
Road Design Training Course: Alignment, Junctions, Drainage and Safety Review

3 – 7 May 2027
New York





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Programme Summary

Road design is the subject of this one-week training course for road programme managers, client-side highway engineers and transport authority leads at managerial level, ending in a design review file for one road scheme. Designs reach client teams as drawing packages, yet reviewers often lack a shared way to test speed, alignment, junctions and drainage against safety and cost. The programme moves from design speed and cross-section to alignment, junctions, drainage and road safety audit, using cases from urban arterials, rural highways and interchange upgrades. Mars Training Centre UK delivers this programme on road design to mixed-organisation cohorts.

The Business Case

A road scheme locks in its geometry for decades, so a weak decision at design stage is repaid in crashes, flooding, rework and land cost long after opening. Reviewers unable to read the trade-offs between speed, safety and land take tend to approve on the consultant's word. A common review method lets leaders challenge assumptions early, while changes are still cheap.

- Redesign Rework: Falls as design assumptions are tested before the package is approved.
- Crash and Flooding Exposure: Reduces as junctions, sight distance and drainage are checked against recorded criteria.
- Land Cost: Becomes easier to control as alternatives are compared on one basis.

Principles and Evidence Base

- AASHTO A Policy on Geometric Design of Highways and Streets: Provides an international reference for design speed, alignment and cross-section, applied in Sessions 1, 2 and 3.
- Design Manual for Roads and Bridges, CD 123: Sets out the geometric design of at-grade priority and signal-controlled junctions, applied in Session 3.
- Road Safety Audit Principles: Frame independent review of a design for crash risk by stage, applied in Sessions 4 and 5.

Intended Participants

- Road programme managers who approve design packages.
- Client-side highway engineers who review consultant drawings and calculations.
- Transport authority leaders who set design criteria for their network.
- Consultancy leads who defend design choices to a client panel.
- Asset and safety managers who inherit the finished road.



Typical settings include transport authorities, municipal works departments, engineering consultancies and infrastructure developers.

Learning Outcomes

1. Participants will be able to evaluate a design speed choice against road function, context and cost.
2. Participants will be able to diagnose weaknesses in horizontal and vertical alignment and sight distance.
3. Participants will be able to compare cross-section options for capacity, safety and land take.
4. Participants will be able to assess a junction layout and justify the form chosen.
5. Participants will be able to appraise drainage arrangements for the risk of standing water.
6. Participants will be able to justify a design review file that records findings and decisions for one road scheme.

Programme Structure

Day 1: Road Design Principles and Design Speed

What does a road need to do, and what speed should its geometry support?

- Road Function Classification
- Design Speed Selection Table
- Stopping Sight Distance Check
- Design Criteria Register
- Design Brief Review Sheet

Day 2: Horizontal and Vertical Alignment

Does the alignment fit the design speed, the terrain and the driver?

- Horizontal Curve and Superelevation Review
- Transition and Widening Check
- Vertical Curve and Gradient Review
- Coordination of Horizontal and Vertical Alignment
- Alignment Defect Log

Day 3: Cross-Section and Junction Design

Which cross-section and junction form suit the traffic and the land available?

- Lane and Median Width Comparison
- Cross-Section Option Matrix
- Priority and Signal-Controlled Junction Layout Review
- Visibility and Turning Path Check
- Roundabout and Interchange Option Screen



Day 4: Drainage and Road Safety Audit

Where can water and crash risk hide in a design package?

- Surface Water Runoff and Gutter Check
- Culvert and Outfall Review
- Crash Risk Pattern Review
- Road Safety Audit Stage Plan
- Vulnerable Road User Provision Check

Day 5: Design Review File for One Road Scheme

Do the earlier records support one defensible decision on the package?

- Applying the Session 1 Design Criteria Register
- Testing the Session 2 Alignment Defect Log
- Reviewing the Session 3 Cross-Section Option Matrix
- Checking the Session 4 Audit Stage Plan
- Completing the Design Review File

Methodology

The programme uses a field-style design audit built on one prepared road scheme with plans, longitudinal sections, junction layouts and drainage sketches. Participants review the package against stated criteria, record each finding in a common format, then apply the same sheets to a scheme from their own network.

- Suggested activity: Challenging a design speed choice on a rural highway upgrade.
- Suggested activity: Comparing two junction forms for an urban arterial on safety and land take.
- Suggested activity: Reviewing a drainage layout for low points where water collects.

Capstone Output

Each participant completes a design review file for one road scheme. It holds the design criteria register, an alignment and cross-section assessment, a junction and drainage review, a safety audit stage plan and a decision record for each finding. The file is used at work to brief management and return comments to the consultant.

Frequently Asked Questions

Is road design training suitable for managers who are not highway designers?

Yes. Road design is taught through a worked scheme. It assumes experience in roads, infrastructure delivery or engineering review, but not design software skills.



Which references does road design training rest on?

Road design training rests on the AASHTO policy on geometric design of highways and streets, the Design Manual for Roads and Bridges CD 123 for junctions, and road safety audit principles.

How is the review file from road design training used at work?

You use the design review file to brief management, return structured comments to the consultant, and agree changes before a package is approved.

How does road design differ from pavement design training?

Road design covers geometry, junctions, drainage and safety of the whole scheme, while pavement design training concentrates on the structural layers that carry the traffic load.