Highway Drainage Design Training Course

Professional Development Training Course Outline

Category	Construction Institute	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

Highway Drainage Design Training Course equips engineers, consultants, contractors, and infrastructure professionals with practical knowledge of highway hydrology, hydraulic design, flood risk management, drainage network optimization, and green infrastructure technologies. Participants will learn modern approaches aligned with smart mobility, nature-based solutions, digital engineering workflows, and resilient infrastructure development to design efficient drainage systems that improve road safety, reduce maintenance costs, and enhance long-term highway performance.

With increasing challenges from extreme weather events, urban flooding, climate change impacts, and rapid infrastructure expansion, effective highway drainage design has become a critical engineering priority. This training combines theoretical concepts, industry best practices, design standards, software applications, and real-world case studies to develop advanced capabilities in surface water management, culvert design, stormwater modeling, erosion control, and sustainable drainage systems (SuDS). The course prepares professionals to deliver innovative and cost-effective drainage solutions for modern transportation networks.

Programme Curriculum

Highway Drainage Design Training Course

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Course Objectives

By the end of the **Highway Drainage Design Training Course**, participants will be able to:

1. Understand advanced principles of highway hydrology and stormwater management.
2. Apply modern drainage design methodologies for highways and transportation corridors.
3. Develop climate-resilient drainage solutions using adaptive infrastructure strategies.
4. Analyze rainfall data using hydrological modeling and forecasting techniques.
5. Design efficient surface drainage systems, subsurface drainage, and roadside channels.
6. Perform hydraulic calculations for culverts, bridges, pipes, and drainage structures.
7. Apply sustainable drainage systems (SuDS) and green infrastructure concepts.
8. Use advanced drainage design software and digital engineering tools.
9. Evaluate flood risks through hydraulic simulation and risk assessment models.
10. Integrate GIS-based drainage mapping and geospatial analysis into highway projects.
11. Develop erosion protection and stormwater pollution control strategies.
12. Improve highway safety through effective water management and pavement protection.
13. Implement global best practices for smart, sustainable, and resilient transportation infrastructure.

Target Audience

1. Highway and transportation engineers
2. Civil and infrastructure design engineers
3. Road construction project managers
4. Municipal and government infrastructure professionals
5. Drainage and stormwater management specialists
6. Consulting engineers and engineering firms
7. Environmental and sustainability professionals
8. Contractors and infrastructure development organizations

Course Modules

Module 1: Fundamentals of Highway Drainage Engineering

- Principles of highway drainage systems and infrastructure planning
- Importance of drainage in road durability and transportation safety
- Types of highway drainage systems: surface, subsurface, and cross drainage
- Overview of international drainage standards and design guidelines
- Introduction to climate-resilient highway infrastructure
- Case Study: Analysis of highway drainage failures caused by inadequate stormwater planning and lessons learned from major road rehabilitation projects.

Module 2: Highway Hydrology and Rainfall Analysis

- Rainfall characteristics and hydrological data analysis
- Design storms, intensity-duration-frequency (IDF) curves, and rainfall modeling
- Catchment analysis and runoff estimation techniques
- Flood frequency analysis and extreme weather assessment
- Application of climate change projections in drainage design
- Case Study: Hydrological assessment of a flood-prone highway corridor and development of improved drainage capacity solutions.

Module 3: Surface Drainage Design

- Design of roadside drains, gutters, and channels
- Open channel flow calculations and hydraulic principles
- Highway crossfall and surface water management
- Drainage layout optimization for road safety
- Erosion prevention and slope protection techniques
- **Case Study:** Redesign of a highway surface drainage system to reduce flooding and pavement deterioration.

Module 4: Culvert and Cross Drainage Design

- Culvert types, selection criteria, and design approaches
- Hydraulic analysis of pipe, box, and arch culverts
- Inlet and outlet structure design
- Scour protection and energy dissipation methods
- Construction considerations and maintenance planning
- **Case Study:** Design review of highway culverts after extreme rainfall events and recommendations for improved resilience.

Module 5: Stormwater Management and Sustainable Drainage Systems

- Principles of **Sustainable Drainage Systems (SuDS)**
- Green infrastructure and nature-based drainage solutions
- Detention ponds, infiltration systems, and retention structures
- Stormwater quality improvement strategies
- Low-impact development (LID) approaches
- **Case Study:** Implementation of sustainable stormwater solutions for an urban expressway project.

Module 6: Drainage Design Software and Digital Engineering

- Introduction to hydraulic modeling software applications
- GIS-based drainage analysis and mapping
- Digital terrain models (DTM) for drainage planning
- Integration of BIM and infrastructure design workflows
- Automated drainage design optimization techniques
- **Case Study:** Use of digital modeling tools to optimize drainage networks for a major highway expansion project.

Module 7: Flood Risk Assessment and Climate Resilience

- Highway flood vulnerability assessment

- Hydraulic modeling and flood simulation techniques
- Designing for extreme rainfall and future climate scenarios
- Emergency drainage planning and disaster mitigation
- Resilient infrastructure strategies
- **Case Study:** Climate adaptation strategies developed for highways exposed to increasing flood risks.

Module 8: Highway Drainage Construction, Maintenance, and Best Practices

- Drainage construction quality control
- Inspection and maintenance strategies
- Common drainage failures and corrective measures
- Asset management approaches for drainage networks
- International highway drainage best practices
- **Case Study:** Evaluation of drainage maintenance programs that improved highway operational performance.

Training Methodology

This course employs a participatory and hands-on approach to ensure practical learning, including:

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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