

Unit 16: Plan and Design Transport System Solutions

Unit code:	R/504/4376
QCF level:	6
Credit value:	15

Aim

The aim of this unit is for learners to gain an understanding of the client's needs to produce transport solutions. Learners will gain skills to collect, analyse and use transportation survey data in conjunction with legislation and policies to produce conceptual sustainable transport solutions.

Unit abstract

This unit brings together the relevant transportation policies and legislation that underline sustainable transport solutions. It focuses on the capital costs and the initial collection of transportation survey data and how that information is used to design conceptual transport solutions. Learners will create a sustainable transport design that is built on the transportation survey data and incorporates sustainable strategies. Learners will develop their understanding of environmental and social impact assessments. Learners will also consider the design's lifecycle, which includes maintenance issues.

Learning outcomes

On successful completion of this unit a learner will:

- 1 Understand the client's transport needs to produce transport solutions
- 2 Be able to assess transport survey data in sustainable transport solutions
- 3 Be able to produce concept solutions that are socially and environmentally viable
- 4 Be able to determine the effectiveness of the transport solutions' lifecycle.

Unit content

1 Understand the client's transport needs to produce transport solutions

Policy and administrative framework: government policy and legislation, e.g. Town and Country Planning Act (2011); funding implications facing councils and the Government; public and political engagement Department for Transport advice on Local Sustainable Transport, e.g. resource library for local authorities

Capital costs: pre-construction costs (planning, design); construction costs; post-construction costs (maintenance programmes); sources of capital funding

Monitoring and reviewing: reviewing and evaluating solution against needs; highlighting areas for future development

2 Be able to assess transport survey data in sustainable transport solutions

Data analysis: collection of reliable data; review of trip generation and distribution data; evaluation of results (highlighting key results)

Viability of solution: identify key design requirements; highlighting aspects that need further data gathering; creation of specification; realistic timeframe established; health impact assessment; quality assurance plan

Strategies for prediction: methods used to identify factors that shape current and future demand, pressures and constraints on the network, transportation surveys; demand-led approaches; modelling

3 Be able to produce concept solutions that are socially and environmentally viable

Concept solution: road network drawings; embankment gradient calculations; bridges and viaducts locations; earthwork calculations; identification of road links with existing systems; aesthetic considerations; severance considerations (community); property acquisition considerations

Production techniques: review of specific road networks; construction procedures; materials; flood impact assessment; effects on community; ethics; accountability

Social and environmental strategies: social, e.g. economic, lifestyle; environmental (natural, built, biodiversity, sustainable communities) setting out targets and performance measurement techniques

4 Be able to determine the effectiveness of the transport solutions' lifecycle

Maintenance programme: cost (replacement and depreciation); materials utilisation; links to corporate strategies; service delivery mechanisms; principles of best value; continuous improvement strategies; quality assurance plan; health and safety considerations

Sustainable assets: asset management; risk management; environmental management

Project lifecycle evaluation: overall project programme; financial budgeting and planning

Learning outcomes and assessment criteria

Learning outcomes On successful completion of this unit a learner will:	Assessment criteria for pass The learner can:
LO1 Understand the client's transport needs to produce transport solutions	1.1 Assess the requirements of the design policy and administrative framework in relation to a proposed transportation solution 1.2 Analyse the capital costs for a proposed transportation solution 1.3 Critically evaluate the transportation solution against the client's needs
LO2 Be able to assess transport survey data in sustainable transport solutions	2.1 Analyse transportation survey data to inform a transportation solution 2.2 Use transportation survey data to assess the viability of a sustainable transportation solution 2.3 Critically evaluate the strategies used to predict factors affecting the proposed transportation solution
LO3 Be able to produce concept solutions that are socially and environmentally viable	3.1 Produce a concept solution incorporating a viable environmental and social impact assessment 3.2 Determine the production techniques for the concept solution 3.3 Evaluate the implementation of an environmental strategy in a transport solution
LO4 Be able to determine the effectiveness of the transport solutions' lifecycle	4.1 Analyse the maintenance programme of the transport solution 4.2 Evaluate the transport solution in terms of the use of best value sustainable assets 4.3 Assess the effectiveness of the design and construction of the transport solution to manage its project lifecycle

Guidance

Links to National Occupational Standards, other BTEC units, other BTEC qualifications and other relevant units and qualifications

The learning outcomes associated with this unit are closely linked with:

Level 4	Level 5	Level 6
		Unit 6: Civil Engineering Design (D/504/4347) Unit 15: Design and Build Highways (D/504/4364) Unit 19: Managing Resources for Project Work (Y/504/4380) Unit 21: Project Management in Construction (A/504/4386)

This unit has been informed by the following National Occupational Standards:

- COSBED4C01 Develop design team programmes and working methods P2, P3, K2, K3, K8
- COSBED4C02 Develop and advise on design recommendations P1, P2, P3, P4, P5, P6, K1, K2, K3, K4, K5, K6
- COSCCOL4O05 Plan measured surveys P1, P2, P20, K1, K4, K35
- COSCCOL4O08 Develop and agree project designs P11, P13, P20, K8, K11
- COSTTML4C01 Develop transportation project brief P1, P2, P3, P4, P12, K3, K4
- COSTTML4C02 Manage transportation project to completion P4, P7, K1, K2, K3, K9, K10, K12
- COSTTML4C04 Undertake transportation health and safety risk management P2, P3, K2, K3.

Essential requirements

Appropriate national and local design standards, IT facilities and design and modelling computer software may be necessary for demonstration purposes.

Delivery

Case studies should be used extensively to develop a working knowledge of practice within the industry. The unit might usefully include the production of sketches and drawings (manually or using computer-aided design) to enhance the knowledge gained. Learners will usually work individually and should be encouraged to provide oral presentations to discuss and justify their work. Consideration must be given to sustainable methods and environmental issues in the selection and execution of solutions.

Design and implementation solutions must comply with health and safety and welfare legislation and practice. Particular attention should be given to the implications that the site investigation and solution design have for the safety of the project. The use of visiting speakers is encouraged given the specialist nature of this unit.

Assessment

In order to pass this unit the learner must achieve all the criteria. A mixture of assessment types would be appropriate. There should be some practical-based assessment, where learners are required to demonstrate the ability to collect reliable transportation survey data to use to create conceptual transportation designs. There should also be some practical-based assessment where learners are required to create transportation solutions and the methodology of how the project is to be delivered and maintained.

Resources

Books

Bell M G H and Lida Y – *Transportation Network Analysis* (Wiley, 1997)
ISBN 978-0471964933

Catling I – *Advanced Technology for Road Transport: IVHS and ATT*
(Artech House, 1994) ISBN 978-0890066133

Daganzo C F – *Fundamentals of Transportation and Traffic Operations*
(Pergamon, 1997) ISBN 978-0080427850

Edwards B – *Sustainability and the Design of Transport Interchanges*
(Routledge, 2011) ISBN 978 0415464499

Hensher D A and Button K J – *Handbook of Transport and the Environment*
(Handbooks in Transport, Volume 4) (Elsevier Science, 2003)
ISBN 978-0080441030

O'Flaherty C – *Highways: The Location, Design, Construction and Maintenance
of Road Pavements* (Butterworth-Heinemann, 2001) ISBN 978-0750650908

Washington S P, Karlaftis M G and Mannering F L – *Statistical and Econometric
Methods for Transportation Data Analysis* (Chapman and Hall/CRC, 2010)
ISBN 978-1420082852

Wonnacott T H and Wonnacott R J – *Introductory Statistics* (Wiley, 1990)
ISBN 978 0471615187

Websites

www.ciht.org.uk	The Chartered Institution of Highways and Transportation
www.data.gov.uk	Government data
www.dft.gov.uk	Department for Transport
www.highways.gov.uk	Highways Agency
www.ice.org.uk	Institution of Civil Engineers
www.legislation.gov.uk/ukxi/2011/1824/ contents/made	The National Archive: The Town and Country Planning (Environmental Impact Assessment) Regulations 2011
www.statistics.gov.uk	UK National Statistics: Publication Hub
www.tps.org.uk	Transport Planning Society