



Design, Construction and Maintenance of Highway Drainage Systems

Overview

The increasing frequency of flooding and a growing awareness of the effects of climate change are drivers towards a greater recognition of the importance of effective surface water drainage systems.

This two day course aims to provide up-to-date information on current practice concerning design, construction and maintenance of highway drainage systems. Legislation with particular reference to the Flood & Water Management Act 2010 together with design and construction standards, appropriate materials and innovative solutions will be covered, focusing on achieving effective and maintainable drainage systems. Due emphasis is given to environmental aspects arising from climate change, the provision of Sustainable Urban Drainage Systems (SuDS) and mitigation of flood risk. The course is presented by recognised experts in their field, who have extensive experience in the highways industry.

Learning Outcomes

On completion of this course, delegates will have:

- A working knowledge of the various design and construction approaches to the provision of effective highway surface and subsoil drainage.
- An awareness and understanding of the wide range of drainage options, their appropriateness and cost effective application.
- An awareness of current Environment Agency guidance concerning control of pollution and promotion of Sustainable Urban Drainage Systems (SUDS).
- Be familiar with current legislation and approaches to climate change and flood risk management.

Who Should Attend?

This course will prove to be invaluable to:

- Graduates and technicians newly involved in road design and construction.
- Experienced staff converting from a role in road construction to highway maintenance management.

Programme*

Day 1 Highway Drainage: Function, Conservation & Design

- 09:45 **The need for Highway Drainage**
Introduction & definitions; Effects of water on the highway; Categories of drainage; Legal & environmental aspects of drainage
- 10:30 **Surface Water Drainage**
Positive and non-positive systems; Specification and layout of drainage systems; Road gully location and spacing; Options for hydraulic design
- 11:00 **Break**
- 11:15 **Manual calculation of Surface Water run-off**
- 12:45 **Lunch**
- 13:30 **Pipe capacity-gradient and flow**
Example calculations & Tutorial
- 15:15 **Break**
- 15:30 **Environment Agency Requirements and Advice**
Water Conservation Policy; Prevention of Pollution; Best Management Practice (BMP); Sustainable Urban Drainage Systems (SUDS)
- 17:00 **Close Day 1**

Day 2 Flood Risk Management, Subsoil Drainage, Specification & Construction & Maintenance

- 09:00 **Climate Change & Flood Risk Management**
Anticipated impact of Climate Change; Planning Policy Statement 25 (PPS25); Overview of Designing for Exceedance (CIRIAC635); Flood and Water Management Act 2010
- 09:45 **Computer Programmes for Drainage Design**
Overview; Flows in culverts
- 10:15 **Break**
- 10:30 **Outfalls, Retention & Soakaways**
- 11:15 **Specification & Installation of Highway Drainage Systems**
Bedding & protection of pipes; Organisation - Safety First!; Summary of laying specification; Backfilling & testing of drains; Typical Specification & Construction Details; Drainage channels - open and closed; Combined Kerb/Drain; Scope for Innovation; Open Discussion : Urban Drainage Details
- 12:45 **Break**
- 13:30 **Subsoil Drainage**
Permeability of soils; Function of Subsoil drainage; Subsoil drainage structures; Geotextiles in subsoil drainage
- 14:30 **Design of Subsoil Drainage**
- 15:30 **Break**
- 15:45 **Maintenance of Drainage Systems**
- 16:30 **Conclusion & Evaluation of Course**
- 16:45 **Close Day 2**

*Please note that this is a preliminary programme and is subject to change

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Date of course and location		
Title	Forename	Surname
Position		
Department		
Organisation		
Address		
		Postcode
Telephone		
Email		
Please state any special dietary or access requirements		
How did you hear about this course?		

Attendance Fees

Please tick as appropriate:

- Standard rate** Fee (please write in amount) _____ + VAT
- CILT/Local Authority/Charity rate** Fee (please write in amount) _____ + VAT

Method of Payment

Card No.

Expiry Date	CSV Code	Cardholder's Name
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Cardholder's Address

Postcode

Invoice Purchase Order Number

Invoice address (if different from delegate address listed above or the attached PO)

Please attach a copy of your purchase order made payable to PTRC

Telephone

Email

Cheque enclosed for £ _____ made payable to PTRC

Signature of Authorisation

I have read and accept the terms and conditions

Signature _____ Date _____

Name _____

Barclays PLC. Sort Code: 20-45-77 Account No: 50536466

Please return to: The Events Team, PTRC Education & Research Services Ltd, 22 Greencoat Place, London, SW1P 1PR
T: 020 7348 1970 F: 020 7348 1989 E: info@ptrc-training.co.uk

Terms and Conditions

1 Registration Form

Applications should be made on the official registration form. Photocopies are accepted. One form should be completed for each delegate attending an event. It is important that all sections are completed legibly. Delegates are advised to retain a copy of the registration form for reference before sending.

2 Fees

Fees include attendance at lectures, lecture notes, lunch and all refreshments unless otherwise indicated.

Fees do not include overnight accommodation, breakfast and evening meals unless stated or otherwise indicated.

3 Acknowledgement

Receipt of a registration form will be acknowledged by email, delegates will be sent an invoice and an email of acknowledgement. Joining instructions, including a map, will be sent to each delegate by email approximately two weeks before the start of the event.

4 Payment

Unless otherwise stated payment in full must be made at the time of booking. All prices are exclusive of VAT, unless stated otherwise.

5 Cancellation

All cancellations, or alterations to a booking, must be received in writing. To avoid cancellation penalties, substitutes will be accepted at any time, if notified in writing and in advance of the event. Adjustments in fees will be made if there is any change in fee category. Cancellations received in writing up to 14 days before an event will be subject to an administration fee of £75 + VAT or the event delegate fee, whichever is the lower. Cancellation within 14 days of the event date or a 'no show', will be liable for the full fee.

6 Disclaimer

PTRC reserves the right to vary the programme and to cancel an event if it is under subscribed or for any other reason. In the event of cancellation, where reasonably possible, PTRC aims to give delegates at least two weeks' notice and the fee will be refunded in full. PTRC will not be held liable for any pre-booked travel, accommodation or similar costs incurred under any circumstances whatsoever.

7 Data Protection

Details will be held on a database in accordance with the 1998 Data Protection Act. Information will be used for internal marketing purposes only and will not be shared with any external organisations.

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