

COSBEDMC03 - SQA Unit Code FM6L 04

Develop and agree detailed design information in built environment design management



Overview

This unit is concerned with carrying out detailed designs and is the technical heart of the award. Candidates must know about relevant current legislation e.g. building regulations and DDA. This award also recognises the paramount importance of health and safety requirements as well as welfare, and environmental sustainability issues. It is about ensuring that all aspects of the design process are integrated.

You must be able to take an overview of the process and set up a system which will produce a holistic design that is coherent and consistent. It is about deciding what materials, components and systems will incorporate the finished product. You must have a deep knowledge of the available options, and be able to make informed choices.

This standard will challenge your technical competence. It is about producing the details of the design solution. You must be able to demonstrate your accountability for any work you delegate to others. It is about agreeing with the stakeholders what you have done so far. You must report on progress to date, justify the decisions you have taken, and gain people's trust and support.

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Performance criteria

Identify the purpose, methods and techniques for preparing detailed design information

You must be able to:

- P1 agree with the stakeholders the uses for the production and installation design information appropriate to the project stage
- P2 choose a format for presenting the production and installation production and installation information which meets the requirements of the stakeholders
- P3 identify the aspects of the overall project design which require production and installation design information
- P4 identify the aspects of the overall project design which interact with each other, and agree ways to maintain coherence and consistency between all aspects of the production and installation design information
- P5 set up procedures which will maintain coherence and consistency between the production and installation solutions and the overall design concept
- P6 select techniques which are suitable for investigating, calculating, testing, developing and specifying production and installation design information which are consistent with best industry practice and which conform to relevant codes of practice and standards

Identify and select materials, components and systems

You must be able to:

- P7 identify and investigate the technical, environmental, production and installation factors which are relevant to the project stage
- P8 prioritise the technical, environmental, production and installation factors of the agreed design
- P9 assess whether existing design solutions which contain similar technical, environmental, production and installation factors might be relevant
- P10 identify and assess the potential of new materials, components and systems to meet technical, environmental, production and installation factors

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P11 select materials, components and systems which meet the identified technical, environmental, production and installation factors and standards

P12 choose the solutions which best meet the significant technical, environmental, production and installation factors, evaluate them against the requirements of the agreed design parameters and keep records of them for the project team

Investigate, produce and analyse detailed design solutions

You must be able to:

P13 identify relevant technical, environmental, production and installation factors and data which are likely to influence the production and installation solution and assess their significance as appropriate to the project stage

P14 analyse and prioritise the factors which will influence the production and installation solution and resolve any conflicts between the different factors

P15 agree and apply criteria for selecting and producing production and installation solutions against design parameters

P16 record the data from calculations, investigations and analysis and arrange for appropriate checking

P17 assess the technical, environmental, production and installation solutions against all relevant factors, and recheck the results

P18 select the preferred production and installation solutions and present them to stakeholders

P19 maintain records of production and installation solutions which have not been selected but which might be useful in other projects

Integrate the design of fabric, services and systems

You must be able to:

P20 collate and review relevant design information appropriate to the project stage which cover parts of the overall design solution, clarify any design information which is not clear and ensure that it is updated

P21 identify those parts of the fabric, services and systems that interact with each other and potentially require greater care in integration to achieve sound construction

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- P22 identify relevant technical, environmental, production and installation factors to be taken into account in design processes and review their implications to achieve sound construction
- P23 identify potential issues posed by new technologies and their impact on the design solution and make arrangements for any necessary guidance, training and co-ordination of those responsible for implementing the work
- P24 agree and communicate particular methods to be used in design processes to take account of technical, environmental, production and installation factors and issues posed by new technologies
- P25 organise and control design processes and resources to meet technical, environmental, production and installation factors and issues posed by new technologies and ensure compliance with contract and regulatory requirements

Agree a detailed design

You must be able to:

- P26 provide stakeholders with relevant and accurate information appropriate to the project stage to review production and installation solutions
- P27 assess and justify the features and benefits of the recommended production and installation solution
- P28 compare the recommended production and installation solution with the requirements of the agreed brief and justify its selection
- P29 confirm with the stakeholders the implications of implementing the recommended production and installation solutions
- P30 reach an agreement on the production and installation solution which is acceptable to the stakeholders and which allows the project to progress to the next project stage

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Knowledge and understanding

You need to know and understand:

Identify the purpose, methods and techniques for preparing detailed designs

- K1 how and why to agree with the stakeholders the uses for the production and installation design information appropriate to the project stage (evaluation)
- K2 how and why to choose a format for presenting the production and installation design information which meets the requirements of the stakeholders (evaluation)
- K3 what to identify as the aspects of the overall project design which require production and installation design information (understanding)
- K4 what to identify as the aspects of the overall project design which interact with each other, and agreeing ways to maintain coherence and consistency between all aspects of the production and installation design information (understanding)
- K5 how and why to set up procedures which will maintain coherence and consistency between the production and installation solutions and the overall design concept (evaluation)
- K6 how and why to select techniques which are suitable for investigating, calculating, testing, developing and specifying production and installation design information which are consistent with best industry practice and which conform to relevant codes of practice and standards (evaluation)

Identify and select materials, components and systems

You need to know and understand:

- K7 what to identify as the technical, environmental, production and installation factors which are relevant to the project stage (understanding)
- K8 how and why to investigate the technical, environmental, production and installation factors which are relevant to the project stage (analysis)
- K9 how and why to prioritise the technical, environmental, production and installation factors of the agreed design (analysis)

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- K10 how and why to assess whether existing design solutions which contain similar technical, environmental, production and installation factors might be relevant (analysis)
- K11 what to identify as the potential of new materials, components and systems to meet technical, environmental, production and installation factors (understanding)
- K12 how and why to assess the potential of new materials, components and systems to meet technical, environmental, production and installation factors (analysis)
- K13 how and why to select materials, components and systems which meet the identified technical, environmental, production and installation factors and standards (evaluation)
- K14 how and why to choose the solutions which best meet the significant technical, environmental, production and installation factors (evaluation)
- K15 how and why to evaluate solutions against the requirements of the agreed design parameters (evaluation)
- K16 how to keep records of them for the project team (application)

Investigate, produce and analyse detailed design solutions

You need to know and understand:

- K17 what to identify as relevant technical, environmental, production and installation factors and data which are likely to influence the production and installation solution (understanding)
- K18 how and why to assess the technical, environmental, production and installation factors and data their significance as appropriate to the project stage (analysis)
- K19 how and why to analyse and prioritise the factors which will influence the production and installation solution (analysis)
- K20 how and why to resolve any conflicts between the different factors (synthesis)
- K21 how and why to agree criteria for selecting and producing production and installation solutions against design parameters (evaluation)
- K22 how to apply criteria for selecting and producing production and installation solutions against design parameters (application)

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- K23 how to record the data from calculations, investigations and analysis and arrange for appropriate checking (application)
- K24 how and why to assess the technical, environmental, production and installation solutions against all relevant factors, and recheck the results (analysis)
- K25 how and why to select the preferred production and installation solutions and present them to stakeholders (evaluation)
- K26 how to maintain records of production and installation solutions which have not been selected but which might be useful in other projects (application)

Integrate the design of fabric, services and systems

You need to know and understand:

- K27 how to collate relevant design information appropriate to the project stage which cover parts of the overall design solution, clarify any design information which is not clear and ensure that it is updated (application)
- K28 how and why to review relevant design information appropriate to the project stage which cover parts of the overall design solution (analysis)
- K29 what to identify as parts of the fabric, services and systems that interact with each other and potentially require greater care in integration to achieve sound construction (understanding)
- K30 what to identify as relevant technical, environmental, production and installation factors to be taken into account in design processes (understanding)
- K31 how and why to review the implications of technical, environmental, production and installation factors to achieve sound construction (analysis)
- K32 how and why to identify potential issues posed by new technologies and their impact on the design solution (synthesis)
- K33 how to make arrangements for any necessary guidance, training and co-ordination of those responsible for implementing the work (application)
- K34 how and why to agree particular methods to be used in design processes to take account of technical, environmental, production and installation factors and issues posed by new technologies (evaluation)

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- K35 how to communicate particular methods to be used in design processes to take account of technical, environmental, production and installation factors and issues posed by new technologies(application)
- K36 how and why to organise design processes and resources to meet technical, environmental, production and installation factors and issues posed by new technologies and ensure compliance with contract and regulatory requirements (synthesis)
- K37 how and why to control design processes and resources to meet technical, environmental, production and installation factors and issues posed by new technologies and ensure compliance with contract and regulatory requirements (evaluation)

Agree a detailed design

You need to know and understand:

- K38 how to provide stakeholders with relevant and accurate information appropriate to the project stage to review production and installation solutions (application)
- K39 how and why to assess the features and benefits of the recommended production and installation solution (analysis)
- K40 how and why to justify the features and benefits of the recommended production and installation solution (evaluation)
- K41 how and why to compare the recommended production and installation solution with the requirements of the agreed brief and justify its selection (synthesis)
- K42 how to confirm with the stakeholders the implications of implementing the recommended production and installation solutions (application)
- K43 how and why to reach an agreement on the production and installation solution which is acceptable to the stakeholders and which allows the project to progress to the next project stage (evaluation)

Additional Information

Scope/range

Identify the purpose, methods and techniques for preparing detailed designs

1. Stakeholders:

- 1.1. the client
- 1.2. consultants
- 1.3. potential contractors
- 1.4. potential subcontractors and suppliers
- 1.5. regulatory authorities
- 1.6. facilities/asset managers
- 1.7. users

2. Project stage:

- 2.1. Stage 4 (Design)
- 2.2. Stage 5 (Build and Commission)

3. Format for presenting:

- 3.1. in writing
- 3.2. graphically
- 3.3. electronically

4. Aspects of the overall project design:

- 4.1. location and size
- 4.2. assembly and construction
- 4.3. components and systems
- 4.4. environmental assessment objectives

5. Maintain coherence and consistency:

- 5.1. visual and spatial
- 5.2. functional performance
- 5.3. technical performance
- 5.4. operation and maintenance
- 5.5. requirements of relevant legislation and codes
- 5.6. cost
- 5.7. health and safety
- 5.8. environmental quality and sustainability
- 5.9. buildability/disassembly

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- 5.10. value management
- 5.11. concurrent design and construction
- 5.12. comparison of costs of new and renewable energy systems in buildings
- 5.13. building services system controls
- 5.14. minimise thermal bridging and air leakage
- 5.15. minimize emissions and waste
- 5.16. water usage
- 5.17. energy use (U Value Calculations, Building Energy Assessment, Carbon Rating)
- 5.18. protect archaeological and historically valuable resources
- 5.19. carbon footprint
- 5.20. risk/confidence in information

6. Techniques:

- 6.1. data research
- 6.2. survey and investigation
- 6.3. conformity with regulations
- 6.4. specialist guidance and good practice
- 6.5. relevant previous solutions and feedback
- 6.6. computer modelling
- 6.7. calculation
- 6.8. Building Information Modelling

Identify and select materials, components and systems

7. Technical factors:

- 7.1. structural forms
- 7.2. materials and component performance standards and fitness for purpose (form, performance, appearance, availability, sustainability, efficiency of use, component life, durability)
- 7.3. available and projected technology (including renewable energy)
- 7.4. prefabricated components and system options
- 7.5. performance, quality, operation and maintenance requirements
- 7.6. building physics (energy performance of structures, insulation, fire protection)
- 7.7. materials form, performance, appearance, availability, sustainability, efficiency of use
- 7.8. building services integration and control

8. Environmental factors:

- 8.1. local ecology
- 8.2. hydrology (tides and currents and flood risk)
- 8.3. water use
- 8.4. exposure/shelter/shading
- 8.5. heating, ventilation and cooling (solar gain, temperature range, natural ventilation, thermal and ventilation performance, thermal flows)
- 8.6. thermal properties (heat loss and SAP variables, U values, thermal bridging, air tightness)
- 8.7. daylight and illumination
- 8.8. acoustics
- 8.9. energy; natural resource use and management
- 8.10. interaction of users and buildings,
- 8.11. carbon (embodied and in-use) and carbon rating
- 8.12. resource/waste management
- 8.13. pollution risk and reduction of emissions and waste

9. Production and installation factors:

- 9.1. construction requirements and compatibility with site constraints
- 9.2. adaptation of existing structural elements
- 9.3. practicality, buildability and disassembly
- 9.4. standardisation and component co-ordination
- 9.5. production and installation processes, scheduling, lead-in times, construction programming/sequencing and quality control
- 9.6. expertise including experienced crafts people
- 9.7. fit and tolerances
- 9.8. production resources availability and performance (plant/equipment/people/skills)
- 9.9. materials, components and systems availability and capability
- 9.10. strategies to address interface issues on and off-site
- 9.11. access/transportation/traffic management
- 9.12. health and safety
- 9.13. system commissioning
- 9.14. operation and maintenance information

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10. Project stage:

- 10.1. Stage 4 (Design)
- 10.2. Stage 5 (Build and Commission)

11. Identify and assess:

- 11.1. options for compliance
- 11.2. compatibility with design brief & related design choices
- 11.3. potential benefits (whole life costs, quality time, energy/low carbon)

12. Standards:

- 12.1. British Standards and Codes of Practice
- 12.2. BBA certificates
- 12.3. EU Standards
- 12.4. trade advisory guidance publications
- 12.5. BRE publications
- 12.6. CIRIA publications
- 12.7. client standards
- 12.8. environmental assessment/certification schemes

13. Design parameters:

- 13.1. client, user and community requirements, expectations, options and preferences
- 13.2. project type/purpose/use
- 13.3. site, location and surrounding environment
- 13.4. geology (seismology, ground movements and soil type)
- 13.5. transport and infrastructure
- 13.6. planning, urban social integration
- 13.7. design form (architectural, structural, civil, services)
- 13.8. design quality (character/scale/aesthetics)
- 13.9. function/spatial planning (occupancy/room information/access and egress incl. DDA, security)
- 13.10. programme budget
- 13.11. cost (including whole life)
- 13.12. development timetable
- 13.13. risk assessment and mitigation
- 13.14. cost planning (including life cycle cost) and value management
- 13.15. procurement

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- 13.16.in-use performance
- 13.17.environmental quality and sustainability
- 13.18.environmental assessment/certification schemes
- 13.19.protection of archaeological, architectural, cultural and historically valuable resources (significance/status)
- 13.20.statutory, regulatory and legal constraints
- 13.21.standards and codes of practice
- 13.22.health and safety
- 13.23.form, function, materials, components and systems
- 13.24.loose fit design - for flexibility/adaptability/deconstruction/disassembly
- 13.25.buildability
- 13.26.operation and maintenance

Investigate, produce and analyse detailed design solutions

14. Identify:

- 14.1. standard lists and procedures
- 14.2. investigative research

15. Technical factors:

- 15.1. structural forms
- 15.2. materials and component performance standards and fitness for purpose (form, performance, appearance, availability, sustainability, efficiency of use, component life, durability)
- 15.3. available and projected technology (including renewable energy)
- 15.4. prefabricated components and system options
- 15.5. performance, quality, operation and maintenance requirements
- 15.6. building physics (energy performance of structures, insulation, fire protection)
- 15.7. materials form, performance, appearance, availability, sustainability, efficiency of use
- 15.8. building services integration and control

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16. Environmental factors:

- 16.1. local ecology
- 16.2. hydrology (tides and currents and flood risk)
- 16.3. water use
- 16.4. exposure/shelter/shading
- 16.5. heating, ventilation and cooling (solar gain, temperature range, natural ventilation, thermal and ventilation performance, thermal flows)
- 16.6. thermal properties (heat loss and SAP variables, U values, thermal bridging, air tightness)
- 16.7. daylight and illumination
- 16.8. acoustics
- 16.9. energy; natural resource use and management
- 16.10. interaction of users and buildings,
- 16.11. carbon (embodied and in-use) and carbon rating
- 16.12. resource/waste management
- 16.13. pollution risk and reduction of emissions and waste

17. Production and installation:

- 17.1. construction requirements and compatibility with site constraints
- 17.2. adaptation of existing structural elements
- 17.3. practicality, buildability and disassembly
- 17.4. standardisation and component co-ordination
- 17.5. production and installation processes, scheduling, lead-in times, construction programming/sequencing and quality control
- 17.6. expertise including experienced crafts people
- 17.7. fit and tolerances
- 17.8. production resources availability and performance (plant/equipment/people/skills)
- 17.9. materials, components and systems availability and capability
- 17.10. strategies to address interface issues on and off-site
- 17.11. access/transportation/traffic management
- 17.12. health and safety
- 17.13. system commissioning
- 17.14. operation and maintenance information

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18. Data:

- 18.1. identified construction criteria
- 18.2. existing design solutions

19. Project stage:

- 19.1. Stage 4 (Design)
- 19.2. Stage 5 (Build and Commission)

20. Design parameters:

- 20.1. client, user and community requirements, expectations, options and preferences
- 20.2. project type/purpose/use
- 20.3. site, location and surrounding environment
- 20.4. geology (seismology, ground movements and soil type)
- 20.5. transport and infrastructure
- 20.6. planning, urban & social integration
- 20.7. design form (architectural, structural, civil, services)
- 20.8. design quality (character/scale/aesthetics)
- 20.9. function/spatial planning (occupancy/room information/access and egress incl. DDA, security)
- 20.10. programme budget
- 20.11. cost (including whole life)
- 20.12. development timetable
- 20.13. risk assessment and mitigation
- 20.14. cost planning (including life cycle cost) and value management
- 20.15. procurement
- 20.16. in-use performance
- 20.17. environmental quality and sustainability
- 20.18. environmental assessment/certification schemes
- 20.19. protection of archaeological, architectural, cultural and historically valuable resources (significance/status)
- 20.20. statutory, regulatory and legal constraints
- 20.21. standards and codes of practice
- 20.22. health and safety
- 20.23. form, function, materials, components and systems

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20.24.loose fit design - for
flexibility/adaptability/deconstruction/disassembly

20.25.buildability

20.26.Investigations:

20.27.operation and maintenance

20.28.data research

20.29.conformity with regulations

20.30.specialist guidance and good practice

20.31.relevant previous solutions and feedback

20.32.computer aided analysis

21. Present:

21.1. orally

21.2. in writing

21.3. graphically

21.4. electronically

22. Stakeholders:

22.1. CDM Co-ordinator

22.2. financial advisers

22.3. consultants

22.4. potential subcontractors and suppliers

22.5. potential investors

22.6. facilities/asset managers

22.7. prospective occupiers

Integrate the design of fabric, services and systems

23. Review:

23.1. with co-designers, suppliers, contractors

23.2. with experts, decision makers

23.3. research authoritative industry guidance

23.4. reference to regulatory requirements

24. Design information:

24.1. survey information

24.2. location details

24.3. construction assembly details

24.4. construction component details

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24.5. structural layouts; details

24.6. building services layouts; details

24.7. specialist suppliers layouts; details

24.8. graphical and non-graphical electronic data files

25. Project Stage:

25.1. Stage 2 (Concept)

25.2. Stage 3 (Definition)

25.3. Stage 4 (Design)

25.4. Stage 5 (Build and Commission)

26. Fabric, services and systems:

26.1. structure

26.2. elements of the building

26.3. materials

26.4. finishes

26.5. furnishings

26.6. power and light

26.7. heating and ventilation

26.8. telecommunications

26.9. movement of goods and people

26.10. special services and equipment

26.11. external works

26.12. landscaping

27. Technical factors:

27.1. structural forms

27.2. materials and component performance standards and fitness for purpose (form, performance, appearance, availability, sustainability, efficiency of use, component life, durability)

27.3. available and projected technology (including renewable energy)

27.4. prefabricated components and system options

27.5. performance, quality, operation and maintenance requirements

27.6. building physics (energy performance of structures, insulation, fire protection)

27.7. materials form, performance, appearance, availability, sustainability, efficiency of use

27.8. building services integration and control

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28. Environmental factors:

- 28.1. local ecology
- 28.2. hydrology (tides and currents and flood risk)
- 28.3. water use
- 28.4. exposure/shelter/shading
- 28.5. heating, ventilation and cooling (solar gain, temperature range, natural ventilation, thermal and ventilation performance, thermal flows)
- 28.6. thermal properties (heat loss and SAP variables, U values, thermal bridging, air tightness)
- 28.7. daylight and illumination
- 28.8. acoustics
- 28.9. energy, natural resource use and management
- 28.10. interaction of users and buildings,
- 28.11. carbon (embodied and in-use) and carbon rating
- 28.12. resource/waste management
- 28.13. pollution risk and reduction of emissions and waste

29. Production and installation factors:

- 29.1. construction requirements and compatibility with site constraints
- 29.2. adaptation of existing structural elements
- 29.3. practicality, buildability and disassembly
- 29.4. standardisation and component co-ordination
- 29.5. production and installation processes, scheduling, lead-in times, construction programming/sequencing and quality control
- 29.6. expertise including experienced crafts people
- 29.7. fit and tolerances
- 29.8. production resources availability and performance (plant/equipment/people/skills)
- 29.9. materials, components and systems availability and capability
- 29.10. strategies to address interface issues on and off-site
- 29.11. access/transportation/traffic management
- 29.12. health and safety
- 29.13. system commissioning
- 29.14. Issues posed by new technologies:

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29.15.operation and maintenance information

29.16.the logistics of assembling labour and materials for the execution of the works

29.17.ensuring compliance

29.18.achieve high levels of quality control and precision

29.19.accreditation requirements for workers and systems

29.20.integration and interaction between different materials, components, systems and finishes

29.21.what is required to achieve highly thermally efficient and airtight fabric

29.22.how to spot the most likely problems, e.g. identify thermal bridging

29.23.how to upgrade products to meet more stringent requirements

30. Work

30.1. new build

30.2. infrastructure

30.3. extension

30.4. alteration

30.5. refurbishment

30.6. conservation

30.7. retrofit

30.8. temporary works

30.9. installation

30.10.demolition

Agree a detailed design

31. Stakeholders:

31.1. the client

31.2. the client's financial advisers

31.3. consultants

31.4. potential contractors and suppliers

31.5. potential investors

31.6. partners in the development programme

31.7. potential occupiers

31.8. public interest organisations

31.9. local authorities

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31.10.government agencies

31.11.internal

31.12.facility/asset managers

32. Project stage:

32.1. Stage 4 (Design)

32.2. Stage 5 (Build and Commission)

33. Justify (by using):

33.1. sketches

33.2. drawings

33.3. physical models

33.4. diagrams

33.5. mathematical modelling

33.6. photo-montage

33.7. mock-ups

33.8. written reports

33.9. cost estimates

33.10.programming

33.11.cash analysis

33.12.outline approvals from regulatory authorities

33.13.design quality benchmarking analysis

33.14.3D computer models

33.15.lifetime impact modelling

33.16.decision tools for passive/active systems

33.17.Implications:

33.18.building performance dynamic modelling

33.19.cost (including whole life)

33.20.resources

33.21.time

33.22.quality and technical

33.23.effectiveness

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Developed by ConstructionSkills

Version number 2

Date approved December 2012

Indicative review date January 2018

Validity Current

Status Original

Originating organisation ConstructionSkills (CIC)

Original URN COSBEDMCO3

Relevant occupations Architects; Civil Engineers; Graphic Designers; Architectural Technologists, Town Planning Technicians; Building Surveyors

Suite Built Environment Design Management

Key words detailed design; project stage
