Highway Drainage Design

Scope

There are two key elements to highway drainage design, surface and sub-surface systems. Lincs Lab should always be consulted alongside the TSP Drainage team with respect to sub-surface drainage.

Core Standards

The following standards will apply: -

Development Road and Sustainable Drainage Guide *link to document*

Lincolnshire Development Roads and Sustainable Drainage Design Approach *link to document*

Maintenance Design Manual *link to document*

CG 501 Design of highway drainage systems *link to document*

CG 502 The Certification of drainage design *link to document*

CD 521 Hydraulic Design of Road Edge Surface Water Channels link to document

CD 522 Drainage of runoff from natural catchments link to document

CD 523 Determination of pipe roughness and assessment of sediment deposition to aid pipeline design link to document

CD 524 Edge of pavement details link to document

CD 525 Design of combined surface and sub-surface drains and management of stone scatter link to document

CD 526 Spacing of road gullies link to document

CD 527 Sumpless gullies link to document

CD 528 Vortex separators for use in road drainage systems link to document

CD 529 Design of outfall and culvert details link to document

CD 530 Design of soakaways link to document

CD 531 Reservoir pavements for drainage attenuation link to document

CD 532 Vegetated drainage systems for highway run-off link to document

Technical Services Partnership
Highway Drainage Design Guide

CD 533 Determination of pipe and bedding combinations for drainage works link to document

CD 534 Chamber tops and gully tops for road drainage and services link to document

CD 535 Drainage asset data and risk management link to document

CS 551 Drainage Surveys link to document

Other Relevant Standards

The following documents offer good advice, but it is not an exhaustive list:

CIRIA 635 Design for Exceedance in Urban Drainage link to document

CIRIA C753 The SuDS Manual link to document

CIRIA 698 Site Handbook for the Construction of SUDS link to document

Design and Analysis of Urban Storm Drainage; The Wallingford Procedure link to information

Flood Estimation Handbook; Centre for Ecology and Hydrology link to information

Sewerage Sector Guidance Appendix C, Design and Construction Guidance (replaced SfA in 2020); Water UK link to information

Application

All surface drainage systems whether they are for development roads, new works (bypasses etc.) or maintenance works where the Highway Authority is the client.

Development roads shall comply with the standards set out in the Lincolnshire Development Roads and Sustainable Drainage Design Approach and Development Road Specification and Construction Guide.

Maintenance (minor improvements to existing infrastructure) shall comply with the standards set out in the Maintenance Design Manual.

All other works shall be designed in accordance with the relevant standards contained in the Design Manual for Roads and Bridges.

Drainage systems for other authorities will be designed in accordance with their requirements.

Notes/Guidance

Technical Services Partnership
Highway Drainage Design Guide

The three major objectives for draining highways are:

1. The rapid removal of surface water allowing the safe passage of vehicles with minimal nuisance;

2. To maximise the longevity of the pavement structure and associated earthworks;

3. To minimise the impact of surface water run-off on the receiving environment.

Designers will need to take into account the following:

- Design guidance particularly the advice in the Design Manual for Roads and Bridges which should not be read in isolation.

- Ensuring you have an outfall, confirming the ownership of the receiving asset and ensuring discussions to understand restrictions and seek consents are held early in the project lifecycle.

- Consider how the drainage system will be maintained – i.e. personnel access, vehicle access for off highway drainage, traffic management and easements.

- Any works within 9m of Environment Agency or IDB infrastructure requires their written consent.

SuDS (Sustainable Drainage Systems) - Highway Authority Position Statement

SuDS encompass a range of techniques for holistically managing surface water runoff on site to reduce the quantity, and increase the quality, of surface water that drains into sewers, generally mimicking natural drainage systems along with enhancing biodiversity and amenity.

SuDS which the Highway Authority are currently willing to adopt, along with their specifications can be found within the *Development Road and Sustainable Drainage Guide* and the *Lincolnshire Development Roads and Sustainable Drainage Design Approach* documents (both linked to above). Other SuDS features may be used with prior agreement of the TSP Drainage Team.

All SuDS shall be inside the highway boundary, or covered by a suitably sized easement that allows access so that they can be maintained

Groundwater

Within Lincolnshire there are areas that experience a very high groundwater table. A full ground investigation and 12 months of groundwater monitoring should take place prior to the proposal of a SuDS scheme on any site that experiences high ground water (<2.0m BGL). The Highway Authority will not accept the use of any SuDS infiltration features that do not have a minimum 1.0m clearance from the lowest underside of the feature to groundwater.

Geo-cellular Storage Structures

The Highway Authority will only accept the use of geo-cellular storage structures where all other, preferable, storage structures have been assessed and can be clearly demonstrated they are not technically or hydraulically feasible. Geo-cellular storage structures must not be placed beneath the carriageway. The TSP Drainage Team is to be consulted on all schemes where geo-cellular storage structures are to be proposed.

Combined Kerb Drainage (CKD)

CKD should be considered as a last-resort due the maintenance implications of these features. Where traditional pipe and gully systems or SuDS can be demonstrated that they are not technically or hydraulically feasible then CKD's may be considered. CKD's should be designed to have adequate self-cleansing velocity and structural integrity for the intended location. on all schemes where CKD's are to be proposed.

Materials

The use of fibreglass or plastic drainage products must be agreed with the Client beforehand. Any proposed drainage products must have a BBA HAPAS certification.