should be used as the design method
- Soakaway dimensions proposed and construction detail
- Proposed invert level and effective drainage depth
- Porosity of proposed drainage medium.

3 Materials and Construction

- Location plan(s), indicating the position of the infiltration test(s) with respect to the location of the proposed soakaway(s)
- The design submission must provide evidence that contaminated land does not exist, or that the construction of the drainage system will not harm the environment.
- Where appropriate, the design submission must provide evidence that the effects of past mining/quarrying activity has been considered and addressed
- Ground water levels

3.7.17 Permeable Paving

The use of permeable paving has the potential to both store and treat highway water without the land take of conventional sustainable drainage features. Engagement with the highway authority into the use of permeable paving is encouraged as early as possible.

At present TWC are not willing to adopt permeable paving on the adopted highway. However, the construction of permeable paving under private highways and shared parking areas is permitted subject to the submission of a detailed design, maintenance plan and future ownership details at the planning stage.

Any permeable paving systems should be designed in line with the most up to date version of Interpave's permeable paving guidance documents. The approval of permeable paving designs that rely on infiltration drainage will be subject to the design requirements above.

The construction of permeable paving on private drives is permitted. However, as home owners may replace their drives with cheaper impermeable material in the future, the inclusion of any storage volume in the site drainage design will not be permitted.

3.7.18 Drainage of Private Areas

Drainage of private areas shall be considered as part of the technical submission. No element of private drainage will normally be permitted within the area offered for adoption.

Run off from private driveways and courtyards is to be intercepted by linear channels and discharge into the private network associated with the proposed dwelling/private structure. In a similar fashion, the drainage design should ensure that no surface water runoff from proposed adoptable areas enters areas in private ownership.

Private culverts/structures will not be permitted within areas offered for adoption. This issue should be addressed at the earliest possibility during the design stage. Culverted watercourses should be restored to open channel in POS wherever possible. If the de-culverting of the watercourse is not possible, the culverted section should be located in areas of POS with clear evidence on their future ownership submitted as part of any planning submission.

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3.7.19 Further Design Guidance

Different sites will present different opportunities for sustainable highway drainage systems therefore early engagement with the Councils Highways DC Team and the LLFA is advised. There is a range of guidance available on the design and construction of sustainable highway drainage systems which should be adhered to as part of any drainage system serving the adoptable highway.

The Design Manual for Roads and Bridges (DMRB) includes the following guidance relevant to sustainable highway drainage:

HD 33/06 – Surface and subsurface drainage systems for highways

HA 37/97 – Hydraulic design of road edge surface water channels

HD 45/09 – Road drainage and the water environment

HA 78/96 – Design of outfalls for surface water channels

HA 83/99 – Safety aspects of road edge drainage features

HA 80/99 – Surface water drainage of wide carriageways

HA 102/00 – Spacing of road gullies

HA 103/06 – Vegetated drainage systems for highway runoff

HA 105/04 – Sumpless gullies

HA 118/06 – Design of soakaways

HA 119/06 – Grassed surface water channels for highway runoff

HA 217/08 – Alternative filter media and surface stabilisation techniques for combined surface and sub surface drains

In some exceptional circumstances there may need to be some variance from the above approved guidance documents. On these occasions designers are encouraged to consult with the Councils Highways DC Team at the earliest possible opportunity.

3 Materials and Construction

3.8 Pavements

3.8.1 General

All earthworks are to comply with SHW Series 600, along with this specification.

All embankments and areas of fill must:

- Be formed of an acceptable material excavated from within the site or imported to the site:
- Meet the requirements of SHW table 6/1 and our specification for use in pavement works, along with,
- The approval of our engineer to be used within a particular area.

3.8.2 Road Pavements (Constructing Site Access and Roads External to a Development)

Any works and design to works outside of classified roads and others outside of this design guide should normally comply with the 'Design Manual for Road and Bridges' published by Her Majesty's Stationary Office.

3.8.3 Road Pavements (Internal Development Roads)

Table TWC7 below list the road types covered within this design guide. The road construction varies dependent upon the road type. It is essential the correct road type is highlighted on plans submitted for approval in line with the abbreviations below.

Table TWC7: Development Road Types

Road Category	Abbreviation
Residential Access Road	RAR
Residential Access Way	RAW
Major Industrial Access Road	MaAR
Minor Industrial Access Road	MiAR

3.8.4 Subgrade Assessment

The CBR value must be estimated for design purposes before you begin construction. Before any site tests are carried out you must give us advanced notice to give us the opportunity to be present at such tests. A copy of all test results should be provided to the highway authority.

Laboratory Soil Classification tests should be used to establish the equilibrium CBR given to different soil types based on material type, using Table TWC8 below unless agreed with the Highway Authority.

Table TWC8: Equilibrium CBR Values to be used for Design Purposes		
Type of Soil	**Plasticity Index**	**Equilibrium CBR%**
Heavy Clay	70 or greater	Less than 2
Heavy Clay	60	2
Heavy Clay	50	2
Heavy Clay	40	2.5
Silty Clay	30	3
Sandy Clay	20	4
Sandy Clay	10	3
Silt*	Less than 10	1
Sand (poorly graded)	Non-plastic	20
Sand (well graded)	Non-plastic	40
Gravel (poorly graded)	Non-plastic	40
Sandy Gravel (well graded)	Non-plastic	60
* estimated assuming some probability of material saturating		

- Table based on Design Manual for Road Bridges 7.2.2 I.A.N 73/06

3 Materials and Construction

3.8.5 Carriageway Sub-Base and Capping Layer

Please use Table TWC9 below to find the correct capping and sub-base thickness that will be required to be used.

Table TWC9: Carriageway Sub-Base and Capping Thickness		
CBR%	**Capping (mm)**	**Sub-base (mm)**
Less than 2.5%	Detailed design required	
2.5	600	150
3	600	150
3 to 5	450	150
5 to 15	300	150
More than 15	0	225

Note: The foundation design should not vary frequently along the road. An appropriate selection should be made for the value of each significant change in the subgrade properties.

When the subgrade is significantly lower than 2.5% that capping and sub-base are no longer sufficient to support the pavement, special measures must be taken in conjunction with a Telford and Wrekin Highway Engineer. Advice on measures can be found within DMRB 7.2.2 HD25/94.

3.8.6 Frost Susceptibility

Any material within 450mm of finished surface level must not be frost susceptible.

3.8.7 Capping Materials

Capping layers will be considered on a site by site basis. However, it must comply with our specification Table TWC9, Type 6F2 or 6F5. The capping layer must be tested to satisfy and demonstrate that the in-situ CRB 15% or equivalent result is achieved. Other materials may be approved as long as it has previously demonstrated to us that they achieve an in-situ CBR of 15% or equivalent test results. If recycled material is to be used it must comply fully with the requirements of SHW CL710 and WRAP Protocol for Producing Aggregates from Inert Material.

3.8.8 Sub-Base

Sub-base must comply with SHW Clause 803 Type 1 sub-base. The sub-base must be tested to satisfy a CBR value of 30% or more.

3.8.9 Surface and Binder Course and Bases

Table TWC10 below is designed to give the following information:

- Required minimum design thicknesses along with;
- Various pavement options for flexible and modular materials you should normally use for different types of development roads.

Any roads that aren't covered by the table below should be designed on a site by site basis to Design Manual for Roads and Bridges, Volume 7.

Table TWC10: Road Carriageway Construction Materials and Depths

	Residential Access Roads		**Residential Access Ways**		**Industrial Access Roads**
	Bituminous	Block	Bituminous	Block	Bituminous
Surface Course	Polymodified 40mm SMA 10 Surf 40/60 (PSV 55) to the specification of TWC	80mm	40mm SMA 10 Surf 40/60 (PSV55)	80mm	50mm 35/14 F Surf 40/60 des (20mm pre-coated chips)
	40mm HRA 55/10 Surf 40/60		40mm HRA 55/10 Surf 40/60		
	40mm AC10 Close Surf 40/60		40mm AC10 Close Surf 40/60		
Binder Course	60mm AC20 dense bin 40/60 rec	30mm sand	60mm AC20 dense bin 40/60 rec	30mm sand	60mm AC20 dense bin 40/60 rec
					60mm AC20HDM des
Base	150mm AC32 Base 40/60 Rec	As bituminous	150mm AC32 Base 40/60 Rec	As bituminous	190mm AC32 Base 40/60 Rec
					190mm AC32 HDM Base 40/60 Rec

Note: Polished stone value shall be determined by the Table of Investigatory levels, see DMRB Part 1 HD36/06

SMA 10 Surf 40/60 is not to be hand laid.

3 Materials and Construction

Subgrade and capping designs are covered in Tables TWC8 & TWC9

HRA – Hot Rolled Asphalt,HSCA – High Stone Content Asphalt, CGM – Close Graded Macadam, DBM – Dense Bitumen Macadam, HGM - Heavy Duty Macadam.

3.8.10 Concrete Block Paving

Where we deem it appropriate the use of concrete block paving to carriageways, shared surfaces and other areas to be used by vehicles will be accepted. They should be laid on a bituminous base as per table TWC10 above for the appropriate road type.

The use of block paving may require you to pay a commuted sum.

3.8.11 High Friction Surfacing

You will be required to use high friction surfacing (HFS) on approaches to signal controlled junctions, roundabouts and pedestrian crossings unless we agree otherwise. It may also be used to delineate areas such as junctions within Developments however this must be agreed at the early stages of any design.

3.8.12 Alternative Materials for Carriageways and Shared Surface Areas

Where a change of environment or for aesthetics or any other reason you propose to use an alternative surfacing material, we will be prepared to consider options providing:

- We can agree the change at the early stages of design.
- The material meets the required standards of quality, durability, maintainability and sustainability.
- It must also meet the required PSV value, AAV Value and so on unless otherwise agreed.

3.8.13 Resurfacing Carriageways at Junctions with Existing Roads or Widening Existing Roads

Where a proposed carriageway meets an existing adopted road or an adopted road is to be widened and:

- The construction joint falls within the running lane of an existing adopted road, and/or
- Involves changes to the adopted road, including additional areas of Highway, then;

The surface must be overlaid or resurfaced for the entire area/ full width of the altered or widened carriageway unless we agree otherwise. When considering junctions the area will be required to be from the tangent point to the tangent point of the junction radii, full carriageway width. However, if the junction includes acceleration and deceleration splays on the main carriageway the full overlay or resurfacing of these lengths will be required unless agreed otherwise.

3 Materials and Construction

3.8.14 Speed Control Humps

Vertical speed humps shall be used where it is agreed that speeds cannot be controlled through the use of appropriate site layout or horizontal speed measures.

Other than bus routes, speed control humps must be flat topped humps or junction tables with a minimum plateau length of 7m and height of 75mm. Ramps from both sides should have a gradient of 1 in 13. Please also refer to the requirements set out within TSRG/DOT.

3.8.15 Speed Control Bends

Over run areas must be provided on the inside of speed control bends, the normal construction is as follows:

- The outer kerb line is to be 12-15mm kerb face constructed using a 125mm x 150mm bull-nosed kerb.
- The inner kerb line should be constructed using 8m radius 125mm x 225mm half batter kerbs.
- Granite sets should be used as a surfacing material in a colour that contrasts the main carriageway.
- The area should be constructed with a 1 in 30 cross fall towards the opposite kerb line.

3.9 Kerbs, Footways, Cycleways and Other Paved Areas

3.9.1 General

The construction of footways, cycleways and paved areas should be in line with Table TWC11, you should also refer to our standard details.

3 Materials and Construction

3.9.2 Residential Footways

Table TWC11: Residential Footways		
	Bituminous	Block/Flags
Surface Course	20mm AC6 Dense Surf 100/150	90mm (60mm blocks on 30mm sand bedding)
Base Course	50mm AC20 dense bin 100/150 rec	70mm AC20 Dense bin 100/150 rec
Sub-Base	160mm Granular Type 1 200mm for vehicular crossings serving 5 or more dwellings	200mm Granular Type 1

3.9.3 Concrete Block Paving

You may lay concrete paving to footways where we agree that it is appropriate. It must be laid and constructed in accordance with the requirements of the TWC Site Engineer.

Concrete paving may require a commuted sum to be paid.

3.9.4 Strengthened Footways

Footways are required to be strengthened where heavy vehicles such as delivery or maintenance vehicles are likely to be parked. Table TWC12 outlines the requirements.

Table TWC12: Strengthening Footways		
	Bituminous	Block
Surface Course	25mm AC6 Dense Surf 100/150	90mm (60mm blocks on 30mm sand bedding)
Base Course	90mm AC60 dense bin 100/150 rec	90mm AC20 Dense bin 100/150 rec
Sub-Base	270mm Granular Type 1	270mm Granular Type 1

3 Materials and Construction

3.9.5 Footways on Industrial Access Roads

The construction of footways or other hard paved areas on industrial access roads should be in line with Table TWC13.

Table TWC13: Footways on Industrial Roads	
	Bituminous
Surface Course	40mm HRA 55/10 f Surf 100/150 des
Base Course	75mm AC20 dense bin 100/150 rec
Sub-Base	270mm Granular Type 1

3.9.6 Widening Existing Footways and Cycleways

The surface must be overlaid or resurfaced to the full width of any existing footway or cycleway that is widened unless agreed otherwise.

3.9.7 Widening Existing Footways and Cycleways

3.9.8 Kerbing, Channels and Edgings

The type of kerbing is to be agreed at planning and should conform to standards set out within the TWC Design Guide and SHW Series 1100. However, the principles in the table below set out the dimensional minimum and maximum requirements for standard carriageway kerbing and footway edgings.

Table TWC14: Kerb Types	
Kerb Type	Kerb face depth (mm)
Standard Carriageway	125mm
Bus Stops	160mm
Shared Surfaces & Table Tops	25mm
Vehicular Crossings	25mm
Pedestrian & Cyclist Crossings	0-6mm

*Note – Conservation kerbing may be required in specific areas, (this is to be agreed at planning).

Details of all kerbing scenarios can be found in TWC Design Guide Standard Drawings. Where details differ from these agreement is to be sought from the Telford Site Engineer before works commence on site.

3 Materials and Construction

3.10 Traffic Signs, Road Markings and Traffic Signals

3.10.1 General

All traffic signs used and proposed are to be in line with The Traffic Signs Regulations and General Directions 2002. They should be the size, shape and colour as described within. The standards will apply to any revised details within the above document and later amendments will be sought after.

3.10.2 Traffic Regulation Orders (TRO'S)

Traffic regulation orders are required for cycleways and may be needed for footways to stop motorists or cyclists using them. They can also be required for certain road markings and traffic signs. You must pay the associated costs for submitting a TRO, however, it is not guaranteed an application will be successful.

3.10.3 Public Consultation

A public consultation is required before we make a TRO. This is the opportunity for members of the public to raise any objections they may have. Due to this process, the timescales associated with TRO's can be quite extensive. It is therefore suggested that any TRO applications are submitted at the early stages of the design so as not to hold up the works. You must also pay any costs associated with carrying out these consultations. Even if an application is unsuccessful the costs are still required to be paid by you.

3.10.4 Traffic Signs

Individual traffic signs must be shown including the posts and foundations along with a schedule. All signs must be in line with The Traffic Signs Manual.

3.10.5 Road Markings and Studs

Road Markings and studs must be in accordance with The Traffic Signs Manual, Chapter 5. The location, colour and type of permanent road marking must be shown on your drawings.

3.11 Street Lighting

3.11.1 General

Please refer to Telford and Wrekin Street Lighting Design Guide.

3 Materials and Construction

3.12 Highway Related Structures

3.12.1 General

Highway related structures will normally include the following:

- Retaining walls
- Bridges
- Culverts
- Bridges
- Reinforced soil and earth retaining structures

Any structures supporting, carrying, spanning or adjacent to the adopted highway require technical approval in accordance with the Highways Act S167. Submissions will be based on their premise of BD2, Technical Approval of Highway Structures, published by Highways England. All designs are to be in accordance with Eurocodes.

A highway structure can fall into three categories, either;

- A structure that is built in, under, over, the highway, or;
- Any structure that supports the highway where the distance between the boundary of the highway and the rear face of the structure is less than twice the difference in the level between the ground at the front of the structure and the highest level of the adjacent highway at any point along the length of the structure or;
- Any retaining wall that is proposed to be built within 3.65m of the highway boundary where the retained height above the adjacent highway is 1.4m or more.

3.12.2 Design

You must employ a chartered civil or structural engineer with experience in highway related structures and approved by the relevant highway authority to carry out the design and to oversee construction.

The supervision of construction must be carried out under the direction of an independent chartered civil or structural engineer, whom will be approved by us, and will have substantial experience of the construction of highway structures.

3 Materials and Construction

3.12.3 Adopting Structures

Discussions regarding the adoption of structures need to be agreed at the early stages and, ideally, before any planning permission has been granted.

A commuted sum may be required to pay for the maintenance of any highway structure that is to be adopted.

3.13 Soft Landscaping and Trees

3.13.1 General

It is important to consider the soft landscaping within the highway design as this can often determine the character of the development and to create an attractive environment. These areas can also be used to create visual effects for motorists determining the feel of the street.

Landscaping proposals should be submitted at the pre-application stages so the suitability can be assessed. A chartered landscape architect should advise and prepare proposals on your behalf for the development.

Whilst trees can enhance the visual appeal of a street scene it is necessary to consider the visual appearance of building frontages as well as car parking areas and that they do not impede motorists visually. It is also important that any utility works are to be considered when creating landscaping proposals as there is potential for tree roots and utilities to clash.

Soft landscaping must comply with SHW Series 300. Please note that we will not adopted small areas of verge and will request these areas are hard surfaced.

*Note – Small areas of verge are no smaller than 10m^2.

3.13.2 Existing Feature Considerations

It is important you are aware of protecting and preserving existing trees on the proposed development. Please speak directly to Telford and Wrekin's Neighbourhood and Environmental Services Team.

It must be made clear to individual purchasers of property at the time of sale that you are transferring ownership and responsibility of these existing boundary hedges and fences.

You must not remove or carry out any works to existing or planted trees, shrubs, hedges and other vegetation during the bird nesting season in line with the Wildlife & Countryside Act 1981 and any subsequent amendments. This is generally considered to be between March and the end of July, however, this period can be extended. It should be noted that the site is required to be checked for active nests outside of that period to confirm that works can commence.

3 Materials and Construction

3.13.3 Proposed Feature Considerations

Any areas to be planted, grassed, turfed or seeded must be prepared in accordance with SHW Clause 3004.

Trees planted in hard areas should be planted in tree grilles with guards in line with Telford and Wrekin specification.

The planting of new trees within any visibility splays are not normally permitted. They will only be permitted in exceptional circumstances.

Peat or peat based products must not be used.

The method and application of pesticides must be strictly in accordance with current legislation and codes of practice and in accordance with SHW Clause 3001.

You must maintain any new or existing grassed areas before we will issue you with a satisfactory certificate. These areas must be maintained throughout the maintenance period and until final certification is awarded in accordance with SHW Clause 3007.

Public open spaces including children's play areas and amenity open spaces will normally be adopted by district or parish councils. We will only consider adopting these types of areas where the following occurs;

- Is it next to but not an essential part of the adoptable highway,
- It is not going to be adopted by the district or parish council
- The design is unable to mitigate the requirements above and therefore cannot be designed out

If the maintenance is deemed to be difficult to sustain satisfactorily if it becomes part of the adjacent property.

4 Highway Specification

4 Highway Specification

4.1 Introduction

The following specification is for the development of residential estate roads. It is not intended to be fully comprehensive and works must comply with the Manual of Contract Documents for Highway Works Specification for Highway Works and Highway Construction Details (MCDHW) current at the time of construction unless amended by this document.

Developers are encouraged to acquire these two volumes of the MCDHW.

The details contained within this document are relevant and correct at the time of issue. However, it is acknowledged that the specification will require amendments from time to time and as an Authority we will do our best to amend the specification to reflect changing technology and policies.

It is therefore recommended for Developers to check with the Councils Highways Development Management department that the edition of the specification which they intend to use for their design proposals is the most up to date version available.

4.2 General Roadwork Requirements

4.2.1 Structural Design

Any carriageway formation CBR of less than 2.5% will require a detailed structural design. However, if the developer is able to prove that the equilibrium CBR values are 2.5% or greater, then the capping thicknesses should be in accordance with table TWC9 in Part 3 of this document.

4.2.2 Structural Testing

The roads will need to be cored and tested for “Air Voids” for compliance with the air voids testing upon completion of the works. Cores are to be removed and tested in accordance with TWC sub appendix 1/1 and can be requested by TWC Engineers at the developer’s expense.

Carriageway and footway cores found to be sub-standard in either material types, thickness, or degree of compaction, will not be adopted as Publicly Maintained Highways until defects have been rectified at the Developers expense.

4.2.3 Quality Assured Bituminous Materials

All bituminous materials used within the works must be produced in plants registered to BS EN ISO 9002, and National Sector Scheme 14 ‘Production of asphalt mixes’. All non-proprietary asphalt mixtures shall be CE marked and must comply with BS EN 13043 and the relevant annex of BSI PD 6691.

4 Highway Specification

4.2.4 Sampling and Compliance Testing

The Developer will be required to arrange for testing and sampling of the works and materials by a UKAS accredited laboratory. They are listed in sub Appendix 1/5.

Upon request the developer must provide the Council with details of applicable quality management and Product Certification Schemes and a copy of all relevant test results. The Authority may also require additional sampling and testing of certain works and materials. The Developer is obliged to allow access and assistance where necessary. All testing and assessments will be carried out at the Developers expense.

The Developer must employ a UKAS accredited testing laboratory to sample and carry out all material testing on their behalf, this will not obviate the necessity for testing the Council may wish to carry out.

Where a UKAS laboratory is to be employed by the Developer care should be taken to ensure that the work is carried out to the satisfaction of the Councils specifications and requirements.

Highway construction will only be adopted as Publically Maintained Highway where all appropriate testing and assessments have been carried out and results are provided to and approved by the Council.

4.2.5 Road Construction Programme

It is assumed that carriageways will be completed to finished surface course level before they are subject to traffic loadings. However, the Developer may wish to construct the roadworks in two stages. Initially to top of base or binder course level, and then to final surface course level. This is permitted, however, at the Developers own risk. In the event of partially completed roadworks deforming or deteriorating and failing in any way, the Council will require the necessary remedial and/or reconstruction works to be carried out before the roadworks are completed.

Where a two stage construction is adopted, particular importance should be given to thoroughly cleaning the existing surface prior to superimposition of succeeding layers, and to the placement of material at the carriageway edge. Where the base and binder course layers are completed prior to kerb laying, material subsequently placed between bituminous layers and the kerb face shall be adequately compacted.

ST4 Concrete may be used in-lieu of base and also binder course. Where the void between binder course and kerb face is less than 100mm wide. Where the void is greater than 100mm, the longitudinal edge of binder course material shall be saw cut and the binder course material shall be removed up to approximately 300mm from the kerb face. Vertical faces shall be coated with bituminous edge seal prior to compaction of additional binder course material.

Surface course materials, which in any way become damaged by the development works, shall be replaced at the Developers expense before the works are adopted.

4.2.6 Surface Levels of Pavement Courses

These are to be constructed to comply with the requirements set out in SHW 702.

4 Highway Specification

4.2.7 Road Categories

This specification covers different categories of road listed in Table TWC7: Development Road Types in Part 3 - Materials and Construction. The construction specification varies according to the road type. It is essential that the road category is clearly marked on the plans submitted for approval. Details of road hierarchy are included in Part 2 of this Design Guide dealing with access layout.

4.2.8 Sustainable Drainage

Where it is feasible to provide a conventional positive drainage system, there will be a presumption that this is the preferred option.

S100 (9) of the Highways Act includes for soakaways, therefore local authorities cannot decline the long term maintenance of such facilities on the grounds that a non-conventional system of drainage has been provided. Accordingly, where a conventional drainage system is not a practical option, a Sustainable Urban Drainage System (SuDS) will be considered for adoption providing that:-

- The developer provides the required comprehensive details of the porosity of the ground into which the soakaways will discharge, together with appropriate design calculations,
- A maintenance plan is provided detailing the method to be adopted when the soakaway is desilted, including access arrangements to the soakaways.
- A commuted sum may be required in the respect of the extra cost associated with maintaining the system, over and above that of a conventional system.

The use of a soakaway chamber will normally only be considered as a ‘last resort’ drainage measure, because of the inherent maintenance liability in comparison with that associated with balancing ponds.

Where soakaway chambers are to be used, then the maintenance will normally be carried out by the Highway Authority and a commuted sum commensurate with the projected additional maintenance liability will be required.

Where SuDS involve the use of swales and/or balancing ponds outside the highway boundary, then clearly defined maintenance arrangements must be agreed prior to the adoption of the highway infrastructure.

Where developers proposed to use balancing ponds, appropriate measures must be included in the in the design to mitigate risks associated with drowning particularly in respect of children. A safety audit may be required.

Permeable surfaces are not currently considered for adoption due to the risks associated with inducing inadequate stability in the carriageway structure.

4 Highway Specification

4.2.9 Compliance with British & EC Standards

Any requirement in the document that any material or article shall comply with any specified standard, whether a British standard, other named standard or otherwise, shall be satisfied by compliance with any relevant national or governmental standard of any member state of the European Parliament. Alternatively, any relevant international standard recognised in such a member state, provided that, in either case, the standard in question offers guarantees of safety, suitability and fitness for purpose, equivalent to those offered by the standard which is specified in this document, demonstrated to the satisfaction of the Highway Authority.

Any requirement in this document to use a material or an article which is defined by reference to a named supplier, or manufacturer, or a specified quality assurance scheme, or agreement certificate, or HAPAS certificate of which is registered with, or has otherwise received the approval of the Highway Authority, shall be satisfied using material or an article which has received equivalent approval in another member state of the European Parliament, provided that the material or article in question is as safe, suitable, and fit for the relevant purpose, as a material or an article complying with the requirements as set out in this document, demonstrated to the satisfaction of the Highways Authority.

4.3 Drainage

4.3.1 Pipes

Materials for pipes will be restricted to clay, concrete or plastic, as approved for use by the appropriate Water Authority.

4.3.2 Manholes, Gullies and Other Chambers

Manholes and other chambers shall be constructed in pre-cast or in-situ concrete, or Class B engineering brickwork. Gullies connected to surface water drains may be fabricated from pre-cast concrete, or in-situ concrete.

4.3.3 Manholes and Gully Positions

(a) Manholes/catchpits should be provided at:

(i) Every change of gradient or alignment

(ii) Every change in size of pipe

(iii) A maximum spacing of 90m

(b) Gullies should be positioned so that:

(i) The area draining to each road gully does not exceed 150m^2.

(ii) The spacing of the gullies does not exceed 25m along each channel.

(iii) Double gullies are provided at all low points on a concave channel profile. In this circumstance separate connections should be made to each gully.

(iv) On the upstream side of the road at all road junctions, pedestrian crossings and private drive entrances.

(v) The maximum length of the connection is 20m.

4.3.4 General Details

The laying of pipes shall start from the point of outfall immediately after completion of trench excavation. Pipe lines shall be laid to straight lines and gradients. The lengths between manholes shall not be backfilled until they have been inspected and approved.

Drainage works will not be inspected for approval unless the sides of trenches and other excavations are adequately supported.

Concrete grade ST4 shall be used to provide bed and surround for pipes;

- Under carriageways where the cover to the top of the pipe is less than 1.2m,
- Under any other part of the Highway where cover is less than 0.9m,
- Wherever the cover exceeds 5m,
- Where directed by the Highway Authority

Redundant gullies shall have gratings and any supporting brickwork removed and the pot filled with concrete grade ST4.

A piped outfall discharging into a ditch or watercourse shall have an invert level at least 150mm above either the level of the average flow, or the bed level, whichever is the higher. The angle of discharge shall not be greater than 45° to the direction of flow in the ditch or watercourse and a headwall shall be provided, to a design approved by the authority or the Environment Agency, supporting the bank and preventing any scouring.

Drains will be tested and cleaned as outlined in MCDHW, on completion of the works, and at other times at the direction of the authority. The drainage system shall be cleaned at the end of the maintenance period prior to the joint inspection for adoption. A CCTV survey of the system shall be carried out after completion of the works and before the end of the maintenance period. A copy of the DVD shall be supplied to the Highway Authority before the works are adopted.

4.3.5 Covers and Frames

All units shall comply with BS EN 124 as supplemented by BS 7903 and they shall also be supplied and installed in compliance with Highways Advice Note HA104/02, contained within the Design Manual for Roads and Bridges vol. 4.

4 Highway Specification

4.4 Carriageway Construction

4.4.1 Natural Formation

If details of existing ground conditions are not available, the natural formation shall be assessed to ensure that the strength assumptions made in the design of the Developers roadworks can be substantiated. Fill materials shall be classified and placed in accordance with the requirements of SHW series 600. The acceptability parameters and testing regime shall be agreed with the Highways Engineers on a site specific basis.

4.4.2 Design

Carriageway construction layer thickness are specified in Part 3. A formation CBR less than 2.5% will be assumed unless the developer is able to provide test results to show otherwise. A reduced capping layer thickness should not be allowed solely on the basis of in-situ CBR testing. Soil classification tests shall be used to assign an “Equilibrium CBR” based on the material type, using table TWC 8, in Part 3 of this document.

4.4.3 Capping Layer

Capping layer shall comply with SHW table 6/1 class 6F2 or 6F5 and be compacted following the requirements set out in SHW table 6/4 method 6. Recycled material may be used providing that it is compliant to WRAP protocol for producing aggregates from PPA inert waste. All sampling and testing shall be carried out by a UKAS accredited laboratory and certification provided to the council upon request.

4.4.4 Sub Base

Sub-base material shall be manufactured to comply with SHW Clause 801 & Clause 803. SHW Clause 803 requires sub-base to be produced under a “Factory Production Control” (FPC) system, details of suppliers FPC and test results shall be provided upon request to the Council.

4.4.5 Base

Base materials shall be constructed using AC 32 Dense Base 40/60 recipe mix complying with Table B.11 of PD6691:2015. The asphalt shall be machine laid, except where agreed otherwise. Certain alternative construction materials and techniques, employing the use of recycled materials or in-situ stabilisation, are available. The use of granulated Fly Ash (GFA) or foamed Bitumen are examples.

The base shall be constructed only after drains, sewers, service pipes and any other underground works have been satisfactorily completed.

4.4.6 Binder

Binder course shall be constructed with AC 20 Dense Bin 40/60 recipe mix to Table B.11 of PD6691:2015 except across bridge decks where HRA 50/20 Bin, 40/60 to Table C1 of PD6691:2015 shall be used.

4 Highway Specification

4.4.7 Surface Course - Other Roads

The surface course shall be HRA 55/10 C surf 40/60 to Table C.2C of PD6691:2015. The coarse aggregate shall be crushed rock with a minimum PSV appropriate to traffic flow but, generally not less than specified in Table TWC10 in Part 3 of this document.

4.4.8 Handling of Bituminous Materials

All bituminous materials shall be transported, laid and compacted in accordance with the requirements of BS 594987, as supplemented or amended by the requirements of this document, to achieve the in-situ void levels in Sub Appendix 1/2 when tested as described in BS EN 12697:8

4.5 Footway Construction

4.5.1 General

Flexible footways on housing developments shall be constructed, as shown in Table TWC11, in Part 3 of this document.

4.5.2 Surface Course

Adjacent to local Distributor Roads, Collector Roads, Connector Roads and in shopping areas, the footway surface course shall be 25mm thickness of HRA 45/6 surf 100/150 proprietary material is specified. In other areas the surface course shall be 20mm thick AC 6 Dense surf 100/150 to Table B15 of PD6691:2015. The minimum PSV of coarse aggregate shall be 50.

4.5.3 Binder Course

All footways should have a binder course material thickness of 60mm thick AC 20 Dense Bin 100/150 to Table B.11 of PD6691:2015.

4.5.4 Compaction

All asphalt layers shall be compacted to achieve the requirements of air voids as specified in Table TWC 1/2 in Appendix 1/2.

4.5.5 Weed Killer

An approved weedkiller shall be applied to the sub-grade before laying the sub-base. The specification details are included in sub appendix 1/9.

4.5.6 Vehicle Crossing

Dropped crossing consisting of a minimum of three type BNC150 x 125mm and two dropper kerbs types DL, DR, complying with the requirements of BS EN 1340:2003. Footway crossings are shown on the standard detail drawings in sub-appendix 1/10.

4 Highway Specification

4.6 Miscellaneous Items

4.6.1 Grassed Areas

Turfing and seeding shall be carried out in accordance with SHW clause 3005 using seed mix specified below.

Perennial Rye Grass	S23	27kg
Red fescue	S59	9kg
Smooth Stalked Meadow grass		4.5kg
Crested dogstail		5.0kg
White Clover	S100	4.5kg

The developer will ensure that grassed areas are mown at least once before adoption and on adoption vegetation should not be more than 50mm high.

Hydraulic Mulch Seeding may be permitted on areas with difficult access, subject to the prior approval of the Development Services Directorate or Agent Authority.

4.6.2 Service Margins

(a) In the absence of a footway, (e.g. on shared service roads) underground management services shall be located in grass service margins. A grass service margin must be rolled to give a satisfactory appearance and achieve a gradient of 1 in 12. In order to avoid damage to the mains and services, the planting of trees and shrubs in the service margin will not normally be permitted, except under a license to plant, which must be obtained from the local council or Agent Authority.

(b) Where the highway boundary is not delineated by a wall or fence, the grass service margin must be clearly delineated on site by means of flat edge concrete edging kerbs laid such that the top surface is flush with (and not proud of) the turf level between cross over points. The intention here is that the grass service margin should appear to be part of the adjacent garden, and maintained by the frontages as such. Notwithstanding the desirability of encouraging the frontages to maintain the service margin, it will be necessary for the developer to ensure that a clause is provided in the individual plot conveyances, clearly indicating that the service margin does in fact form part of the publicly maintained highway.

(c) The developer will need to comply with the specific requirements of the relevant statutory undertakers. In addition sewers, water mains and other underground services must be laid in accordance with the diagrams given in this specification and road crossings shall be reduced to a minimum. Work in connection with the installation of all services and the subsequent reinstatement of trenches shall comply with the requirements of the HAUC Specification for Reinstatement of Openings in Highways (SROH). Where underground cables and services etc. are to be installed at some later date, suitable ducts under the carriageway must be provided at the expense of the developer, unless otherwise provided by the statutory undertaker.

(d) The developer is reminded of his responsibility for any gas, water, communications, sewer or other services or mains which may be damaged or require support during the progress of the road works. The cost of any such works, including any diverting of existing services carried out by the statutory undertakers concerned, is to be met by the developer.

(e) Where the installation of Cable television will result in significant disturbance to footways and other public areas, a suitable duct for cable TV shall be included as part of the overall service arrangements for the site, at the outset. When the developments are likely to be served by the Cable TV network, prior agreement should be reached with the National Joint Utilities Group and the highways Authority as to the positioning of any necessary ducting.

(f) Where work is undertaken to form a development road connection, or other vehicular crossing to an existing highway, attention is drawn to section 184(9) of the Highways Act 1980 (as amended by chapter 22 of the New Road and Streetworks Act 1991 and any other amendment or enactment in force at the time of construction of the works) with regards to statutory undertakers plant. Attention is also drawn to Section 50 of the act regarding the licences necessary for non–statutory apparatus which includes requirements in respect of insurance against third party liability. Any duct, cable or concrete surrounds thereto must comply with the requirements of NJUG with regards to the depth below the finished carriageway level.

(g) Special attention must be paid to cross over points. The specification should be 30mm dense surface course with a 50mm binder course (see section) and a minimum of 150mm sub base. The width should be a maximum of 6m and slightly splayed to a maximum of 0.5m. The extremity of the service strip within the cross over point should be delineated by the use of bullnose kerbs.

4.6.3 Traffic Signs and Road Markings

All Developments shall be signed and marked with white and yellow lining as appropriate. The signs and markings shall be in accordance with The Traffic Signs Regulations and General Directions 2002.

4.6.4 Modular Block Paving

Where appropriate, small element 80mm thick concrete block paving for roads shall be laid on a foundation comprising machine laid 100mm minimum compacted thickness of AC20 Dense Base 40/60 recipe mix complying with table B.11 of PD6691:2015 compacted to achieve a maximum air void as specified in sub Appendix 1/2 Table TWC1/2B1. The underlying sub base shall comply with SHW Clauses 801 & 803.

Concrete blocks to be laid in accordance with the code of practice BS6717: Part 3 on a 50mm layer of bedding sand compacted to 30mm. Clay and calcium silicate pavers to be laid in accordance with the relevant code of practice for design and construction BS6677: Part 2 and Part 3.

4.6.5 Coloured Surfacing

The type of coloured surfacing materials shall be governed by the degree of usage in terms of volumes of vehicular, pedestrian and cycle traffic likely to use or cross the surfaces.

4 Highway Specification

4.6.6 Skid Resistant Surface Treatment

Shall be in accordance with SHW Clause 924. Under normal circumstances, a calcined bauxite aggregate with a minimum 70 PSV will be required. Treatments shall be HAPAS approved and used in situations appropriate to the class of certification.

4.6.7 Coloured Surfacing for Traffic Calming and Surface Delineation Purposes

Coloured surfacing for traffic calming and surface delineation purposes shall, wherever practical, be coloured variants of HAPAS approved skid resistance treatments. The aggregates used shall have a PSV appropriate to the location but shall have a minimum 55 PSV. The surfacing shall be spread to achieve a finished thickness of 3 – 5mm.

Sites subject to high traffic volumes require a high durability material complying with SHW Clause 924 classification reference type 1.

The aggregate should be a contrasting colour.

4.6.8 Coloured Surfacing for Cycle Tracks

Coloured surfacing shall be applied to achieve a finished thickness of between 2 and 3mm. The aggregate shall have a minimum 55 PSV.

The colour of the aggregate shall be a contrasting colour.

4.6.9 Grouted Macadam

Where a coloured surface course is required, in connection with the surfacing of a cycle track, definition of traffic calming, or bus layby feature, an acceptable alternative is the use of a thin macadam surface course incorporating a liquid asphalt grout.

Such treatments have the advantage of colour longevity and durability due to the pigmented material being integral to the wearing course. Proprietary products are available which enable a wide range of surfacing colours to be utilised.

4.6.10 Cycleway Construction

The guiding principle in selecting the appropriate treatment should be the achievement of the lowest whole life cost. Thus, the need to provide surface treatments such as resin based anti-skid surfacing should be questioned to ensure that the subsequent maintenance costs are justified in the circumstances.

4.6.11 Cycleway Edging

Footway edging shall be 150mm x 50mm concrete footway edging to BS EN 1340:2003, Type EBN.

4 Highway Specification

4.6.12 Lighting Details

The role of the footways and cycleways does not necessarily reflect the road hierarchy. An example would be a strategic route with high levels of traffic flow may well have very little, if any, pedestrian activity. Conversely, a minor access road may have a predominance of pedestrian movement.

4.6.13 Dowel Bars in Kerb Foundation Concrete

Dowel bars in kerb foundation concrete are not required.

4.6.14 Protection of Utilities from Root Growth

Proprietary materials should be used where trees are to be planted adjacent to utility company's apparatus, highways drainage, footways and carriageways to prevent root growth causing damage.

4.6.15 Dressed Natural Stone Setts

Dressed natural stone setts shall comply with BS EN 1342:2012 and shall be laid in accordance with the relevant sections of BS7533:2010. In particular, setts shall be laid on a 150mm concrete bed: Grade ST4 concrete. Jointing and pointing shall be in high strength proprietary HAPAS approved jointing material as approved by TWC engineers.

4.6.16 Design and Specification Issues

Highways design, maintenance and Development Engineers are on available to give technical guidance on any design and specification issues that may arise on a development site. Issues should be address to:

Highways Development Control - HighwaysDevelopment@telford.gov.uk

General Development Design Issues - Callum Bebb - Callum.Bebb@telford.gov.uk

- Thomas Goffe - Thomas.Goffe@telford.gov.uk

Development Control Site Engineers - Daniel Sims - Daniel.Sims@telford.gov.uk

- Hayley Abel - Hayley.Abel@telford.gov.uk

5 Appendix A

5 Appendix A

Telford and Wrekin

Technical Audit, Associated Documents

5.1 Drawings & Data Required

All submitted drawings should comply with the following design standards, DMRB, Telford and Wrekin Technical Design Guide and planning considerations.

Unless otherwise stated, the drawings/data below shall be provided in the form of a single set of full sized paper copy(s) and an electronic copy (PDF format) posted to the technical review team. Drawings should be submitted at a scale no smaller than 1:500. All designs are to be based on a 3D topographical survey in line with RICS specification.

PLANNING	**General Information**	**Delete as appropriate**
	• **Planning Layout -** A copy of the approved planning layout should be submitted along with the Decision Notice	Y/ N/ NA
	• **Adoptable Area Plan -** Identifying the limits of areas to be dedicated as highway to be coloured in "Burnt Sienna" (RGB 135, 45, 23 or AutoCAD colour 32 or similar). A copy of the lateral extent of adopted highway network should be submitted as the basis of the technical drawings.	Y/ N/ NA

GENERAL ARRANGEMENT	**General Arrangement Drawing**	**Delete as appropriate**
	• **Topographical Survey Plan -** copy of the original and unamended base topographic survey information at the same scale as the adoption drawing.	Y/ N/ NA
	• **Setting Out Plan -** and associated information i.e. Chainage and levels.	Y/ N/ NA
	• **Highway Chainage & Road Numbers -** A carriageway chainage and road numbers/names to be included on at least one drawing; plot numbers to also be stated. A drawing must also include	Y/ N/ NA

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	dimensions where areas of the proposals are not as per any typical sections.	
	• **Visibility Splays -** Forward visibility and junction visibility to be included, stating 'x' and 'y' values.	Y/ N/ NA
	• **Tactile Paving -** All tactile paving to be in line with 'DFT, Guidance on the use of tactile Paving Surfaces'.	Y/ N/ NA
	• **Landscaping -** location plan, any existing protected trees (Tree Protection Plan) and root protection plan(s).	Y/ N/ NA
	• **Location Plan -** small insert plan identifying the location of the site, site boundary, and nearest postcode.	Y/ N/ NA
	• **Spot Levels -** Spot levels to cover proposed design.	Y/ N/ NA

DRAINAGE	**Drainage Information** to include:	**Delete as appropriate**
	• **Drainage/Contour Plan -** All areas of highway offered for adoption should be contoured at 25mm intervals including at least 10m past the tie in points to the existing highway. Proposed gully locations must also be included.	Y/ N/ NA
	• **Storm and Foul Drainage -** Separate indications of foul and surface water drainage to be shown on the drawing. Foul to be shown in brown, highway authority adoptable drainage elements in blue and all other surface water to be shown in black.	Y/ N/ NA
	• **Private Drainage -** Spot levels and drainage provision should be indicated, private drainage required to prevent run off onto the area offered for adoption.	Y/ N/ NA

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	• **SuDS Drainage -** where SuDS proposals form part of the overall S38 site storm water drainage strategy, please liaise directly with the development control team for advice/guidance on adoptable drainage features.	Y/ N/ NA
	• **Longitudinal Section -** Section to indicate level information at least 10m beyond the design tie in, showing SWS, FWS and any Highways drains including locations of gullies.	Y/ N/ NA
	• **Drainage Calculations -** Network and simulation results for (1 in 5, 30 and 100 year +CC% storm events) for any drainage system to be adopted by the Local Authority. Calculation results should be submitted using relevant software such as Microdrainage.	Y/ N/ NA

CONSTRUCTION	**Highways Drawing**	**Delete as appropriate**
	• **Highway Boundary Treatment Plan -** Plan identifying the limits of the site.	Y/ N/ NA
	• **Pavement Layout Plan -** Plan identifying the type and extents of all pavement construction, key to match construction detail descriptions.	Y/ N/ NA
	• **Kerbing & Footways Plan -** Plan identifying the type, kerb face height, curve radii and limits of kerbing works with footway types and extents identified. Key to match construction detail descriptions.	Y/ N/ NA
	• **Construction Details -** All features within the adopted highway should be depicted, including pavement construction, kerbing, drainage and typical sections.	Y/ N/ NA

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	• **Reinstatement Details -** Trench reinstatement and narrow widening details for construction. Tree pit details for the landscaping and root protection details for retained trees.	Y/ N/ NA
	• **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. Additional cross-sections to be provided on request.	Y/ N/ NA
	• **Auto tracks -** Using a 3 axle refuse vehicle, 11.3m in length, 2.65m wide. All areas to be offered for adoption must be tracked. All adoptable turning heads need to show that the refuse vehicle can manoeuvre and turn around within the adopted highway. AutoCAD version to be provided. Additional tracking requirements may be required for Section 278 agreements.	Y/ N/ NA

TRAFFIC, LINING & SIGNING	**Traffic Lining and Signing Drawing**	**Delete as appropriate**
	• **Traffic Signing & White Lining -** Sign details including TSRDG diagram number, foundation, post and sign face materials. White lining diagram number and any specific dimension must be shown.	Y/ N/ NA
	• **Traffic Signals Details -** Construction drawing to include ducting plan and staging diagram. Designers will be required to attend FAT & SAT	Y/ N/ NA

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STRUCTURES	**Structures Drawing**	**Delete as appropriate**
	• **AIP information -** all information relating to AIP to be provided in full in accordance with "Technical Approval of Third Party Structures"	Y/ N/ NA
	• **Commuted Sums -** Amounts to be agreed with Telford & Wrekin Council	Y/ N/ NA

STREET LIGHTING	**Street Lighting Drawing**	**Delete as appropriate**
	• **Street Lighting -** Refer to STREET LIGHTING, Development Management Specification	Y/ N/ NA

ADDITIONAL INFORMATION	**Back-up Information**	**Delete as appropriate**
	• Road Safety Audit Stage 1 & 2 - For all S278 schemes a copy of RSA 1/2 which has been completed in line with DMRB HA19 is required; as well as a copy of the designers responses.	Y/ N/ NA
	• **Discharge Consent and S104 -** Copy of confirmation from applicable authority stating acceptance	Y/ N/ NA
	• **Construction Programme -** Programme identifying the anticipated construction duration for all works to be adopted.	Y/ N/ NA
	• **Utilities -** Copies of all statutory undertakers apparatus plans identifying all new services and required diversions. Depths of all ducting to be identified.	Y/ N/ NA
	• **TR2500 -** Signal Controller Specifications along with specifications for any extra or unusual equipment to be used on the site	Y/ N/ NA
	• **Standard Details -** To be issued as appropriate	Y/ N/ NA

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	• **Principal Designer/CDM2015 -** To be notified when submitted	Y/ N/ NA
	• **Ground Investigation Information -** CBR's, boreholes, groundwater, permeability test results etc.	Y/ N/ NA

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

5 Appendix A

5.2 Technical Approval / Form F

Section ** Technical Approval Form								
Project Title:	Technical Audit – **********							
Discipline:	Highways	**X**	Traffic / Transport		Structures		Street Lighting	Please see note below
Telford & Wrekin Approving Engineer: Nick McGurk								
Telford & Wrekin Job Code: ********								
Notes: The S** submission for the scheme has been checked against the current Design Manual for Roads and Bridges with reference to current council guidance and Manual for Streets. Following these checks and subsequent revisions of the design, the scheme now meets adoptable standards and is therefore recommended for approval.								
S38 Information								
Approved Drawings								
Drawing Number	**Drawing Title**							**Revision**
Reviewed for Information								
Drawing Number	**Drawing Title**							**Revision**
Notes:								

6 Appendix B

6 Appendix B

Telford and Wrekin

Technical Audit, Standard Details

7 Appendix C

7 Appendix C

Telford and Wrekin

Street Lighting Guidance

8 Sub-Appendix 1/1

8 Sub-Appendix 1/1

Notes for Guidance

1. Testing Regime

Sub appendix 1/5 testing is entirely the responsibility of the Developer. Details of Quality Management Schemes, product Certification details etc, must be supplied as requested by Telford and Wrekin Council Highways Development Control Staff. The Developer must also give access and assistance to HDC Staff to carry out any necessary additional sampling and testing work that may be required. This work must be carried out by a UKAS accredited laboratory at the Developers expense.

2. Design for Carriageway Construction

Carriageway construction layer thickness is specified in Part 3, Table TWC 10. A formation CBR of less than 2.5% is assumed unless the developer is able to provide test results to show otherwise. Reduced capping layer thicknesses will not be allowed solely on the basis of in-situ CBR testing. It is intended that soil classification tests be used to assign an “Equilibrium CBR” based on the material type as stated in IAN 73/06.

3. Capping Layer

Material used should be 6F2, or 6F5. The Specification for Highway Works specifies the placement of capping to a “method”. However, it must be demonstrated that the Developers material complies with SHW Table 6/2 grading requirements, and is appropriately placed. CBR testing on the compacted material must be carried out to demonstrate that the design assumption of 15% Equivalent CBR has been achieved.

Full SHW Appendix 1/6 method specification requires Optimum Moisture Content to be determined and the material moisture content to be measured at the point of deposition to show that it complies with the specified range of Optimum Moisture Content to Optimum Moisture Content to Optimum Moisture Content +/- 2%.

The use of 6F2, or 6F5 material is specified. The finer grade 6F1 and 6F4 materials are likely to be more susceptible to moisture content problems and 6F1 and 6F4 material outside the specified moisture range is less likely to provide adequate bearing capacity.

4. Sub-Base

Type 1 sub-base should be placed to a method specification SHW Clause 803 and Table 8/1 specifies compaction and layer thickness requirements. The Specification for Highway Works specifies the placement of sub-base to a “method”. However, it must be demonstrated that the Developers material complies with SHW Table 8/1 grading requirements, and is appropriately placed. CBR testing on the compacted material must be carried out to demonstrate that the design assumption of 30% Equivalent CBR has been achieved.

8 Sub-Appendix 1/1

5. Base and Binder Course

Core sampling shall be carried out routinely on every scheme to check for air voids and layer thickness. Cores are normally cut through binder course and base but contractors should note that they cover the road base at their own risk. Whilst the material is being laid, NDG testing and binder content sampling are required and laying and temperature records need to be submitted to the Council. Failure to provide this information will result in cores being taken.

6. Surface Course

Core sampling of surface course is normally only carried out if problems are suspected.

9 Sub-Appendix 1/2

9 Sub-Appendix 1/2

9 Sub-Appendix 1/2

Table TWC 1/2 A: Air Void Contents of Compacted Material used in Carriageway

	Mean of 6 Cores		Means of any pair	
	Min %	**Max %**	**Min %**	**Max %**
AC32 Dense Base	2	7	1	9
AC32 or AC20 Dense Bin	2	7	1	9
All HRA surf and bin	2	6	1	8
SMA surf 10mm	2	6	1	8
SMA surf 14mm	2	6	1	8

Table TWC 1/2 B: Air Void Contents of Compacted Material used in Footway

	Mean of 6 Cores		Means of any pair	
	Min %	**Max %**	**Min %**	**Max %**
AC20 Dense Bin	2	9	1	11
AC6 Dense Surf	2	9	1	10
SMA	2	7	1	9

9 Sub-Appendix 1/2

Table TWC 1/2 C: Equilibrium CBR Values to be used for Design Purposes within Telford and Wrekin

Soil Type	Plasticity Index	Equilibrium CBR %
Heavy Clay	70	2
Heavy Clay	60	2
Heavy Clay	50	2
Heavy Clay	30	2.5
Silty Clay	20	4
Sandy Clay	10	3
Silt *	Non-plastic	1
Poorly graded Sand	Non-plastic	20
Well graded Sand	Non-plastic	40
Poorly graded Gravel	Non-plastic	
Well graded Gravel	Non-plastic	60

* estimated assuming some probability of material saturating

Note: (i) *Granular material with greater than 15% passing 63 µm test sieve will be considered on a site specific basis.*

(ii) CBR values for made or placed ground may be determined using in-situ methods if the material is granular in nature.

10 Sub-Appendix 1/3

10 Sub-Appendix 1/3

1. **Procurement Policy**

Only products that fully comply with BS EN 124 as supplemented by BS7903 and HA 104/02 are permitted.

Notes for guidance on interpretation of HA 104/02. Notes for guidance on the selection, Installation and Maintenance of Chamber Tops and Gully Tops.

Thefollowing notes are not intended to be a substitute for HA 104/02

1.1 - The document covers most aspects of selection and installation of chamber tops, gully tops and associated bedding systems and materials.

1.2 - Premature failure is a major problem. Failures are not usually of the frame and cover but of the adjacent surfacing due to 'rocking' frames after the failure of the supporting system and/or bedding.

1.3 - Recent research has shown that the bedding materials are one of the main factors. Conventional materials and procedures have become superseded by recent developments. Improved specifications for bedding materials and improved frame and cover designs are available.

2. **Definitions**

HA 104/02 Chapter 2 lists definitions and terminology.

3. **Design Considerations for chamber and gully tops**

3.1 - Chamber tops and gully tops shall be specified to comply with BS EN 124 and HA 104/02.

3.2 - The minimum class of chamber top or gully top to be installed in carriageway locations shall be D400.

3.3 - Where ironwork is located in the wheel paths of major routes, then class E600 ironwork is required.

3.4 - All products used shall have been assessed and certified as required by the HA 104/02 and shall have been issued with product conformity certificated to BS EN 124.

4. Design of Chamber Tops

4.1 - Any chamber constructed for man-entry purposes, with a rectangular opening, should have a minimum clear opening of 600mm with a diagonal measurement of >700mm. Circular openings should have a minimum diametric measurement of 700mm.

4.2 - Class D400 frames should be a minimum 150mm deep. The depth of insertion of the cover within the frame should be 50mm minimum if the cover is secured or 80mm minimum if relying on the depth of insertion for security.

4.3 - Seatings of covers in frames shall be such that stability and quietness are achieved without the need for cushioning inserts or the need for periodic maintenance.

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4.4 - The frame bearing area shall be designed in such a way that:

- The nominal bearing pressure, in relation to the appropriate BS EN 124 test load, shall not exceed 2.1N/mm^2
- The minimum bedding width of the frame at any point shall be 50mm.

4.5 - Frames weighing more than 15kg should be provided with lifting holes, located to permit a balanced lift.

4.6 - Frames should not contain bedding flange holes located beneath the cover seating's. Any bedding flange holes present should be allowed for when calculating the bearing pressure under the test load.

5. Design of Gully Tops

5.1 - Gully tops shall comply with BS EN 124 and HA 104/02.

5.2 - Hinged gully gratings and frames may be kerbed hinged as appropriate to the traffic flow. The minimum area of waterway should be 900cm^2.

6. Bedding Material

6.1 Chamber tops and gully tops shall be bedded using material with the following properties:

- Non-shrink
- Minimum workable life of 15 min
- Compressive strength >30N/mm^2 in 3 hours
- Tensile strength >5N/mm^2 in 3 hours

6.2 - This specification is for a rapid hardening material and is typically achieved by the use of resin based products.

6.3 - Bedding materials should be laid in accordance with manufacturer's recommendations, taking particular account of site conditions, temperatures and thickness of material used.

6.4 - Packing material may be used providing that it is within the recommendations of the mortar stated by the manufacturer.

7. Packing Material

7.1 - Packing material have historically been used to raise the finished levels of chamber and gully tops, while retaining the existing supporting structure e.g. in overlay maintenance work.

7.2 - SHW clause 507 does not intend packing materials to be used. If packing materials are to be permitted then it should be purpose made. It should be ensured that the product is compatible with the bedding material used. The use of materials such as quarry tile and slate is not permitted. Packing materials should be installed in accordance with the RSTA Adept (HE) code of practice for ironwork systems installation and refurbishment.

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8. New Installation

8.1 - Frame supporting structure shall be constructed to such level that the packing materials, within the bedding mortar, are not needed.

8.2 - Operatives should be appropriately trained.

9. Mixing Mortar

9.1 - Mechanical mixing is preferred; the maximum quantity mixed should not exceed 50kg. Hand mixing is allowed, with a maximum mix of 25kg. Manufacturer's recommendations for mixing, water content etc shall be followed.

9.2 - Bedding must be placed onto the chamber without delay after mixing and floated to an even finish approximately 5mm thicker than required.

9.3 - When using polymer resin materials the following points should be noted:

- Harmful vapour may be produced and the use of gloves, goggles and barrier cream is recommended.
- Select the appropriate grade of product to suit temperature conditions and the time available for the initial set.
- Setting may be very rapid and bedding must take place promptly.
- The bond may be impaired if the surfaces are not kept clean and dry. Site conditions may require extra measures to maintain a dry and clean condition.
- Removal of frames previously bedded with resins is likely to damage the supporting structure.
- Once set, the material is inert and is therefore not classed as toxic waste.
- Any unmixed material must be mixed prior to careful disposal (COSHH) and in accordance with manufacturer's instructions.

10. Placing of frames and covers

10.1 - Health and Safety considerations mean that frames should preferably be lowered into positions with mechanical lifting devices.

10.2 - The frame shall be placed so that the bedding flange, webs etc are fully supported and there must be no voids between the bedding material and the frame.

10.3 - The frame must be tamped down to the appropriate level.

10.4 - Any holes within the frame must be filled with bedding material and the frame flange enveloped by a minimum of 10mm of the same material. A greater thickness is permitted provided that sufficient depth is available for surfacing layers.

10.5 - Exposed bedding shall be floated to fill any voids and bedding material inside the chamber must be pointed to a smooth finish.

10.6 - Covers should be placed in the frames after the bedding is sufficiently set, preferably using a mechanical lifting device.

10 Sub-Appendix 1/3

10.7 - No surround material shall be placed until the bedding has achieved sufficient tensile and compressive strength.

11. Reinstatement Works

11.1 - Reinstatement works should be in accordance with RSTA Adept (HE) code of practice for ironwork systems installation and refurbishment.

12. Removal of existing installations

12.1 - Mark the positions of cuts, to enable removal, at least 200mm from the estimated outer edge of the frame. Cut positions should be adjusted to encompass any existing cracks, with a clearance of at least 50mm.

12.2 - Cut through the full depth of the bound layers, with a circular saw, and remove material to expose the frame along each edge.

12.3 - Remove the cover and frame. HSE manual handling guidance means that this will usually require at least two operatives.

13. Re-use of existing covers and frames

13.1 - Where re-use is permitted, examine cover and frame for damage. If either cover or frame is unfit then the complete unit should be replaced. Previous use of polymer resin will prevent re-use. Any adhering cementitious bedding should be removed prior to the re-use of any frames.

14. Frame supporting structure

14.1 - The structure should be inspected for integrity.

14.2 - All old bedding material must be carefully removed, avoiding dropping loose material into the shaft.

14.3 - Consider Health and Safety regulations and Confined Spaces regulations before operatives enter manholes.

14.4 - If the previous bedding was polymer resin it will be necessary to remove and rebuild the top layer of the supporting structure to suit the depth of reconstruction. If the structure is brickwork, all joints shall be full and pointed.

14.5 - The bedding surface must permit a bedding thickness of between 10mm and 75mm.

14.6 - The frame supporting structure must be either class B engineering bricks or pre-cast cover frame and seating rings, laid with proprietary mortar which will develop a minimum 20N/mm^2 prior to trafficking. (This requirement will not be readily met by use of OPC and sand mixes)

15. Re-bedding of Covers/Gully Gratings

15.1 - Bedding layers >50mm should be laid in 2 stages. The first layer no thicker than 40mm and must be covered with proprietary packing material while the mortar is workable. The packing should be tamped down to ensure a uniform and even finish.

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16. Reinstatement of Surrounding flexible Carriageway

16.1 Once the mortar is set and the cover has been placed in the frame, the bituminous reinstatement should be carried out in accordance with the SROH specification for reinstatement of openings in highways and subject to the following considerations:

1. Cover and frame should not be exposed to any load or disturbance until the bedding material has attained sufficient strength
2. Care must be taken to avoid contact between compaction plant and the frame in order to avoid damage to the frame, cover or bedding layer.
3. If compaction plant will not fit between the frame and the reinstatement sides then a self-setting material, compatible with the bedding material, should be used.
4. The level of any self-setting material used should allow for the specified surface course thickness to be placed. Some materials will require a bonding agent.
5. Vertical faces of frames and existing surfacing shall be painted with hot 50pen bitumen or other approved edge sealing system.

11 Sub-Appendix 1/5

11 Sub-Appendix 1/5

Testing Frequencies and Product Certification (by the Developer)

1.0 General Requirements

1.1 - Tests comparable to those specified in this Appendix will be necessary for any equivalent work, goods or materials proposed by the Developer.

1.2 - Unless otherwise shown in this Appendix tests for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in Development.

1.3 - Cube strength tests are not required for concrete complying with SHW Clause 2602.

1.4 - Unless otherwise shown in this Appendix, tests certificates for work, goods or materials as scheduled under any one Clause are required for all such work, goods or materials in the Development.

1.5 - The Appendix refers to mandatory testing. Additional appropriate testing and assessment may be required on a site specific basis; details of any additional work will be agreed with Development Services staff.

1.6 - Unless otherwise scheduled under SHW Clause 2603, samples of concrete complying with that Clause are not required.

Table TWC 1/5- Testing Requirements

00 Clause	Work, Goods or Material	Test	Frequency of Testing	Comments
N/A	Formation	Equilibrium CBR based on Plasticity testing of cohesive material or grading of granular material	1 per material type sampled from formation inspection every 30m to be tested in a UKAS accredited laboratory. In-situ CBR testing 1 per 30m to be carried out by DCP.	Note: If equilibrium CBRs are not carried out then the maximum design CBR of clay soils will be assumed to be a maximum of 3%
600 Series	General Fill	M/C, MCV, OMC, PI, Grading	1 per 1000m^3	Testing and acceptability parameters to be agreed with TWC on a site specific basis

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	6F2, 6F5 Selected Fill	Full SHW table 6/1 testing	1 per source	
		Or grading and sight of FPC data where appropriate, supplemented by in-situ CBR	1 per source plus in-situ CBR tests every 30m	In-situ CBR to be greater than 15%. If recycled material is to be used, it must fully comply with the WRAP protocol
	6N Fill to Structures	M/C, OMC, Grading Field dry density	1 per source 1 per 400t	End product compaction
803	Type 1 sub base	Grading, PI and sight of FPC data. Dynamic stiffness measurement	1 per source in-situ CBR tests every 30m	In-situ CBR to be greater than 30%
900 Series	Tarmac Base and Binder course	Sample taken for Binder content/Grading analysis - 1 per 100 tonnes	In-situ NDG readings, laying records and temperatures	NDG readings, air voids max. 7% or cores will be required.
	Tarmac 55/10 Surface course	Sample taken for Binder content/Grading analysis - 1 per 60 tonnes	Laying records and temperature	
	Tarmac 30/14 HRA and Chippings	Sample taken for Binder content/Grading analysis - 1 per 60 tonnes. Chippings - sample taken for Binder content/Grading - 1 per source.	Laying records, temperatures, rate of spread of chippings and texture depth.	
	SMA Surface Course	Sample taken for Binder content/Grading analysis - 1 per 60 tonnes.	Laying records, temperatures, texture depth and air voids.	

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		Texture depth - 1 set of 10 per 150m laid carriageway lane. A visual inspection of finished mat looks to have excessive voids then cores will be required for air void testing.		

All testing must be carried out by a UKAS accredited laboratory or as agreed by a TWC site engineer.

12 Sub-Appendix 1/6

12 Sub-Appendix 1/6

1. Carriageway Construction Materials

1.1 - The Borough Council is keen to promote environmental sustainability through the use of secondary or recycled aggregates. Developers are, therefore, encouraged to consider ways in which they can minimize the use of primary aggregates. Proposals for construction works, using recycled options, will be considered on an individual basis.

Recycling of Highway Materials

2. Recycled Granular Material

2.1 - Attention is drawn to the amendments to SHW which allow the use of recycled aggregate for many classes of unbound granular materials: principally pipe bedding, filter media, capping layer and sub base. It has not been considered necessary to specify these products individually as they are required to comply with relevant clauses of SHW. All recycled materials are also required to comply with WRAP protocol for the production of recycled aggregates from inert materials. Full certification for these materials is required at the frequency specified in the WRAP protocol.

3. In-situ Material in Base

3.1 - In-situ material, recycled in place using bitumen, bitumen emulsion, foamed bitumen, cement, lime, pfa, or a combination of these or other binding agents, shall be subject to the proposals being previously agreed with TWC site engineers. Foamed bitumen usage shall be based on and follow the principles set out in SHW clause 948. Targets of 95% confidence levels for the dynamic stiffness and fatigue strength of the in-situ recycled material shall be either previously agreed or agreed following Joint pilot trials carried out by the Developer and TWC. Sampling plans and testing ages and rates shall be agreed before any work commences on site.

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1. Highway Work Detail

1.1 - Highway Details Coming Soon!

14 Sub-Appendix 1/8

14 Sub-Appendix 1/8

1. Surface Levels of Pavement Courses

1.1 - Horizontal Alignments, Surface Levels and Surface Regularity of Pavement Courses shall comply with the requirements of SHW clause 702. For the purposes of this document, Distributor roads shall be designated category A roads and all other roads shall be category B.

15 Sub-Appendix 1/9

15 Sub-Appendix 1/9

1. Formation Weedkiller Treatment

1.1 - Surfaces shall be sterilized by the application of a weedkiller. In the case of completed formations, the surface shall be sterilised prior to the laying of sub-base or base material.

1.2 - Where weedkiller is to be applied to a surface to sterilise it on a permanent basis, prior to superimposing further construction layers, a suitable residual weedkiller shall be used in accordance with the manufacturer's instructions in order to prevent weeds growing within the construction surface.

1.3 - A granular residual herbicide shall be used which contains 6.75% Dicholobenil as the active ingredient and, shall be spread at the rate of 175kg per hectare, or as directed by the manufacturer. The type of weedkiller to be used shall be approved by the County Council prior to its use.

1.4 - The Developers shall ensure that surfaces and vegetation beyond those surfaces to be sterilized do not receive weedkiller. Areas to be treated shall be suitably screened and shall receive measures to prevent animals entering onto treated surfaces and being in contact with or consuming treated vegetation. The Developer shall not contaminate any watercourse with the use of weedkillers. The developer shall display and remove, as necessary, appropriate notices to warn the public of hazards from his operations and the treated surfaces.

1.5 - The Developer shall be responsible for any adverse effects of herbicides on desired vegetation, particularly the effects of drift or seepage onto roadside planting, adjacent trees, shrubs, agricultural crops and gardens.

1.6 - Vegetation removed from the surface to be treated, part used materials and containers, shall be transported and disposed of by approved means to a licensed tip to be provided by the Developer.

1.7 - The Developer shall take into account the recommendations contained in the Health and Safety Commission Approved Code of Practice, "The safe use of pesticides for non-agricultural purposes".

1.8 - The storage of weed spraying materials will not be permitted within the highway boundary.

1.9 - Herbicides shall be applied in carriageway channels to give a maximum treatment width of 300mm, which shall comprise a 150mm width at the front and rear of the kerb face. At the back of the footway, the maximum treatment width shall be 225mm.

1.10 - All spraying equipment must be capable of operating 1m or less above ground level and be of sufficient pressure to produce a coarse spray quality to prevent wind-drift of chemicals.

1.11 - The method of filling the water tanks of the spraying vehicles is to be carried out in accordance with the requirements of the Environment Agency.

16 Sub-Appendix 1/13

16 Sub-Appendix 1/13

1. Construction Works in the Vicinity of Trees

1.1 - Where it is proposed to construct highway infrastructure or buildings in the vicinity of trees then appropriate measures must be taken to ensure that existing trees are not damaged by the construction works and that new or existing trees are not adversely affected during their natural life cycle and, equally importantly, that those trees do not have an adverse effect on the adjacent infrastructure.

1.2 - In preparing proposals for development work in the vicinity of existing trees, the guidelines and recommendations set out in BS 5837, "Guide for Trees in relation to construction" shall be followed. This standard gives guidance on the principles to be applied to achieve a satisfactory juxtaposition of trees, including shrubs and hedges, and structures. Appendix A to the Guide also provides guidance on the most appropriate species for new planting in relation to construction constraints.

1.3 - The criteria which must be addressed in preparing proposals for highway related development works in the vicinity of trees include the following:-

- Effect of leaf deposition
- Effect of trees/branches on visibility
- Proximity of vehicles to Trees
- Effect of construction works on root system Inc. compaction, soil stripping, oxygen starvation, etc.
- Need to adopt special construction measures to avoid damage to roots
- Need for exclusion zone to prevent storage of materials and plant
- The age of the trees; in general, the older tree, the more susceptible it will be to disturbance through changes in the surrounding ground conditions. It is recommended that expert arboricultural advice is sought to assess the effect of construction works on mature tree specimens.

1.4 - Where young tree specimens are involved, the effect of tree and root growth on the carriageway and footway must be considered.

1.5 - Where it is necessary to construct footways within the curtilage of the trees root system, then it will be necessary to adopt a "no-dig" type of construction in carrying out this work. No roots should be severed, soil must not be compacted and oxygen must be able to diffuse into the soil beneath the constructed surface.

1.6 - The construction should incorporate a high tensile synthetic geogrid overlaid with a layer of granular sub-base with a minimum thickness of 150mm, 6mm - 50mm graded granular sub-base and a porous tarmacadam surface course 60mm in thickness.

1.7 - The edge of the footway should be a minimum of 0.5m from the trunk of the tree and should be supported by timber edging and retaining pegs. The only original ground surface should be stripped of non-woody vegetation only. The maximum depth of excavation should not exceed 100mm.

1.8 - Further details of "no-dig" construction may be obtained from the Arboricultural and Advisory Information Service, tel. 01420-22022.