



**SYMMONS  
MADGE**  
ASSOCIATES

# Highways & Transportation

# Asphalt Technology: An Introductory Course for Civil Engineering Construction

The course covers the properties of asphalt and its constituent materials, giving an appreciation of the factors that are essential to the successful production, use and application of asphalt for concrete pavements.

- Define current terminology used in the context of asphalt technology for pavement construction
- Identify the different types of asphalt in accordance with the BS EN 13108 series and the Design Manual for Roads and Bridges Vol 7
- Recognise the performance characteristics of asphalt
- Identify the types of binder and aggregates used in asphalt mix design and how these materials contribute to on-site production methods
- Identify factors that can impact on durability and select appropriate methods to prevent early and long term deterioration
- Appreciate the equipment and methods necessary for the successful placing and compacting of asphalt including preparation practices, treatment of joints and application of surface finishes.
- Understand the principles and application of BS 594987:2015 for transport and delivery, laying, compaction and testing
- Determine the curing period on environmental and production drivers prior to opening to live traffic
- Perform pre and post quality control tests including loose mixtures, density and cores
- Recognise the process for identifying and dealing with non-conforming asphalt
- Identify common asphalt repairs methods



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## Bills of Quantities for Highway Works

This course gives delegates the opportunity to understand how Volume 4 The Manual of Contract Documents for Highway Works operates in order to ensure that bills of quantities are prepared properly so that Contractors make due allowance for including elements of work when tendering and claim those items to which they are contractually entitled in payment statements.

### Session 1: Preamble

The role of the Design Manual for Roads & Bridges and the Manual of Contract Documents for Highway Works. The contents of the current version of the Manual of Contract Documents for Highway Works. Volume 4 in context.

### Session 2: Volume 4 Section 1 The Method of Measurement for Highway Works

How the system works including consideration of General Directions, Itemisation Tables and the importance and applicability of Item Coverage.

### Session 3: Exercise 1 Preparing a list of items required for a Bill of Quantities

### Session 4: Volume 4 Section 2 The Notes for Guidance on the Method of Measurement for Highway Works

The importance of referring to this Section whenever Sections 1 and 3 are used.

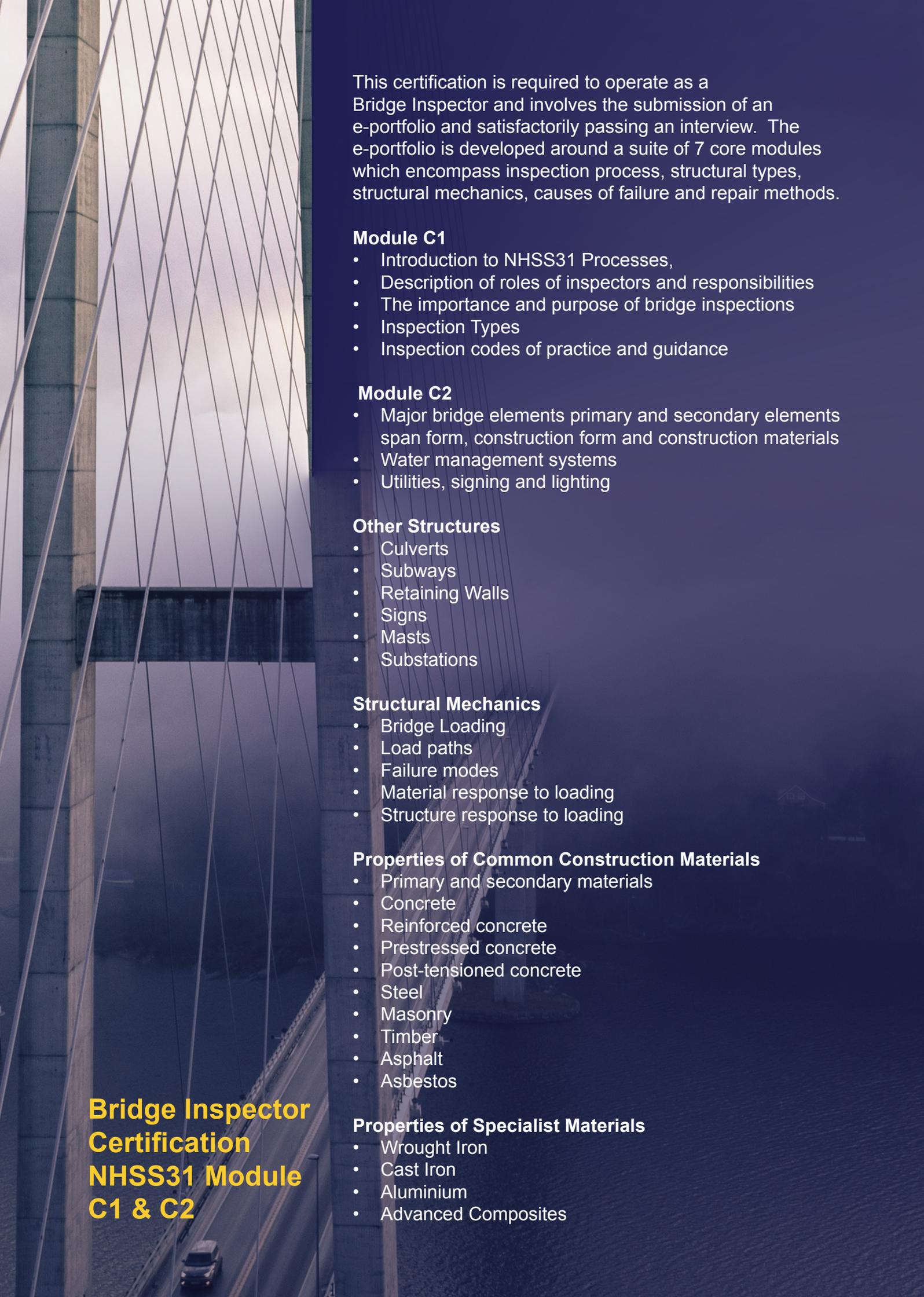
### Session 5: Volume 4 Section 3 The Library of Standard Item Descriptions for Highway Works (LSID)

How to word items properly.

### Session 6: Exercise 2 Preparing a Bill of Quantities

### Session 7: Miscellaneous Exercises Demonstrating various facets of Volume 4

### Session 8: Review and Discussion



This certification is required to operate as a Bridge Inspector and involves the submission of an e-portfolio and satisfactorily passing an interview. The e-portfolio is developed around a suite of 7 core modules which encompass inspection process, structural types, structural mechanics, causes of failure and repair methods.

### **Module C1**

- Introduction to NHSS31 Processes,
- Description of roles of inspectors and responsibilities
- The importance and purpose of bridge inspections
- Inspection Types
- Inspection codes of practice and guidance

### **Module C2**

- Major bridge elements primary and secondary elements span form, construction form and construction materials
- Water management systems
- Utilities, signing and lighting

### **Other Structures**

- Culverts
- Subways
- Retaining Walls
- Signs
- Masts
- Substations

### **Structural Mechanics**

- Bridge Loading
- Load paths
- Failure modes
- Material response to loading
- Structure response to loading

### **Properties of Common Construction Materials**

- Primary and secondary materials
- Concrete
- Reinforced concrete
- Prestressed concrete
- Post-tensioned concrete
- Steel
- Masonry
- Timber
- Asphalt
- Asbestos

### **Properties of Specialist Materials**

- Wrought Iron
- Cast Iron
- Aluminium
- Advanced Composites

**Bridge Inspector  
Certification  
NHSS31 Module  
C1 & C2**

# Bridge Inspector Certification

## NHSS31 Module

### C3

**Module C3** – ‘Inspection Process’ reviews the cradle to grave planning, doing and reporting process of inspections. Most inspectors have a good understanding of these but for the certification process may require refreshing on some of the elements and how to get the best out of their experience for the application

#### **Module C3**

- Scheduling Inspections
- Planning and Preparing for Inspections
- Performing Inspections
- Recording Inspection Findings
- Interpretation of Inspection Findings
- Maintenance Planning process
- Obligations of current Health and Safety Legislation
- Other skills e.g. Traffic Management

# Bridge Inspector Certification

## NHSS31 Module

### C3

**Module C4** – ‘Defects Descriptions and Causes provides a detailed understanding and refreshER of the causes and defects seen in bridge types and materials. This module is considered one of the more challenging in that a Senior Inspector needs to demonstrate ‘Proficiency’ and an Inspector needs to demonstrate ‘Experience’.

#### **Module C4**

- Principal Causes of Defects
- Concrete Defects
- Steel Defects
- Masonry Defects
- Miscellaneous Materials Defects



# Bridge Inspector Certification

## NHSS31 Module

### C5 & C6

**Module C5** – Investigation and Testing provides an understanding of the variety of testing methods available for bridge structures.

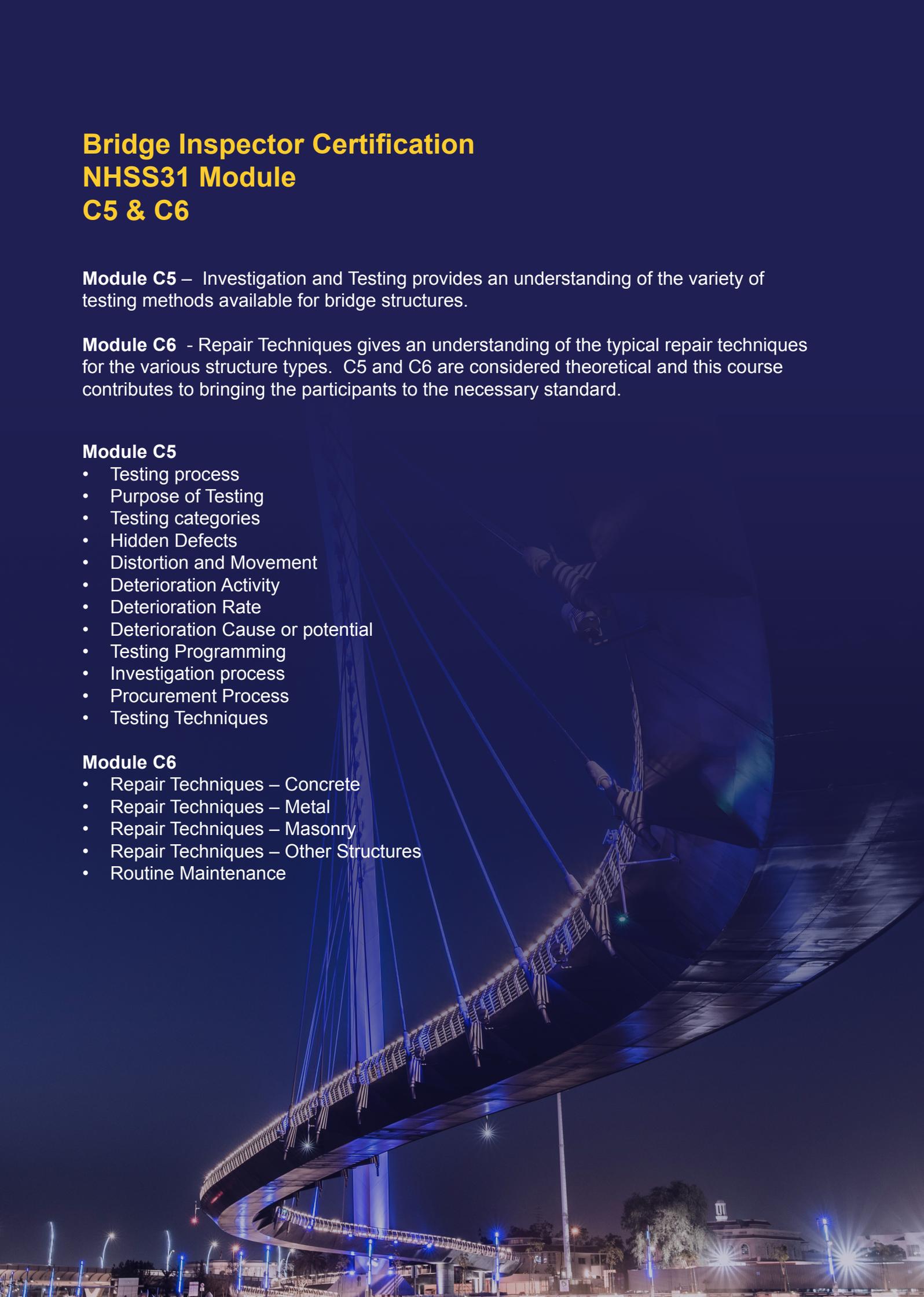
**Module C6** - Repair Techniques gives an understanding of the typical repair techniques for the various structure types. C5 and C6 are considered theoretical and this course contributes to bringing the participants to the necessary standard.

#### Module C5

- Testing process
- Purpose of Testing
- Testing categories
- Hidden Defects
- Distortion and Movement
- Deterioration Activity
- Deterioration Rate
- Deterioration Cause or potential
- Testing Programming
- Investigation process
- Procurement Process
- Testing Techniques

#### Module C6

- Repair Techniques – Concrete
- Repair Techniques – Metal
- Repair Techniques – Masonry
- Repair Techniques – Other Structures
- Routine Maintenance



# Bridges & Highways: The Legal Provisions

Maintenance of highways and highway structures is a continuing liability for a highway authority and the temporary closure of a highway to undertake repairs to a bridge can create delays and inconvenience. This course is designed to meet the needs of those involved with highway structures and will focus on the maintenance responsibility for highways and highway structures.

- The duty to maintain the Highway - Section 41 Highways Act 1980
- Enforcement for an order to repair and the Special Defence
- Powers to Construct bridges and the extent of repair
- Retaining walls
- Construction of structures under and over highways
- Powers of entry
- Regulating Traffic - Temporary Orders
- New Roads and Street Works Act 1991 - Special requirement in certain streets
- Apparatus affected by bridge works
- Section 278 Agreements - Contribution towards highway works by persons deriving special benefit.



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## Collision Investigation & Prevention

- Introduction to the police road traffic personal injury accident data recording system
- Interpreting and understanding accident data
- How to identify common patterns and trends which lead to accident clusters
- Site investigations; what to look for
- The role of Enforcement
- The role of Education
- The role of Engineering
- Devising alternative scheme measures
- Evaluation of the alternatives
- Tutor presentation with Visual Aids
- Individual and Group Exercises
- Discussion
- Open Workshop
- An understanding of the basic principles of Accident Investigation and Prevention



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## Design of Road Signs and Markings - Introduction

Our Design of Road Signs & Markings training course provides an introduction to the various chapters of the Traffic Signs Manual that provide advice on the correct use of signs and road markings which must themselves comply with the mandatory requirements of The Traffic Signs Regulations and General Directions (TSRGD).

This course examines the key aspects of Chapter 3 (Regulatory Signs), Chapter 4 (Warning Signs), Chapter 5 (Road Markings) and Chapter 7 (The Design of Traffic Signs) and the TSRGD in the context of relevant legislation.

### Legal

- Highways Act
- Road Traffic Acts
- Road Traffic Regulation Act
- Traffic Management Act
- Traffic Signs Regulations and General Directions
- Health & Safety at Work etc Act
- CDM Regulations

### Traffic Signs Regulations and General Directions

- Regulations
- Prescribed Signs
- Directions

### Chapter 3 - Regulatory Signs

- STOP and GIVE WAY
- Compulsory and Prohibited Movements
- Waiting and Loading Restrictions
- Parking
- Speed Limits

### Chapter 4 - Warning Signs

- Junctions
- Hazard Warnings
- Low Bridges and Level Crossings

### Chapter 5 - Road Markings

- Junctions
- Centre Lines
- Warning Line
- Edge Lines
- Double Lines
- Hatching

### Chapter 7 - The Design of Traffic Signs

- X-height
- TA 1/94
- Standard Alphabets
- Basic Design Principles
- Direction Signs

# Environmental Impact Assessments of Highway Schemes

This course is aimed at those either new to the development control and planning process or those who need an update on Environmental Impact Assessment(s), (EIAs) which is a fundamental part of the planning process for major schemes.

The course will provide a general understanding of this procedure in the context of the planning process - from feasibility through planning to operation.

- What is it an EIA?
- Why undertake an EIA?
- When is an EIA required?
- How does it fit into the process?
- EIA Legislation/Regulations
- Other Legislation
- Scoping studies
- Impact Types
- Impact significant?
- Mitigation
- Environmental Design
- Environmental Management Plan
- Environmental Commitments Register
- Environmental Impacts and Aspects Register
- Environmental Management Programme
- Environmental Monitoring, Inspection and Audit Register
- Non-Conformance and corrective Action Register
- Accident and Emergency Register



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# Highway Law - Introduction & Advanced Course

This course examines the various ways in which the rights of way over a highway are organised by a highway authority, including the duties of the highway authority, in maintenance as well as discretionary powers of improvement

- Foundations of Highway Law – creation and ownership of highways, determination of highway boundaries and liability of adjacent owners.
- Creation and Adoption of Highways – the private street works and advance payments codes.
- Development and Highways - Agreements under section 278 Highways Act
- Highway Maintenance - Duties in relation to maintenance and repair and defence by highway authority
- Improvement of Highway - General powers, street lighting, tree planting and other amenities
- Lawful and Unlawful Interference - Protection of Public rights, damage and danger and annoyance to users of highways
- Legal Challenge - Issues that will make an authority vulnerable to challenge, Judicial Review
- Obstructions in the Highway – unauthorised signs, advertising boards and other forms of obstruction.
- Extinguishment and Diversion of Highways – powers under the Highways and Planning Acts.
- Highway Structures
- New Roads and Street Works Act 1991 – an overview and update of the act
- Improvement of Highways – general and specific powers of improvement.
- Highway drainage – Powers and Responsibilities.
- Trading on the Highway – the designation of streets for street trading purposes and licences for street cafes and other amenities.
- Legal challenges- local authority decision making process
- TRO'S – Traffic Regulation Orders



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## **Highway Law in Development Management: Introduction**

This course is aimed at those either new to the development management and planning process or those who need an update on various agreements and processes that permit developers to work with the highway authority.

The course will give a general understanding of the agreements, how these are used and the legal framework of why these are used.

- Understand the implications of Section 37's
- Understand S38 Agreements, their use and process
- Have an understanding of legal requirements and case Law
- Have improved knowledge of Section 278 Agreements in line with planning permissions
- Understand Best Practice of section 38 and 278 Agreements
- Know when to use a section 38 or 278 Agreement
- Understand the reasoning of fees and Bonds
- Understand APC Process and building control/ Section 106 Agreements

# Highway Drainage Construction Maintenance

Our Highway Drainage Construction and Maintenance course will provide delegates with an increase and/or update in knowledge of highway drainage systems, their construction and ongoing maintenance and a greater awareness of the effects of climate change and the need for control of storm flows.

- Elements of Surface Water Drainage Systems
- Methods of Controlling/Containing Stormwater Flows (including SUDS features)
- Climate Change and Flood Risk Management
- Specification and Installation of Highway Drainage Systems
- Service Inspections & Maintenance of Highway Drainage Systems



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## Legislation of Lawful & Unlawful Use of Public Highways: An Overview

This course is to provide an overview of the various legislation and the interdependency of various legal requirements for the usage of a highway. This would include the duties of a highway authority, including maintenance, improvements and permitting others to use the highway.

- Protection of public rights – the highway authorities' duties as highway authority
- Highways Act 1980 – Sections 184 and 278
- Highways Act 1980 – Section 4 and 6
- Obstruction, damage, deposits, danger and materials left on the highway by third parties
- Building operations and the effect these have on the highway
- Temporary measures for works in the highway
- NRSWA Section 50
- CDM Regulations and the effect of working in the highway
- Trading the highway
- Traffic Management Act – Permits

# Maintaining Road Surfaces in Times of Financial Restraint

This course considers and contrasts the economics of piecemeal reactive repairs versus timely and pro-active intervention to maintain sound weather proof road surfaces.

The content addresses the natural and man-made causes of deterioration of road surfaces and provides current information and appraisal of maintenance technology for asphaltic surfacing courses, to achieve safe and durable road surfaces, within the discipline of Asset Management.

- The Statutory Duty of Care for Public Highways
- Asset Management & Maintenance Objectives & Standards
- Types & Causes of Pavement Defect
- Maintenance of Pavement Surfacing:
  - Anti-skid treatments for Safety
  - Sealing of Pavement Surfaces: Surface Dressing & Slurrysealing
  - Sealing and minor regulation of Pavement Surfaces
  - Thin Surfacing & Asphaltic Overlays
  - Bitumen Binders, Asphalt Reinforcement and SAMI's
  - Overview of Recycling options for Asphaltic Surfaces



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# Managing Highways Maintenance: An Introduction

This is a course for those with a technical/supervisory background but little or no experience of the management of highways maintenance. It provides a basic overview of the process and sets it in a day-to-day context.

## Legal

- What is a highway and determining its extent
- Legislative framework – the Highways Act 1980, Road Traffic Regulations, etc
- Limitations on ability to act
- Differences between duties and powers

## Political

- Different highway authorities
- Role of elected members
- Public pressure on elected members and those performing the highways maintenance function
- Highway authority policies

## Financial

- Public funding
- Annual budgets
- Financial pressures
- Maintenance backlogs

## Functional

- Who undertakes different elements of the process
- Geography v. function
- Common contractual arrangements eg PFI, direct labour/in house staff, contractors, consultants, etc
- Common functional splits eg bridges, street lights, traffic signals, roads, etc
- Public interface

## Technical

- Why highway maintenance is carried out
- Inspections and the section 58 defence
- When highway maintenance is carried out
- Difference between cyclic, reactive and planned maintenance
- Snow and ice
- Emergency works and working with other agencies



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## **Manual for Streets: Overview of the Design Document**

This course is aimed at those either new to the development control and planning process or those who need an update on this new document - particularly as it now forms a fundamental part of the planning process.

The course will give a general understanding of this document in the context of the planning process, urban design and regeneration.

- Streets in Context - Introduction
- The design process
- Layout and Connectivity
- Quality
- Street Users Needs
- Street Geometry
- Parking
- Traffic Signing
- Street Furniture
- Materials
- Adoption and Maintenance
- The document in the regeneration and urban design process
- Worked examples and exercises

# Manual of Contract Documents for Highway Works

The Manual of Contract Documents for Highway Works is used for the preparation of the majority of UK highway construction contracts (both new works and maintenance). The current version is suitable for use with a variety of Forms of Contract. This course considers the content of the Manual highlighting key elements of the suite to delegates acting on behalf of either the Employer or the Contractor.

## Session 1 - Introduction

- Trunk Roads and Trunk Road standards.
- The uses of the Manual of Contract
- Documents for Highway Works.
- How the system fits together.

## Session 2 - History

- How the Manual of Contract Documents for Highway Works was derived and the various forms it has taken since its inception.

## Session 3 - Outline of the Component Parts.

- Indication of function of each and their inter-relationship.

## Session 4 - Volume 0

- Model Contract Document for Major Works and Implementation Requirements.

## Session 5 - Volume 1 - Specification for Highway Works and Volume 2 - Notes for Guidance on the Specification for Highway Works.

- How they operate with examples of Numbered Appendices.

## Session 6 - Volume 3/3A - Highway Construction Details.

## Session 7 - Volume 4 - Bill of Quantities for Highway Works.

- How rates are compiled and the importance of Item Coverages.

## Session 8 - Volume 5 - Specialist Activities.

## Session 9 - Volume 6 - Departmental Standards and Advice Notes on Contract Documentation and Site Supervision.

## Session 10 - Preparing contracts using the MCHW.

- The elements that combine to produce a contract based on the MCHW. The order in which these elements should appear in such contracts.

## Session 11 - Layout of a typical contract based on the MCHW & NEC3

- The key elements of a highway contract compiled using the MCHW and based on the use of NEC3 as the Form of Contract.

## Session 12 - Review and Discussion



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## **Measurement of Highway Works - Earthworks**

This course addresses matters regarding the classification and measurement of earthworks materials under the Highways Method of Measurement.

### **Classification**

- Why classify the materials?
- Who classifies the material?
- Rules for the classification of material

### **Measurement**

- Weighting of levels
- Bulking of materials
- Hard excavation

### **Method of Measurement for Highway Works**

- The Earthworks Outline
- Itemisation
- Interface with Site Clearance and Demolition
- Relationship between excavation, deposition and importation of materials
- Processing of materials

### **Other Matters**

- Settlement of Embankments
- The Earthworks Table
- Mass Haul Diagrams
- Record keeping

# New Roads & Streetworks Act 1991 & Traffic Management Act TMA 2004

NRSWA requires authorities to coordinate their own works, and those of the utilities carried out on their streets. The Act also requires utilities to cooperate in that process. The TMA imposes a network management duty on authorities to manage their networks to keep traffic moving. This duty includes the coordination of activities. It requires cooperation across the authority and with other affected authorities. This course examines the relevant aspects of the legislation and associated regulations, codes of practice and general guidance.

## Legal

- The New Roads and Street Works Act 1991
- The Traffic Management Act 2004
- The Street Works various regulations
- Codes of Practice

## Notices and co-ordination

- Notice procedure
- Permits
- Co-ordination - the Code
- Records
- Special situations

## Execution of Works

- Managing the network
- Signing and Guarding
- Qualifications of Supervisors and Operatives
- Excavation and Reinstatement
- The Specification
- Performance requirements

## Inspections

- The Code
- Types of Inspection
- Reports
- Notifications
- Inadequacies in Signing Lighting and Guarding
- Financial arrangements

## Diversions Works

- Principles
- Procedure
- Financial arrangements

## Enforcement

- Offences



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## **Practical Highway Design: An Introduction**

Our Practical Highway Design course provides an introduction to the design of highways using the Design Manual for Roads and Bridges (DMRB). Use of the design standards within the manual is mandatory for motorways and trunk roads and forms the basis of design for many other classes of roads.

### **Session 1**

Introduction to the DMRB with particular reference to Volume 5- Assessment and Preparation of Road Schemes, Volume 6-Road Geometry and reference to Volume 7-Pavement Design

### **Session 2**

Highway capacity - Link Capacity and junction capacity

### **Session 3**

Highway Geometry - Highway link design. The geometry of junctions

### **Session 4**

The road in cross section - highway details, headroom and clearance

### **Session 5**

Elements of drainage

### **Session 6**

Workshop



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## **Safety at Streetworks & Road Works**

This course is a review of the code of practice and is intended for those to safely carry out signing, lighting and guarding of street works and road works on all highways and roads, except motorways and dual carriageways with a speed limit of 50mph or more

- Review of the recent Code of Practice
- Legal understanding of the Code of Practice
- Responsibilities of designer, supervisor, manager and operatives on site
- Types of road works
- Setting out road works
- Pedestrian safety
- Traffic control measures on site

# Street Lighting Design: An Introduction

This one day course will introduce delegates to the principles of street lighting design. Its aim is to give them an understanding of current practice and the conditions and criteria that

- Vision and how drivers and pedestrians see at night
- Lamp types and LEDs used for street lighting
- Basic lighting units and intensity distributions
- Basic electrical units, cables, control gear and electrical safety
- Europe and British legislation related to street lighting
- Classification of roads and classes of lighting
- Lighting software
- Assessing if road lighting needs upgrading



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# Traffic Data Collection, Analysis & Validation

- Introductions and rapport building
- Overview of course
- Presentation: "Why do we collect traffic data?"
- Background/history
- Basic principles
- Advantages and disadvantages of collection methods
- Presentation: "Types of survey"
- Human observation
- Video recording
- Sensor output recording
- Questionnaire surveys
- Practical: in pairs, discuss and select best way to survey in a number of scenarios; full group discuss of solutions
- Presentation: Planning surveys
- Defining what is needed
- Balancing data accuracy and scope against value-for-money
- Preparing a brief
- Do-it-yourself or commission subcontractors?
- Pre-survey preparation
- Practical: small groups - prepare a survey brief; full group discussion of briefs
- Presentation: Carrying out surveys
- Practical: individual - analysing movements from video; full group - comparing results
- Presentation: Checking and validating survey output
- Practical: individual - reviewing example survey results for inconsistencies and errors; full group - discussion of results
- Workshop - open discussion with tutors responding to delegate questions



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## Traffic Signs Manual Chapter 8

Our Traffic Signs Manual Chapter 8 course examines the key aspects of the two parts of Chapter 8 and other related guidance - in the context of relevant legislation and guidance on how to plan temporary traffic management to create a safe working environment for workers, and to reduce risks to drivers and to vulnerable road users such as pedestrians and cyclists, plus to increase awareness of the principles of Chapter 8 of the Traffic Signs Manual and of individual's responsibilities in relation to this guidance document

### Legal

- Highways Act
- Road Traffic Acts
- Road Traffic Regulation Act
- Traffic Management Act
- Traffic Signs Regulations and General Directions
- Health & Safety at Work etc Act
- CDM Regulations
- EC Directives, Regulations, Guidance and ACoPs
- Risk Assessment and Method Statements

### Chapter 8 and Red Book

- Parts 1 & 2, and Part 3 (electronic copy only)
- Responsibilities
- Standard Works and Relaxations
- Design parameters
- Safety clearance
- Barriers
- Single carriageways
- Single vehicle works
- Traffic control
- Pedestrians
- Road closure
- Transitions
- Dual carriageway roads
- The five zones
- Hard shoulders
- IPV
- Mobile Lane Closures

### Sector Schemes Working Safely



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## **Various Types of Pavement Design**

Our Various Types Of Pavement Design course will enable you to understand the best practices being used and new techniques available in pavement design plus what type to use, the various types of pavement design available on different networks, the requirements of traffic data and the impact of The Design Manual for Roads and Bridges

### **Session 1 Introduction**

The function of Volume 7 and its relationship to the other parts of the DMRB.

Explanation of its constitution.

### **Session 2 Traffic Volumes**

Requirements of traffic data

### **Session 3 Foundations and structural layers**

Discussion of pavement design on various networks

### **Session 4 Pavement Design**

What type of design to use

### **Session 5 Choice of Surface Course**

HRA, SMA, 10mm SC

### **Session 6 Other types of pavement design**

Best practices being used and new techniques



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