Part 2 ▸ Highway Design and Technical Review

2.1 Introduction

This part of **The Warwickshire Design Guide** covers the design and technical approval of Category 2 or 3a Roads (refer to Table 1.1 in Part 1 of this guide). These roads are typically the strategic and main distributor (primary) roads in the County network, but their design must incorporate considerations to promote walking and cycling in line with WCC's Local Transport Plan.

Designers should follow the guidance provided in this section, when indicated after using the flow chart in Part 1 Figure 1.2, to determine the appropriate design standards for their improvement.

It is expected that the guidance included in this part of the Design Guide will be appropriate for junction improvements connecting a development to the existing network and the distributor roads within larger developments.

The vision of WCC's Land Use and Transportation Strategy is:

'To encourage new development, which is accessible, safe, sustainable and integrated with the transport network, including modes other than the car'.

Therefore, the primary focus of the strategy is to ensure development is located where it can be linked to public transport and where easy walking and cycling access is available to employment areas, shops, schools and other services, thereby reducing social exclusion and dependence on travelling by car. Larger developments should be close to high quality public transport corridors, either existing or proposed, and through routes for buses should always be included within the layout.

The design of the road infrastructure using the correct standards is critical to enabling the vision to be realised.

The County Council expects the Design Manual for Roads and Bridges (DMRB) will be the primary design manual used for new improvements. Developers' attention is drawn to GG101 Revision 0 Note 2 which states:

"Where a local highway authority decides to use the DMRB in whole or in part for development of its own highway/ road network, the overseeing organisation is defined in accordance with their own procedures."

In these situations, Warwickshire County Council will act as the overseeing organisation.

2.2 Scheme Delivery Outline

For improvements that will be carried out on the existing road network, it is expected, once planning consent has been granted, the developer will contact WCC Engineering Design Services to progress their application to enter into a formal agreement to begin the process of scheme delivery, as advised in the informative note provided as part of the planning consultation process.
In general, the process is expected to be as follows;

- Developer to apply to enter into a Section 278 Agreement or Section 38 Agreement. Further information on legal agreements is included in Part 10 and Annex 10.1.
- Developer to supply a preliminary general arrangement drawing which corresponds to the planning consent.

WCC will then supply a fee estimate which will cover the fees relating to the Technical Review process and procurement of a contractor from the current WCC Contractors' Framework. This work will be based upon the scope of the works included on the preliminary general arrangement drawings and the estimated programme for construction. The fee

estimate will also outline what information is required for the Technical Review which can be found in *Annex 2.1 Information relating to technical review, contract preparation, tendering and construction supervision of Section 278 highway improvements in Warwickshire.*

Prospective developers should note - if relevant information is not supplied then this will increase the time for Technical Review and additional fees may have to be charged for the additional reviews. It is also important for developers to understand the typical timescales for Technical Review are months rather than weeks, but a robust initial submission based on the recommendations in this Design Guide will keep the timescales to a minimum.

- When Technical Review and procurement phase fees are paid and works information is submitted, WCC will commence Technical Review. If departures from standards are required these should be applied for and resolved at an early stage, see Annexures 2.3 and 2.4 for further information on Departures from Standards.
- The developer will be responsible for liaising with utility companies together with placing and paying for orders for any necessary diversion works. **The developer must provide proof of payment for the diversion works prior to the start of the tendering process.**
- When Technical Review is approaching its conclusion, the developer's consultant is to supply an updated scheme estimate which will be used to add the scheme to WCC's capital programme. At this point, site supervision fees will be estimated once the full extent of the works is confirmed.
- After consultation with the developer, WCC will book the road space for construction. The timings will be agreed with the developer but if these change due to a delay to the following processes then this could mean a new notice has to be given and the scheme delayed accordingly.
- When Technical Review is completed, and the necessary certificates certified, WCC will prepare the construction contract document and invite tenders from WCC Framework Contractors. The contract will be let using the NEC conditions of contract.
- When quotes are received the developer will agree in writing for the contract to be awarded.
- The construction contract will only be awarded when the legal **agreement (e.g., Section 278 or Section 38 etc.) has been signed, a bond is in place and appropriate fees paid including statutory undertakers' fees. Further information on procurement, contract award and legal document requirements is provided in Part 10 of this Guide.**
- During the construction phase WCC will pay the contractor's invoices and invoice the developer in arrears.

2.3 General Design - Technical Review and General Considerations

WCC will expect a developer to appoint a competent consultant to carry out the design and prepare the works information for inclusion in the NEC contract documents.

During the technical review phase of any Section 278 highway improvement tasks will need to be performed by the developer, the developers' designers and WCC's Technical Review Phase Team. It should be noted that in the absence of a developer's designer for a particular Section 278 scheme, the responsibilities of the developer's designer will rest with the developer.

During the design phase, the developer will perform the role of Client under the Construction (Design and Management) Regulations 2015 (CDM 2015) and will therefore appoint the Principal Designer. The developer must ensure the Principal Designer role is performed throughout the various contract stages (including the construction phases of the scheme) as required by CDM 2015. This will be essential in circumstances where construction phase redesigns become necessary.

Furthermore, prior to Technical Approval commencing the developer shall provide WCC's Technical Review Phase Team with:

- A copy of the Planning Permission for the associated development, including details of any conditions
- One complete set of the proposed scheme-specific tender drawings and any other relevant documents in electronic format together with a signed copy of the Design Certificate
- A list of design standards intended to be used (or has been used), together with details of any proposed applications for departures from standards (see Annexures 2.3 and 2.4 for further information). As stated previously, the design standards used will be determined using the flow chart shown in Part 1 Figure 1.2 which will need to be agreed at pre-application meeting stage and will form the basis of drawings included in the associated Planning Application. Note: departures from these standards are only likely to be accepted in exceptional circumstances
- Details of any tree preservation orders (TPOs) for trees affected by the Section 278 Scheme.
- Details of any archaeologically sensitive areas, scheduled monuments, listed buildings or conservation areas that might be affected by the S278 scheme.

To ensure a smooth transition from the Design and Technical Review phases to the contract procurement and construction phases, the developer shall submit for approval the CVs for the individual or individuals within the design organisation who will perform the actions of the Principal Designer before making the appointment. WCC will expect the appointed organisation, and the individual who will be performing the actions of the Principal Designer, to have suitable experience of designing works to be carried out:

- On live carriageways under appropriate forms of traffic management,
- With adequate provision for pedestrians and cyclists during the construction phase,
- So that the completed works minimise the health and safety risks to those who will perform future maintenance operations.

The organisation undertaking the Principal Designer responsibilities shall be identified and a copy of the letter of appointment shall be supplied. Prior to the commencement of the procurement phase for the Section 278 highway improvement, the Principal Designer shall prepare and supply the Pre-construction Information in a format agreed in advance with WCC's Technical Review Phase Team.

More details of what work is required to be carried out by the developer and the developer's Designer is contained in *Annex 2.1 Information Relating to Technical Review.*

In addition to the above, the developer shall provide a copy of the notice (Form F10) submitted to the Health and Safety Executive, together with a copy of all correspondence between the designer(s) and the Principal Designer during the design phase of the scheme.

2.4 WCC Standard Details - Designing for Maintenance

The County Council not only insist on high quality designs using the correct design standards, but also on the use of an appropriate specification of materials that will ensure the new improvement can last for the appropriate duration before maintenance is required.

WCC's Surfacing and Structural **Maintenance Strategy** and **Highway Construction Details** (HCD) provide information on standard construction details and materials routinely used within Warwickshire. Developers should be aware that deviations from standard details are likely to incur the requirement for commuted sums for future maintenance.

WCC requires design work not specified in WCC's HCD to be undertaken in accordance with principles outlined in The UK Roads Liaison Group (UKRLG) document 'Well-managed Highway Infrastructure – A Code of Practice'.

Design should accord with Recommendation 13 – Whole Life/Designing for Maintenance which states 'Authorities should take whole life costs into consideration when assessing options for maintenance, new and improved highway schemes. The future maintenance costs of such new infrastructure are therefore a prime consideration.'

Table 2.1 below provides factors developers and designers must consider during the design process to ensure that adequate consideration is given to future maintenance requirements of schemes. This list is not exhaustive but includes several key issues that may need to be addressed. Failure to address issues may lead to the requirement for payment of commuted sums to manage specific maintenance challenges.

Issue	Check	Action
Scope and Scale		
Intended life of scheme	Is the scheme long life or 'temporary' and likely to be affected by future redevelopment?	Choose materials and products relevant to the life of scheme.
Nature of scheme	Is the scheme a 'unique' prestige project or a 'routine' standard one?	Choose materials and products relevant to the type of scheme.
Scope of scheme	Has the scheme been 'value-managed' to consider all possible marginal benefits?	All 'significant' schemes should be value managed.
Use of scheme	Is the scheme likely to be subjected to particularly 'heavy duty' traffic use with high rates of wear?	Select design and materials to mitigate these affects as far as possible.
Cost of scheme	Have the costs of future maintenance been calculated and included in future budgets/commuted sums?	Identify any extraordinary maintenance costs and report these alongside construction costs.
Design Aspects		
Pedestrians and cyclists	Do proposals for footways and cycle routes fit the actual desire lines used?	Redesign to reflect actual paths to avoid erosion and later replacement.
Heavy goods vehicles	Is footway paving likely to be over-ridden by HGV or other parked vehicles?	Where necessary use heavy duty paving or prevent over-riding to avoid frequent costly replacement.
Grassed and planted areas	Are grassed and planted areas of a size and position to be effectively maintained?	Redesign or remove where necessary to avoid future poor appearance and later redesign.
Trees	Have trees been selected and positioned to avoid future problems with roots, obstruction or leaf fall?	Reselect or reposition where necessary to avoid potentially expensive future problems.

Design Aspects continued		
Traffic signs	Are traffic signs required to be illuminated or can they be reflectorised?	Maximise use of reflective signs to reduce energy costs.
Historic Environment	Are standard materials suitable in this location?	Discuss with LPA Conservation Team and WCC DM on alternative enhanced materials to suit the environment. If agreed, additional costs will be met by developer accompanied by a commuted sum.
Maintenance Operations		
Maintenance regime	Does the scheme require specialist maintenance regime?	Identify cost of specialist regime and, where appropriate, consider cheaper alternatives.
Cleansing	Does the scheme require specialist cleansing regime?	Identify cost of specialist regime and, where appropriate, consider cheaper alternatives.
Traffic management	Will maintenance require special traffic management?	Identify traffic management costs and minimise wherever possible, possibly through co-ordination with other works.
Maintenance access	Is there a safe and convenient access for plant and personnel?	Redesign scheme to provide safe and convenient access.
Materials and Products		
Specialist materials	Are the materials used for the scheme of standard or specialist nature?	If specialist materials used ensure availability of future replacements.
Durability of materials	Does the durability of the materials provide substandard, oblique, sufficient or excessive life?	Select materials relevant to the intended life and nature of the scheme.
Failure mechanism	How will material/product approach the failure condition – slowly/quickly?	Programme safety and service inspections on basis of risk assessment
Life extension	Are there any processes which could be used to extend useful service life at economic cost?	Investigate cost benefit of using life extension products.
Replacement practicality	Are there likely to be any difficulties in replacing failed sections?	Undertake risk assessment and plan for the likely difficulties.
Replacement cost	Is the cost of replacement likely to be disproportionately high?	Consider alternative materials and products.

Reuse and Recycling		
Practicability of reuse	If the scheme is a short life scheme what is the scope re-using materials and products?	Choose re-useable materials and products wherever possible.
Practicability of recycling	What is the scope for recycling materials and products?	Where re-useable materials and products are not appropriate, use recyclable wherever possible.

Table 2.1 - Required Maintenance Considerations

In general accordance with The UK Roads Liaison Group (UKRLG) document 'Well-managed Highway Infrastructure – A Code of Practice', WCC defines the hierarchy of existing roads and footways in the County as shown in Table 1.1. The hierarchy of the road and footway must be considered when making design decisions.

2.5 The Highways Resilient Network

The Transport Resilience Review recommends that Local Highway Authorities should "Identify a 'resilient network' to which they will give priority, in order to maintain economic activity and access to key services during extreme weather" (DfT, 2014). This has subsequently been supplemented by Well-Managed Highways Infrastructure (A Code of Practice) which further recommends; "Within the highway network hierarchy a 'Resilient Network' should be identified to which priority is given through maintenance and other measures to maintain economic activity and access to key services during extreme weather." The resilient network is part of the winter maintenance network which is a defined network on which we undertake precautionary salting. The winter maintenance network is much more extensive covering approximately 46% of our total network.

Developers and designers must consider Warwickshire's currently defined resilient network when proposing changes to the existing highway network. Alterations to the network must not compromise the Authority's ability to maintain it during extreme weather conditions.

2.6 Pedestrian Facilities

The layout and design of footways should aim to provide convenient, appealing and safe routes for pedestrians. The provision of adequate and convenient car and cycle parking facilities will be a significant factor in discouraging ad-hoc parking that might obstruct pedestrian routes.

Footways must be designed to take account of the type and function of adjacent carriageways, location of apparatus for statutory and other services, street furniture and pedestrian movements and vulnerable road users in the vicinity of schools, shops or other community buildings.

For sites identified as 'roads' using Figure 1.2 in Part 1; footways, footpaths and cycleways must be provided and designed in accordance with standards contained within DMRB. For 'streets', footways, footpaths and cycleways (where provided) should be designed and provided in accordance with Manual for Streets recommendations and requirements, which have been used to inform Part 3 of this guide. If there is any uncertainly as to the Authority's requirements, developers should contact WCC to discuss further and confirm.

Pavement construction requirements for footpaths, footways and cycleways are detailed in the County Council's Surfacing **Strategy Guide** and construction details are included in **WCC HCD**.

In addition to the standards published in DMRB and the guidance contained within the Manual for Streets, the Department for Transport

has published guidance on how to design for **'Inclusive Mobility'**. WCC has considered this document when establishing the widths shown in the HCDs (Highway Construction Details).

Therefore, when designing footways and considering footway width, designers must note that clear width of 2000mm is needed to allow two wheelchairs to pass one another comfortably. This should be regarded as the minimum width. For information regarding longitudinal gradients, refer to the details provided in Part 3.

Crossfall on footways and footpaths is necessary to provide good drainage, but if too great, can make it difficult for wheelchair users. Variable crossfall, such as may be found when travelling along a street with vehicle crossovers, can be problematic as it affects the steering of wheelchair users and can also cause problems for people with walking difficulties. Designers should take these problems into account when considering frontage parking in residential areas, which may result in the installation of crossovers.

If there is a steep slope or drop at the rear of the footway, precautions must be made to prevent wheelchair users running over the edge or blind or partially sighted people walking over it. Suitable mitigation at the side of or across footways may be necessary in such instances.

On longer side roads and residential roads, dropped kerbs should, where possible, be provided every 100 metres to avoid the need for pedestrians and the mobility impaired to make lengthy detours to cross the road having given due consideration to desire lines for pedestrians and inter-visibility.

If the provision of ramps or handrails within the public highway are determined to be necessary, developers, designers and engineers must refer to DfT guidance document **'Inclusive Mobility'** for advice and guidance to provide a feature that is suitable and fit for purpose.

2.7 Cycle Facilities

Developers will be expected to ensure that new developments (residential, retail or employment sites) are connected to the local cycle network by safe, convenient and attractive cycle routes to enable residents to cycle to town centres, rail stations, educational establishments and other key destinations.

As mentioned in Part 1, developers should refer to current **Government Guidance LTN 1/20** (or successor guidance) for designing high-quality, safe cycle infrastructure when planning their sustainable transport strategy.

2.7.1 General Principles

New developments should be designed to encourage cycling for local journeys, in line with the National Planning Policy Framework, national transport policy objectives and Warwickshire's Local Transport Plan and Local Cycling and Walking Infrastructure Plan (LCWIP).

The internal network of roads and streets should be designed in accordance with Manual for Streets principles, so that cyclists can be accommodated safely within the road network. Where traffic levels and speeds are higher, dedicated provision for cycling is required (see Figure 2.1 below). It is important to ensure good access is provided to the cycle route network from all areas of the site. The key design principles for providing for cyclists are set out Local Transport Note LTN 1/20.

2.7.2 Dedicated Cycling Infrastructure

Where dedicated cycling infrastructure is provided adjacent to busier roads, this should take the form of a cycle track, which is both segregated from traffic and separate from provision for pedestrians.

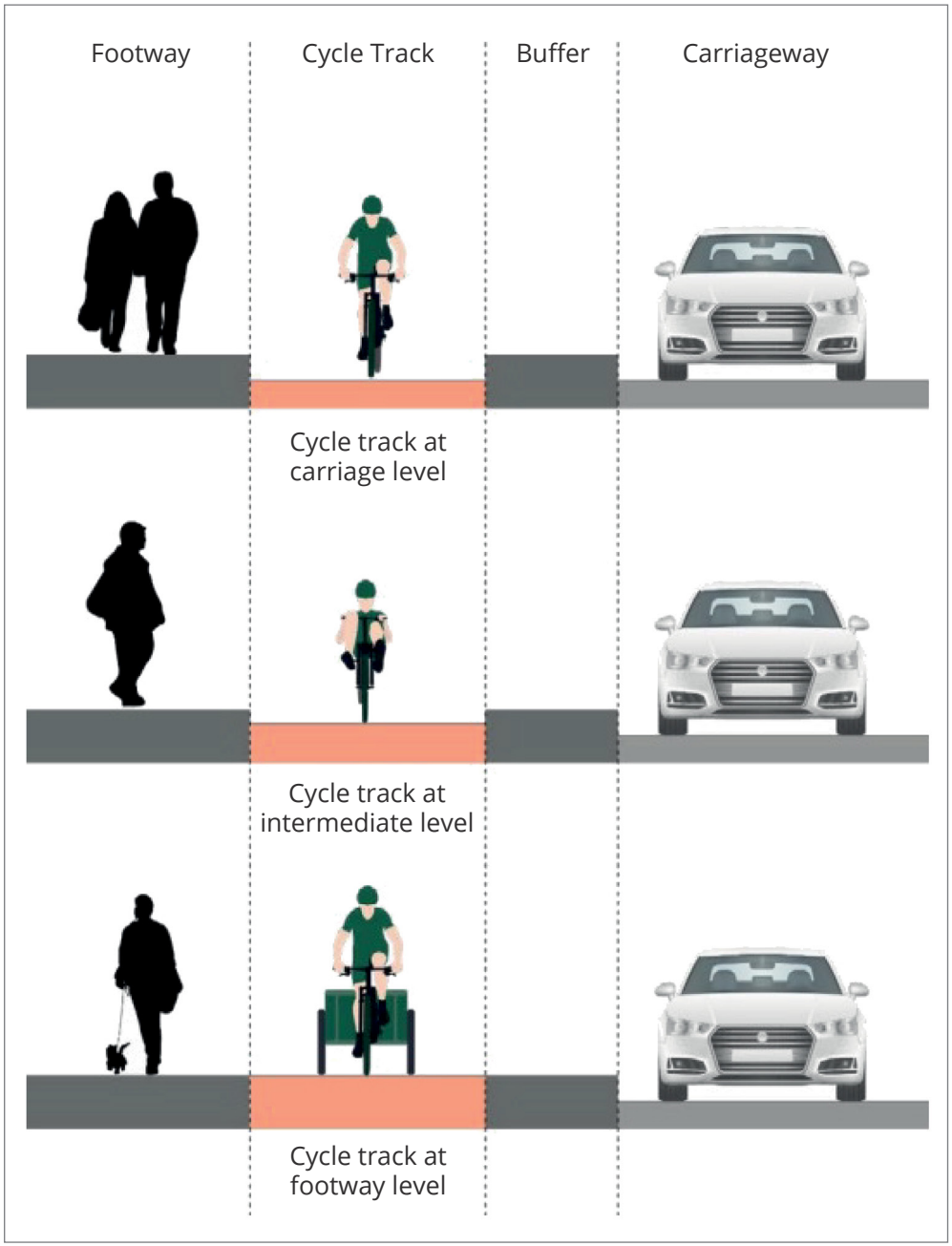

Figure 2.1 - Different levels of segregation
(Source: Cycle Infrastructure Design LTN 1/20, DfT, 2020)

The design of cycle tracks should be in line with the latest guidance set out in LTN 1/20, and site-specific issues should be discussed with WCC. Any verge buffers will need to be a minimum of 1m wide. All routes will need to connect with the existing and planned cycle route network as identified in the Warwickshire LCWIP.

Shared use footway / cycleways may be appropriate at some locations, particularly where pedestrian and cycle usage is likely to be lower, and through open spaces. In these cases, a minimum surfaced width of 3 metres will be required.

Whilst cycling infrastructure provision for new development sites should be guided by the principles and design guidance in LTN 1/20, developers should consult with WCC's Transport Planning Unit to ensure new provision is tailored to specific local requirements.

Cycle Audits and Cycling Levels of Service assessments should be considered as part of Transport Assessments.

2.7.3 Crossing Points

Interruptions to cycle routes should be minimised to ensure that cycling is as convenient and attractive as possible. Where cycle routes cross minor side roads with low traffic flows, designers should seek to provide cycle priority crossings in accordance with LTN 1/20. Where cycle routes cross busier roads, provision of refuges, parallel crossings or Toucan crossings may be necessary.

2.7.4 Cycle Barriers

Cycle routes should be designed to provide efficient travel and should be free of unnecessary obstructions. Historically, staggered guard rail barriers have been used throughout the UK as a method of controlling speeds of cyclists near to junctions with adjacent roads.

Increasingly, staggered barriers are responsible for creating accessibility issues for mobility impaired pedestrians, resulting in them being unable to access the footway. They can also create a collision risk for cyclists, particularly during the hours of darkness, and prevent cyclists from using cycleway facilities due to the difficulty in negotiating through the staggered barriers.

The authority does not support the introduction of staggered guard rails as a method of reducing cyclist speeds at the interface between a cycle route and carriageway. It is the preference of the authority that other measures are explored such as the use of warning signage or road markings.

In exceptional circumstances, the use of physical measures can be considered. It is recommended to contact WCC Transport and Highways **tpu@warwickshire.gov.uk** to obtain advice relating to the particular risk that has been identified during design to agree a solution.

2.7.5 Signing

Direction signing can promote the use of new cycle routes, highlighting how they connect to both the surrounding cycle network and key destinations outside the site. Cycle direction signs (including destinations / distance as appropriate) should be included in cycling infrastructure proposals and agreed with WCC's Transport Planning Unit at an early stage.

2.7.6 Connections to the Wider Cycle Network

It is vital that cycling provision included in new developments connects safely and conveniently to the existing and proposed cycle network as set out in the Warwickshire LCWIP, and other emerging proposals, to ensure that cycling is a viable choice for local journeys. Developers will be expected to provide contributions towards the infrastructure required to connect development sites to key local destinations and / or the existing cycle network.

2.8 Public Transport, Bus Stop Provisions and Services

WCC acknowledges the importance of the role local bus services and supporting bus and highway infrastructure plays in delivering connectivity between new development, urban centres, major employment sites and other prominent generators of local trips. The position of the County Council is aligned with national and local policy, as stated below:

- The National Planning Policy Framework (NPPF) steers development towards promoting its connectivity with sustainable transport to facilitate sustainable development and contribute towards wider sustainability.
- The NPPF also promotes the integration of planning and sustainable transport to provide attractive alternatives to travelling by car to access employment, education, health facilities, leisure, amenities and health objectives - aimed at providing people with a real choice about how they travel.
- The County Council requests provision and/or improvements to local bus services in association with new development in alignment with the policies established in the Warwickshire Local Transport Plan 2011-26, in respect to promoting public transport connectivity between new development and local amenities.
- The Warwickshire Local Transport Plan 2011-26 also specifies that all occupiers within a new development should be no further than 400 metres away from the nearest bus stop, in line with policy stated in the in respect to connectivity between new development and local bus services.

For further information relating to WCC's requirements please refer to *Annex 2.2 Warwickshire County Council Local Bus Service Provision and Supporting Bus and Highway Infrastructure Joint Developer Guide and Design Guide*.

2.9 Traffic Signals

A typical example of highway mitigation works might be the installation of a traffic signal junction, signalised roundabout, controlled pedestrian crossing, etc.

Any such scheme shall be designed in accordance with relevant design standards by a competent person(s) and issued with an approved LinSig model (latest software version). CV's will need to be provided for the individual/s who have designed and approved the scheme/LinSig model. If the design or model is not fit for purpose, WCC reserve the right to carry out a design audit by an external organisation at a cost to the developer.

WCC reserve the right to only implement schemes that are justified in accordance with County Council's policies for:

- **The Provision of a Traffic Signal Junction**
- **The Provision of Pedestrian Crossings and Pedestrian Facility at Traffic Signals Junctions**

If required by the Principal Designer, WCC's TCIS (Traffic Control and Information Systems) team can offer a service to assist with the detail design of the signalisation scheme for the highway works based upon their detailed road layout drawings being issued. A quotation for the detail design fees for preparing the system specification document (Appendix 12/5) and the controller specification form (TR 2500) can be provided on request by contacting **tcis@warwickshire.gov.uk**.

The County Council will tender for the scheme and appoint the Principal Contractor once the Section 278 Agreement is signed.

WCC will normally request the supply and install of traffic control equipment to be installed as part of the highway works by a specialist contractor appointed by the Principal Contractor.

As described in 2.2 and in more detail in Part 10, the highway works will be supervised by WCC. Where traffic signal equipment forms part of the works information, site supervision, factory acceptance test, site acceptance test, commissioning etc. and will be carried out by WCC, this will be included in the site supervision fees associated with the Section 278 Agreement.

The installation will be subject to a commuted sum towards the future maintenance of the traffic signal equipment and one upgrade. The current commuted sums are listed in *Annex 10.1 Highway Works Agreements.*

2.10 Construction Traffic

Where construction is likely to impact on the operation of the highway network, developers must submit a Construction Management Plan (CMP) and a Dilapidation Survey as described in Part 1.5.7 for approval by the Authority prior to commencement of construction.