A Practical Guide to Assessment for Learning

The specification for

TLM Level 1 and Level 2 Certificates in Designing, Engineering and Constructing a Sustainable Built Environment (RQF)

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High Quality Qualifications for the
2018 School League Tables

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TLM Technology and Quality Assurance

This is version 1.0 of the specification for TLM/COYO Level 1 and Level 2 qualifications in Design Engineer Construct! developed in partnership with Mott MacDonald.

The assessment model for the qualifications presented in this publication was designed by TLM in consultation with Class Of Your Own Limited.

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1. Introduction

1.1 We believe these new and innovative qualifications provide the most inclusive and cost-effective qualifications available for a new Built Environment curriculum, preserving the necessary rigour for stretching the highest attaining candidates. In addition, there is a clear intention to reduce the bureaucratic overhead on teachers while preserving the benefits of coursework for motivating learners and dealing validly with recognition of practical competence in what are essentially practical, technical and vocational skills and activities. We have demonstrated that we can provide Level 1 and Level 2 qualifications that are accessible to all learners while still differentiating the top performing students. This enables a clear progression route for the weakest mainstream learners through to identifying those that are likely to be successful in academic A levels and beyond into the associated professions.

1.2 TLM Level 1 and Level 2 Certificates in Designing, Engineering and Constructing a Sustainable Built Environment. (RQF) (DEC or Design, Engineer, Construct!) is a qualification that offers teachers and learners the opportunity to develop a range of skills and knowledge fundamental to successful engagement in the professional aspects of the Construction and Built Environment sector of industry. The qualifications enable coverage of a wide range of general knowledge, understanding and competences. At Level 1 these will support all by leaving progression routes open to Level 2 and Level 3 that will benefit any young person aspiring to progress to a professional career.

1.3 This specification is for two qualifications, one at Level 1 and the other at Level 2, targeted on secondary schools. It has the following key benefits.

- devised in consultation with leading industry consultants, professional bodies and universities
- clear and flexible unit based structure referenced to the European Qualifications Framework (EQF).

- straightforward assessment of competence in real rather than contrived contexts.
- grading through controlled exams introduced progressively from KS3 to KS4.
- provides a focus for continuing professional development for teachers through moderation/verification feedback.
- moderation/verification of coursework on demand.
- three examination opportunities per year.
- use of open source cloud based technologies to reduce costs and add value for schools.
- reduced bureaucracy for teachers and flexibility for them to target specific interests.

1.4 These qualifications lend themselves to formative assessment practices allied to summative differentiation by outcome that can optimise and motivate attainment for individuals rather than assume all will reach a certain level or grade at a particular time. We do this by providing a coursework component that is competence based, reflecting the best and most up to date research in assessment in the workplace complemented by a short academic style examination.

1.5 All candidates must complete the coursework before being eligible to take the exam. This provides an incentive to complete the coursework and makes it less likely that those sitting an exam are ill-prepared.

1.6 The Level 1 exam grades candidates across a range from Pass through Merit and Distinction to Distinction*. The Level 2 exam grades candidates from grade C through B and A to A*. The two qualifications at Level 1 and Level 2 can stand alone but they are designed to provide a coherent progression route starting with coursework at Level 1 for a basic level 1 pass and then an exam to determine the Level 1 grades. Level 2 coursework is differentiated from Level 1 by more demanding assessment criteria and the general RQF level descriptor for level 2. If coursework is completed to the Level 2 standard the candidate can go on to take the Level 2 exam which will then differentiate grades A*-C.

[The published grade boundaries may be subject to change]

1.7 In this way we can provide valid competence based assessment and rigorous testing of knowledge and understanding at a lower cost than both traditional vocational and academic methods applied separately. If replicated across schools it would potentially save significantly on current expenditure on assessment and examinations. There is research evidence that this approach should enhance motivation that will result in higher attainment by supporting both performance-approach goals that focus on displaying competence and performance-avoidance goals focus on avoiding a display of incompetence. (Conclusions from Effects of Classroom Assessment Practices on Students' Achievement Goals, Hussain Alkharusi Sultan Qaboos University, Oman.)

2. Summary of the qualifications specifications

2.1 The Level 2 certificate is graded across 4 levels from A*- C with A* the highest grade equating to 80%+ of the available marks and grade C equating to a minimum of 50%. The Level 1 certificate is graded across 4 levels, pass for completing the coursework to the level 1 standard, pass with merit for achieving 50% or more marks in the examination, pass with distinction for achieving 70% or more marks in the examination and pass with distinction* for achieving 90% or more of the marks in the examination.

[The published grade boundaries may be subject to change]

Content

2.2 The qualification content has been designed for use in schools by referencing it to the new National Curriculum programmes and testing it against similar assessments carried out in current Level 2 qualifications. It is also designed to enable learners to meet the needs of employers, through consultation with leading built environment and engineering consultancies, progressive universities and professional bodies representing a wide section of the industry. Guidance for coursework is aligned with the CBI employment criteria. Guidance takes into account the lack of experience of many teachers in this area ensuring that the most academically able can be stretched and routed to appropriate academic progression at Level 3. Strong industry support provides great potential for staff development, keeping teachers up to date in what is still a rapidly changing sector. Unlike purely academic qualifications, regular reference is made to practical skills and standards and the use of real equipment and technology rather than simulations or generic terms only. There is an emphasis on increasing understanding of the importance of collaborative working systems in keeping with recent Cabinet Office policy and the Government Industrial Strategy 2025.

Assessment

2.3 The qualifications at both Level 1 and Level 2 have two assessment components both of which cover the full content of the qualifications.

1. Coursework assessed in terms of competence in practical areas where knowledge and understanding can be applied in real and motivating contexts.
2. An externally set and externally marked examination to assess knowledge and understanding that underpins user competence.

2.4 Both qualifications are unit based and each consist of 4 units. Units have credit values in the regulatory qualifications framework (RQF). A minimum of 16 credits is needed for each qualification equating to 120 Guided Learning Hours. One delivery strategy is to teach over 3 or 4 years starting with level 1 and building to the highest performance possible at level 2.

2.5 The synoptic examination of knowledge and understanding that is used for grading is based on a syllabus related to **all** the available criteria across **all** units. The design does not allow candidates to compensate for weak coursework by doing well in the exam only. They must complete the coursework to a satisfactory standard at the level to be eligible to take the examination. A weak examination performance will limit the attainment at Level 1 to a pass and could prevent the award of any grade at all at Level 2. It is likely that candidates with a satisfactory coursework performance will at least pass but that is not inevitable and they must take the exam to pass. The exam then also provides an additional very low cost dimension to external moderation/verification feedback for the coursework. Centres with a high proportion of candidates judged to be satisfactory on coursework yet failing to gain sufficient marks in the examination flag up a need for further investigation and will help prioritise CPD.

Summary of the rationale

2.6 The assessment is specifically designed to motivate learning that will support the highest grade(s) attainable by each candidate but also broader aspects of learning that can not be assessed in a traditional exam. Learners must demonstrate that they can achieve at least 16 credits before being eligible for the examination with both coursework and exam covering the entire subject content. There is considerable flexibility to enable contexts of individual interest to be explored in depth. Those that have completed the coursework in areas of personal interest and to a high standard are far less likely to fail to achieve at least the minimum standards set in the examination. This ensures basic practical competence in realistic and motivating scenarios as well as at least some general knowledge and understanding in the more academic sense.

Aggregation of marks

2.7 **Level 1 candidates** will be deemed to have achieved a pass when units to a minimum value of 16 credits have been assessed so that there is evidence of secure performance against the assessment criteria and therefore competence against the specified learning outcomes. They are then eligible to take the examination. The examination is worth 50 marks. Candidates will achieve a merit grade if they score 25 marks or more, a distinction if they gain 35 marks or more and distinction* if they gain 45 marks or more. Candidates will be provided with their marks as well as their grade. Candidates can take this examination when their assessors judge that they are ready and when they have completed the coursework to a Level 1 standard.

2.8 **Level 2 candidates** will gain 30 marks from providing coursework evidence that meets the Level 2 assessment criteria as determined by their assessor with independent moderation/verification samples. They are then eligible to take the examination which provides a further potential 70 marks. If the candidate achieves a total score of 50 marks from the coursework and the examination they will be

awarded a grade C. For 60 marks or more a grade B, for 70 marks or more a grade A and for 80 marks or more a grade A*. In this way those candidates that are more suited to academic work will be differentiated from those more likely to benefit from further practically based study at Level 2 or Level 3. The examination questions get progressively more difficult and those achieving the highest marks will be those most likely to be suited to academic A level study at Level 3.

2.9 Any candidate that completes the coursework to a satisfactory standard at Level 2 but fails to gain sufficient marks in the examination will still receive unit certificates and a full qualification at Level 1 if they have sufficient Level 1 credit and have not already been awarded the Level 1 certificate. We expect this situation to be relatively rare but from an individual's point of view it prevents them doing 2 years' work and coming away with nothing because they had a bad day in an exam or missed the exam through unavoidable personal circumstances.

2.10 In the interests of inclusion, there will be no additional fees for this. An optional subscription model that covers all these qualifications means that schools can enter as many candidates as they believe can meet the criteria and there are no hidden costs such as late entry fees, double entries or replacement certificate fees. This maximises the opportunities for learners to get their achievements recognised without the school worrying about financial penalties.

3. Qualification Content

3.1 The qualification is made up from units in the Regulated Qualifications Framework (RQF). The RQF is referenced to the European Qualifications Framework (EQF), the largest system for referencing nationally accredited qualifications in the world. Unit credit is designed to be compatible with the European international credit transfer system ECVET. The units were designed by TLM in collaboration with teachers currently working in the classroom, industry consultants, professional bodies and universities. In order to provide learners with the skills needed by all sector employers,, extensive consultation with business leaders has taken place. This specification is a distillation of this extensive market research specifically geared to supporting learning in schools. There is an emphasis on developing the transferable knowledge, skills and competences that will support raised attainment in the core subjects of the curriculum as well as providing the grounding need for future construction industry professionals. There are references to science and mathematics especially in terms of control of variables, energy efficiency and sustainability, structural engineering and measurement. Specialist vocabulary with words such as sustainability, life cycle, energy efficiency, prefabrication, budget and BIM, will help support technical English at a level beyond that of most adults.

Key subject aims

3.2 The overarching aim is to enable learners to broaden their understanding of technical and professional procedures so they are better equipped decision makers in a technological age. Those seeking careers in a digital built environment will have an appropriate grounding in collaboration and computing to enable them to make rational decisions about their progression routes into employment in this sector.

Subordinate aims include:

- developing the knowledge and skills needed for employment.
- gaining practical experience needed to underpin lifelong learning.
- increasing the knowledge needed to transfer skills and understanding between contexts.
- reinforcement of learning in the core subjects of English, mathematics and science.
- developing practical skills in creativity and problem solving in technological contexts of personal interest.
- developing an understanding of their place in the community and society.
- developing safe, secure and responsible attitudes to working with other people.
- developing the skills for working collaboratively with IT.
- developing knowledge in the field of critical evaluation and feedback.

Knowledge and understanding

3.3 The following knowledge and understanding will be required to underpin the desired learning outcomes for each qualification. At each level the understanding needed is in keeping with the RQF general description of the qualification level.

- Demonstrate knowledge and understanding associated with the built environment terms:
- sustainability, planning, procurement, building information modelling, zero carbon, energy efficiency, structural analysis, solar gain, thermal mass, indoor climate, insulation, stress, strain, load, torsion, HVAC, renewable energy, precedent, biodiversity, resource efficiency, bill of quantities, facilities management, 2D, 3D, engineering, infrastructure, innovation, damp proof course, clash detection, organogram, carbon footprint,

- Demonstrate mathematical knowledge associated with quantitative methods, simple statistics, and simple geometric structures.
- Demonstrate scientific knowledge and understanding associated with energy and materials including the units joules, watts, kWhr; insulation and the effects of conduction, convection and radiation, balancing forces and their application in simple and straightforward cases, material properties related to construction.
- Demonstrate knowledge and understanding associated with the information and data terms:
- data, information, filetype, file properties, search, validity, compatible, interoperable, cloud, desktop, mobile, concept modelling, validity, accurate, licence, visualisation, simulation.
- Deal with unfamiliar contexts drawing on learning and information provided.

3.4 Opportunities are provided to support real skills, the great majority of which will be assessed directly in coursework in valid contexts. Through a range of sections, students will design an 'Eco Classroom' to help their own local community learn how to look after their planet. A range of appropriate tasks follow the journey of the building including;

1. Understanding sustainability and sustainable design
2. Working with clients and promoting community cohesion
3. Building Information Modelling skills
4. Architectural skills in schematic and design development
5. Building services engineering
6. Energy efficiency and post occupancy behaviour
7. Land surveying and site engineering
8. Landscape design
9. Planning constraints
10. Facilities management
11. Sustainable procurement and resource efficiency
12. Applied construction mathematics

Unit contents

3.5 The content of units is in Annexe C below with some examples of interpreting the criteria. These are available in more detail on the TLM community learning site and will be linked to progressively more free and open supporting resources and guidance as these become available.

3.6 ll centres have an assigned Account Manager who will be very pleased to help at any time. Our aim is to give professional assessors, most of whom are qualified teachers, the confidence to make judgements with a minimum of bureaucracy so that they can focus their time on maintaining their professional knowledge and skills and support learning through effective teaching rather than “chasing paper”.

3.7 There is often a confusion between bureaucracy and rigour, since unnecessarily complex bureaucracy can actually detract from rigour by obscuring the importance of the outcomes in unnecessary process. We also encourage coursework to be carried out in valid and real contexts rather than as contrived simulations. Competence is best assessed in context. All assessors must sign an agreement to uphold standards and feedback from moderation/verification will support consistency.

3.8 **Websites** - TLM provides support through a cloud based system for evidence management linked to grading and certification. Providing assessment grades and the management of certification through the Awards Site is mandatory and all assessors are provided with training in its use. It is simply a matter of recording learner competence against the unit criteria as the evidence is collected and claiming a certificate on behalf of the learner when a unit has been fully assessed. All assessors must sign an agreement to uphold standards before they can use this site.

3.9 The use of the community learning site is optional at no additional cost. It **provides** facilities for learners to submit their evidence online, linking it to the assessment criteria across single or multiple units.

The assessor can accept or reject this evidence and comment on it providing a full audit trail for evidence. Moderator/verifiers can get immediate access to this evidence and so it is potentially a lot more efficient than alternative methods. No paper, no emails with file attachments are necessary. There are facilities for progress tracking that can be based on criteria and/or units and reports that can be shared securely online with parents. The system can be linked as an extension to any standards compliant VLE/e-portfolio system for centres that are already committed to a specific VLE product. Training can be provided and free support is available from your Account Manager. The aim is to eliminate all paper based bureaucracy, all screenshots and referencing that draws time away from teaching. As far as possible we want assessment of real tasks in real contexts that are truly representative of a real working environment. This is a fundamental goal for the competence based assessment at the heart of the Qualifications and Credit Framework and European Vocational Education and Training policy (ECVET). It is the way in which most employers will judge the effectiveness of individuals in their tasks at work.

3.10 **Telephone** and e-mail support is available to all Centres. There is a general convention of firstname.secondname@tlm.org.uk for e-mail addresses. It is usually best to e-mail your account manager in the first instance. Google hangouts can be arranged for video conferencing support.

4. Assessment including e-assessment

Assessment summary

Coursework

4.1 Evidence has to be provided against the unit assessment criteria from practical tasks related to the learners' everyday work. This is likely to be from specialist lessons related to Design Technology but can and should include evidence from across the curriculum, for example from maths, science or computing. The way evidence is gathered is up to the assessor, the only requirement is that it clearly supports the judgements against the assessment criteria and the relevant learning outcomes and reflects the learners personal competence. If on moderation the account manager finds gaps in evidence related to a particular candidate they will request more evidence before approving the award of the unit certificate. Assessors must then adjust their work to ensure all their learners are providing the appropriate level and breadth of evidence. We encourage early submission of at least some evidence so that assessors are confident from the feedback that what they are providing is sufficient (and indeed not over-kill). In this way we can maintain standards while supporting improved efficiency.

4.2 Synoptic assessment has become a popular term. In essence all the coursework assessment is synoptic in that the evidence provided is against collectively synoptic assessment criteria underpinning the learning outcomes for the unit. Synoptic evidence of competence to a minimum value of 16 credits across the units is mandatory for both the level 1 and level 2 certificates. This equates to a minimum of 120 guided learning hours.

4.3 At level 1, there are 3 units of 3 credits each and one unit of 7 credits. The 3 credit units each require 20 GLH and the 7 credit unit requires 60 GLH giving a total of 16 credits and 120 GLH. Dividing into a unit structure is for convenience and compatibility with international conventions for referencing national qualifications frameworks and to

enable credit transfer eg as in the European system ECVET. It is **NOT** intended to determine the method of delivery. Teachers are free to cover units concurrently deciding where the elements are logically related. We encourage the use of the flexibility provided to target particular interests of learners to motivate them in persevering in difficult areas and to raise the level of expectation in cognitive development.

4.4 At Level 1 and 2, the central project within the curriculum is the design and construction of an 'Eco Classroom' following industry standard commercial practices, which includes the use of Building Information Modelling techniques using industry standard software and provides young learners with a range of progressive skills which are in high demand in a wide range of careers in the built environment.

4.5 There is an obvious progression from Level 1 to Level 2 where learners will also have more capacity to tackle academic style questions requiring explanations and more detailed understanding and insight. The outcomes for individuals in terms of the broad level descriptors allied to the assessment criteria, verified by the teacher/assessor and externally moderated by TLM will determine the final outcome. Grouping learners is up to the school but the design enables maximum flexibility. Some students can achieve Level 1 first for example in Year 8 and 9 and then progress to Level 2 units in Year 10 and finally to a Level 2 grade through the exam. Others might be split into Level 1 and Level 2 in Year 10 and work over two years to the particular level with level 1 learners progressing to Level 2 post 16.

Progression and inclusion

4.6 There are some fundamental misunderstandings of unit based assessment with regards to progression and inclusion. The paragraphs below will explain how criticisms related to these issues can be rejected. Having higher levels of professional expectation and improved and lower cost CPD strategies is better than "dumbing down" to less professional approaches.

4.7 Design, Engineer, Construct! is a unique project based learning programme which introduces a range of high level employability and built environment industry specific skills offering students an industry recognised progression route. We consider that students who achieve a Level 1 qualification in DEC! will have improved their numeracy skills through applied mathematics embedded throughout the programme and will benefit through improved literacy as well as through other employability and built environment design skills. For those schools interested in using DEC! in Key Stage 3, students progressing through Level 1, will receive a qualification recognised by government and endorsed by industry that prepares them for Level 2 achievement enhancing motivation through reward. Students, having enjoyed, completed and succeeded at Level 1 by the age of 14 years will be more likely to be successful at Level 2 and with higher grades. This provides an improved strategy for increasing the numbers getting the higher A*-C GCSE equivalent grades by the age of 16, providing a much better basis for progression to Level 3.

4.8 Design Engineer Construct! offers links to career progression in the built environment industries - in architecture, engineering and construction, and introduces the growing career opportunities focusing on sustainable development. The provision at Level 1 and Level 2 underpins progression to Level 3 and the Level 3 qualification has many of the characteristics of undergraduate study.

4.9 It is very unlikely that any learner embarking on a TLM qualification based on these methods will not achieve at least some kind of recognition for their work at a level appropriate to their current attainment level with a progression route from where they end up to higher levels. Clearly some will take longer than others. This inclusion is achieved without sacrificing rigour for the highest attainers since the questions in the examination targeting the A/A* grades can be as difficult as necessary without risking weaker candidates dropping out of a grade altogether. Indeed able students can start Level 3 work in KS4 differentiated by outcome where appropriate.

Currently there is a good argument that candidates achieving A* and A grades across all their subjects are not being adequately stretched in KS4.

4.10 Beyond Level 2 it is possible for work supporting Level 2 units to be converted to Level 3 by candidates if they provide evidence that is clearly at the higher level. For the highest attainers this provides an accelerated route to Level 3 so that they are not just marking time at the end of KS4. This is where current systems fail the highest level attainers. Some individuals can cope with university level work in KS4, not many but these individuals matter just as much as those with learning disabilities and so we need systems flexible enough to cope with them.

4.11 Coursework, particularly at Level 2 should reflect useful and meaningful activities with practical activities useful to other people and the wider community as well as the candidates themselves. Examples might be to interrogate an existing building design brief or tackle an energy efficiency issue in their own school. We want to encourage work that reflects contemporary society using industry standard tools and technologies that enable ALL individuals to contribute, not only those that can afford to. Projects lend themselves to cross-curricular work supporting raising attainment in other subjects, numeracy, literacy, science and information skills but also aesthetic subjects such as art and design. It is far better to learn through creating original work (or original remixes of other people's work) that has a real and practical purpose than to do simulations or theoretical exercises. This is a fundamental part of TLM's coursework philosophy and founded in research evidence.

Criticisms of coursework answered

Criticism 1: Coursework is too susceptible to plagiarism and other forms of dishonesty.

4.12 A Google search will have a high chance of finding any extended text that has been copied from an online source. If we are genuinely concerned about "copying from the internet" simply inform teachers of how to combat the issue using freely available tools. Require teachers to accept professional responsibility for the authenticity of their learners' evidence. If teachers really want to cheat why would they not simply tell students the answers to an exam? If learners want to cheat why not simply forge a convincing looking certificate? There is no tradition of easy certificate authentication so there is a high probability that forgery will be successful. A complementary examination means that we can check back to see if individual teachers are "passing" student coursework for a disproportionately high number that then fail the examination. That provides an evidence source to cross-reference the quality assurance in order to better target staff development. Work smarter not harder!

Criticism 2: Unit based assessment means that knowledge is in compartments.

4.13 Unit structures are for administrative convenience **NOT** teaching plans. There is nothing to stop elements of several units being supported through one or more projects concurrently. Most academic syllabuses are divided up into sections. That is no different in practice to labelling the sections units. There is no requirement to assess units at a particular time. If most evidence is provided at the end of the course across all units why is that any different from a controlled synoptic terminal examination? If teachers do not teach unit based courses effectively, train the teachers, don't blame the tools. If we are really worried about compartmentalised knowledge why preserve a subject based curriculum?

Criticism 3: Unit based assessment does not support progression.

4.14 On the contrary, the scope of unit based qualifications organised in a levelled framework provides a better support for progression when the unit content and structure is designed for that purpose. Where qualifications are opportunistically designed to simply target one level in a terminal examination that is only representative of a subset of the learning, there is a good argument that progression is badly supported but that is true of any qualification whether unit based or not.

Criticism 4: Competence based assessment has to be lowered to the level of the least difficult assessment criterion.

4.15 In well designed assessment units the assessment criteria are contextualised to the general level specified in the overall level descriptors. This means all assessment criteria should be interpreted in terms of that overall level descriptor, not taken on face value in isolation. It is impossible to measure anything with absolute precision and it is scientifically bogus to claim we can, even if it is politically sensitive to admit that there will be some uncertainty in assessment outcomes when applied to individuals. This is true of both coursework based and exam based methods. The important thing is to get a reasonably consistent set of outcomes within the expected degrees of uncertainty. The competence based component of these qualifications is intended to provide a baseline consistent with the general level descriptor and to motivate beyond basic competence by providing the flexibility to pursue contextual interests of individuals. Grading is achieved by a terminal examination. This means we can match the assessment method to the aspect of attainment such that we cover all aspects of learning but we also provided reliable differentiation that can accurately inform progression routes for individuals as well as motivate all, not just those that are good at exams.

Criticism 5: Exams have always been the tried and trusted way of assessing attainment. There is no need for anything else.

4.16 Written examinations have been widely used for academic assessments in schools and universities. However, that is largely due to their academic heritage where theory is often more important than practice. Even so, coursework is well-established where there are practical elements eg in science and medicine. Few jobs assess prospective candidates exclusively using written exams. In most practical areas from brain surgery to teaching, no-one would trust a written examination on its own to prove competence. That is not to say such examinations are not of value. The key is to use coursework **and** examinations intelligently together in order to provide something that is better than either treated in isolation. Ideological arguments of one method of assessment to the exclusion of another are simply political rather than rational.

The Examination

4.17 Examinations at Level 1 and Level 2 are primarily for grading. The details of the way grades relate to marks are provided above in section 2. The examinations also provide a cross reference in order to increase confidence in the validity of the coursework component.

Weightings

4.18 There are two classes of objectives. AO1, AO2, AO3 are generic assessment objectives:

AO1 – Recall, select and communicate knowledge and understanding.
AO2 – Apply knowledge and understanding through analysis, reasoned judgements and drawing conclusions.
AO3 – Practical and technical skills related to applying skills knowledge and understanding in context.

4.19 Additionally, the qualification units each specify subject specific learning outcomes. The qualification design draws on both classes of objective to ensure balanced representation and that the assessment is a valid representation of what has been learnt.

4.20 The assessment objectives provided by the unit learning outcomes are evenly weighted in the coursework element since all must be achieved in order to pass.

4.21 The synoptic examination is directly related to the unit learning outcomes and assessment criteria using the content definitions in section 3. This is designed to be broadly representative of the aspects of the learning outcomes testable in a synoptic terminal controlled examination related to the learning outcomes. The examination provides a means of testing associated knowledge and understanding, powers of analysis and reasoning and of grading the qualification whereas the course work ensures that there is basic competence in their practical implementation in real and relevant contexts.

4.22 At level 1 the examination weighting of AO1 is 50% and AO2 50%. At level 2 the examination is weighted 20% AO1 and 80% AO2 in the examination and approximately equally in the coursework.

4.23 The overall weighting of the objectives varies depending on the grade because for higher grades AO2 contributes a greater proportion of the marks. This is a deliberate strategy because AO2 is most important when it comes to academic learning at Level 3. The assessment will therefore better inform progression pathways while still having the characteristic of inclusion. At level 2.

Grade C approximately weighted AO1 - 40%, AO2 - 40%, AO3 20%.
Grade A* approximately weighted AO1 - 25%, AO2 - 65%, AO3 10%

4.24 This then provides evidence that the Grade A* candidate is likely to be more suited to future academic study whereas the Grade C

candidate is likely to find it difficult to cope with courses highly dependent on academic testing.

Learner entry and costs

4.25 TLM/COYO subscription model enables schools to enter learners at times convenient to them. There are no late entry fees and no additional fees should a learner fail to produce evidence at a particular level but can meet the criteria at a lower level. This can reduce costs to the school by more than 50% when compared to GCSEs and significantly more than this when compared to some GCSE alternatives. Examination entry will depend on whether or not learners meet the coursework criteria.
This again saves money because the school is not paying for examination administration for learners that are unlikely to be successful or for whom there is little or no benefit in taking an exam. There are no fees for replacement certificates or verification of certificates because all certificates can be directly authenticated against a secure database. For details of current subscription costs please contact us or refer to the web site. All of these design features are intended to reduce direct costs but just as importantly the indirect administrative overhead that diverts teachers from teaching.

Online examination and e-assessment

4.26 The examinations can be delivered in a traditional paper based format or online. There is a surcharge for paper based examining reflecting the extra cost involved. The online versions have a secure web user interface and require no software installation. They can run through any standards compliant web browser on any type of computer. The user is restricted to an area in the centre of the screen during the examination and has no access to the internet, or any other storage device without moving the mouse pointer out of the secure area and this will set off a warning. Persistence will result in disqualification from the examination. Since the Level 2 online exam contains open-ended questions it has to be physically marked and so the results will not be

immediately available but we will aim to have these ready within 2 weeks of taking the exam. The Level 1 examination is multiple choice questions and so the results will be available immediately. For those taking the examinations in the traditional paper based format it is likely to take 4 weeks to finalise results.

4.27 TLM provides optional on-line tools for managing coursework evidence through the community learning site at www.tlm.org.uk. This is a free service because it will reduce time and hence costs for both the Awarding Organisation and the Centre. To optimise efficiency, certain teaching and learning styles are required e.g self and peer assessment validated by the assessor. Not all centres are ready for this and it is therefore not a mandatory requirement.

4.28 It is mandatory for all assessors to record grades in the on-line Markbook. This is because to access the Markbook all assessors have to sign an agreement to uphold standards and so any grade recorded by an assessor is effectively subject to that agreement. All grades must be recorded and in place before and award can be requested. Once an award is requested evidence samples will be sought. If the Centre uses the on-line evidence management system, Markbook grades are transferred automatically and the account manager has immediate access to all the evidence and any assessor learner dialogue associated with the award. This is clearly more efficient and it is what we are working towards for all centres. We always welcome feedback so we can continue to improve the systems to reduce the bureaucratic overhead and support better formative as well as summative assessment as a strategy for raising standards.

Examination schedule

4.29 Examinations are available on demand subject to three main constraints. The coursework must have been moderated and the candidate judged to be competent against the criteria. The exam fees for the candidates must have been paid in full and you must give 6 weeks notice before the scheduled examination date.

Currently exams are taken on-line and you need to set up the group(s) on the Markbook site to then automatically register accounts on the learning site. You need to do this even if you are administering the exam on paper. There are more details in the "How to" section linked to help on the TLM site front page.

Internal standardisation of coursework

4.30 The Principal Assessor has the ultimate responsibility for consistency in assessment standards within a centre and has signed an agreement to that effect. All assessors have signed a contract agreeing to uphold standards and should therefore co-operate with the Principal Assessor and Account Manager at TLM to ensure that standards across the centre are consistent. It is advisable to send work samples to TLM early to check that evidence is at the right standard so that there is time to make any adjustments necessary to the course and learner expectations. TLM will generally check a higher quantity of work from new assessors and feedback to ensure that they are confident to make appropriate judgements over time. This reduces risk and improves efficiency in the longer term.

Authentication

4.31 All assessors must take reasonable steps to ensure that any coursework evidence submitted by candidates is a true reflection of the candidates' competence. This is in keeping with the assessor undertaking to uphold and maintain standards in the contract with TLM.

4.32 Certificates can be authenticated directly online using the certificate number or by scanning the QR code on the certificate. There is no charge and it makes it more likely that certificates will be checked and that in turn improves security. Certificate forgeries are a significant problem when authentication is not simple and straightforward because convincing forgeries are easy to achieve with recent technologies and will get easier as time goes on.

5. Other considerations

Access arrangements and special requirements

5.1 All TLM's qualifications are intended to be accessible, as widely as possible. There is an extensive policy documented on the web site at https://theingots.org/community/QCF2.13
Centres should contact TLM if they have any questions related to accessibility issues.

Language

5.2 The language for provision of this qualification is English only. This will only change if we have a significant demand in another language that is sufficient to cover the additional costs involved and some cultural alterations will be needed. TLM will actively support any work in this line that can be shown to cover costs.

Malpractice

5.3 TLM has comprehensive policies and procedures for dealing with malpractice. These are documented with links on the web site at https://theingots.org/community/QCF5.29-5.32 Assessors should be familiar with these policies and make them clear to candidates. Assessors should inform their account manager if they suspect any instance of malpractice that could have a material effect on the outcome of any assessments, either for themselves or colleagues. This is part of the upholding of standards that is part of the contract with TLM.

Equality of opportunity

5.4 TLM promotes equality of opportunity through policies and procedures. These are again documented in detail on the web site at https://theingots.org/community/QCF2.11-2.14

Resources, support and training

5.5 A clear goal of these qualifications is to enable learners to support their own learning and to reduce dependency in order to become “lifelong learners”. The IT revolution makes this progressively easier. As far as possible we encourage the use of technology and up to date methods, especially those based on empirical evidence.

5.6 TLM encourages the use of free and open source applications to reduce costs and to further inclusion. All of the key proprietary software applications needed to support any of the assessed units are available freely from Autodesk®, one of the world’s leading industrial design software specialists, including architectural 3D modelling and visualisation software. This national scheme also allows free access to students and teachers in the home. However, students are at liberty to use any modelling software they wish, and there are many free alternatives which can be accessed from the internet, particularly for generic and non-specialist applications.

5.7 Integrated aspects of the Design, Engineer, Construct! programme ensure that teachers and learners receive a fully supported, expertly enhanced, stimulating and challenging learning experience. It is anticipated that teachers will soon grow in confidence, develop their own networks of industry based support and be able to develop new projects of their own – ones that may be unique to their local context or that offer specific targeted challenges. There is a huge commitment by the industry to support this programme with pledges of time and money from small and large companies. If this acts as a catalyst for better teaching associated with assessment for learning methods, it is likely that the effects on staff development and better use of technologies to support learning will go far beyond the construction sector.

5.8 The curriculum introduces new areas of learning that include close engagement with the world of work and academia. Teachers and learners alike will find it rewarding, challenging and exciting – a

combination that guarantees successful outcomes and a learning environment that is happy, productive and fun.

5.9 Design, Engineer, Construct! qualifications are designed to support learning that enables access to Further Education, Higher Education and employment for a wider range of young people. They also provide a focus for low cost and sustainable staff development that can keep teachers up to date with the technologies that can enhance the capacity for learners to gain the competencies required to make them employable as well as academically knowledgeable.

6. Grade Descriptions

A **grade A** candidate will exhibit most the following characteristics.

6.1 Candidates demonstrate a high level of independence in using their knowledge and understanding to support activities beneficial to themselves and others in everyday contexts. They recall, select and communicate a thorough knowledge and understanding of the general competences needed to support lifelong learning and personal well-being.

6.2 They apply knowledge, understanding and skills to a variety of situations, selecting and using knowledge and information efficiently to solve problems and produce effective support for their own learning as well as the needs of others. They relate these to comparable activities in the world of work. They manipulate and process data efficiently and effectively based on objective criteria. They interpret information and transfer knowledge and understanding from familiar to unfamiliar contexts. They work creatively exploring and developing ideas. They adopt systematic approaches to safety, promoting secure and responsible practices.

6.3 They use scientific methods to analyse problems such as control of variables and observations to identify needs and opportunities. They set hypotheses in relevant contexts and critically analyse and evaluate the knowledge they gain. They review their own work and that of others making supportive and constructive criticism where appropriate. They communicate effectively, demonstrating a clear sense of purpose and audience.

A **grade C** candidate will exhibit most of the following characteristics

6.4 Candidates demonstrate the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks and address straightforward problems. They take responsibility for

completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.

6.5 They use understanding of facts, procedures and ideas to complete well-defined tasks and address straightforward problems in supporting their learning. They interpret information and ideas related to the social and commercial impact of their actions, showing awareness of the types of information that are relevant to their areas of study. They identify, gather and use relevant information to inform their actions and make judgements about how effective their actions have been.

6.6 They work safely and securely, identifying key risks, taking reasonable actions to avoid them. They collaborate in reviewing their work evaluating the way they and others use their construction knowledge and skills and they take positive actions to improve. They use standard English and IT to communicate effectively, demonstrating some consideration of purpose and audience.

Annexe A - example examination Level 1

The following principles will apply to the design and structure of each exam.

Questions will vary in the general area of the required learning outcomes specified in the units and cover all the assessment criteria in the approximate proportions presented in this document. Questions will reflect a balance of the content listed and explained in the guidance in keeping with Level 1 as defined by the RQF global level descriptors.

Each question is worth 1 mark.

Questions

1. What is a building elevation?

   a) Another name for the roof structure
   b) The front, side and rear face of the building
   c) The height of a building
   d) How high a building is above sea level

2. What is a floor plan?

   a) Defines a type of floor covering
   b) An instrument for smoothing a wooden floor
   c) A receptacle for collecting household waste
   d) The layout of a floor in a building

3. What is a cross-section?

   a) A view along an imaginary line cut through the building
   b) The main structural wall of a building
   c) The boundary of a building
   d) A report issued on building defects

4. What types of natural insulation could be used in your building?

a) Sheep's wool
b) Woodfibre
c) Hemp
d) Any of the above

5. Energy produced by natural resources which can be replaced is known as:

a) Kinetic energy
b) Chemical energy
c) Renewable energy
d) Nuclear energy

6. What is a carbon footprint?

a) A method used by archaeologists to date an object found on site
b) A printing method used by architects designing low-carbon buildings
c) A slang term for the chalky deposit found on the inside of poorly maintained central heating systems
d) The amount of carbon dioxide we produce in our everyday life

7. How many watts are in a kW?

a) 10
b) 100
c) 1000
d) 10000

8. The movement of materials/products as they flow from their source to the end customer is know as:

a) A chain of events

b) A product line
c) A source code
d) A supply chain

9. Who is the client?

a) The architect designing the building
b) The person having construction or building work carried out
c) The building inspector
d) The lawyer dealing with the building contract

10. It is polite to greet your client with:

a) A small gift
b) A handshake with your right hand
c) A handshake with your left hand
d) An invoice

11. In terms of the built environment, what is Custodian?

a) A police building
b) An architect specialising in architecture of the American West
c) A conservation architect
d) Anyone who inhabits and has a responsibility for a building

12. Where do solar panels get their energy from?

a) The sun
b) The national grid
c) The wind
d) Tides

13. Which of these statements is true?

a) The sun rises in the south and sets in the east
b) The sun rises in the east and sets in the west

c) The sun rises in the west and sets in the east
d) The sun rises in the north and sets in the south

14. If we are to achieve maximum solar gain we must consider the position and orientation of our building. What does orientation mean?

a) The direction a building faces
b) The way a building feels to its occupier
c) The direction the wind blows
d) The path of the sun

15. What is a community?

a) A group of people who share common values
b) All the people living in a particular area
c) A social group who share the same government
d) All of the above

16. The Secretary in the Eco Classroom Steering Group is taking notes to provide members of the local community with accurate record of discussion and decisions made. These are called:

a) Minutes
b) Seconds
c) Hours
d) Essays

17. What is a quantity surveyor?

a) A person who measures the land
b) A person who conducts a community questionnaire
c) A person who is in charge of a construction company
d) A person who manages the costs of a building project

18. What is a structural engineer?

a) A person who measures the land
b) A person who focuses on the structure and stability of a building
c) A person who is in charge of a construction company
d) A person who structures the management committee

19. What are building services?

a) Motorway restaurants
b) The people who look after you at the reception desk
c) The systems that make a building safe and comfortable
d) The soft furnishings inside a building

20. A written document that thoroughly explains the focus, outcomes and objectives of the building design is known as:

a) A Design Brief
b) A Brief Encounter
c) A Design Challenge
d) A Focal Point

21. What is an architectural precedent?

a) The person in charge of a country's building programme
b) An existing example of a building of similar purpose
c) A drawing issued to the planning committee
d) A 3D modelling program used in architectural design

22. Which type of light bulb is the most efficient in terms of energy and lifespan?

a) Incandescent
b) Fluorescent
c) Light emitting diode (LED)
d) Tubular vortex

23. A number of important factors affect the energy efficiency of a building, and particularly:

a) How end users behave in the building
b) How many end users drive to the building
c) What end users eat in the building
d) The percentage of end users who regularly exercise

24. Which of the following are ALL building services?

a) Gas, electricity, waste water, fire alarm system
b) Air conditioning, cooking, security alarms, drinking water
c) Ironing, heating system, lighting, telephone connections
d) None of the above

25. You are designing your eco landscape to be accessible to wheelchairs and want to determine the gradient of an existing path. To do this you would

a) measure the horizontal rise and horizontal distance
b) measure the vertical rise and vertical distance
c) measure the vertical rise and horizontal distance
d) measure the vertical distance and horizontal rise

26. Your client wants to attract bees to the garden you are designing. What advice do you offer?

a) Advise him not to, as bees are highly dangerous creatures
b) Plant native flower species that produce lots of nectar
c) Use a large amount of pesticide to kill unwanted bugs
d) Grow plants that are all the same height

27. An architect wants to make use of a natural feature in the landscape. Which of the following will best suit his strategy?

a) design the building using wooden beams

b) design the building to be as energy efficient as possible
c) design the building to be in front of a small wooded field
d) design the building with a green finish

28. A landscape designer is using Pythagoras Theorem to ensure that a tool shed is square. One wall is 3m and the other 4m long. How long should the diagonal check measurement be?

a) 2 m
b) 6 m
c) 7 m
d) 5 m

29. I need to reduce the heat loss from my building. Which of the following actions is most likely to be most effective?

a) switch off all the lights
b) increase the bathroom window from double to triple glazing
c) fill all the wall cavities with polyurethane foam
d) paint the outside of the building black

30. You are CEO of a company and your costs are rising. You want to reduce the day to day running costs of your offices. Who would be the best person to contact?

a) Facilities Manager
b) Solicitor
c) Quantity Surveyor
d) Caretaker

31. In order to extend the building lifecycle the manager might

a) build an extension to the building
b) meet regularly with the architect
c) ensure that the lifestyle of the employees is helpful to their work

d) put more resources into the maintenance programme

32. A new building costs £100,000 per year in facilities costs. If the heating bill is £20,000 per annum and electricity is £15,000 what percentage of the facilities cost is made up from other items?

a) 5%
b) 55%
c) 65%
d) 95%

33. A company wants to build an extension on its Grade 2 listed 18th Century Offices. Which one of the following statements is most likely to be true.

a) The new build will be rejected by the police because it might make burglaries more common in the neighbourhood
b) The planning officer will reject the plan because the new build is not in keeping with the existing environment.
c) The Town Clerk will approve the work because it will bring more business into the town.
d) The architect will not be able to match a new extension to an 18th Century building so that it looks good.

34. Your school decides to build a new sports hall. After drawing up a plan the governors will need to

a) decide how much it will cost to run the building
b) make a planning application to the local authority
c) check that there is enough space to site the building
d) take out a mortgage with the building society

35. You have a dispute over the title to your house. The best course of action would be

a) to rename your house at the Land Registry.

b) discuss it with your partner so you can both agree on a name you both like.
c) to ignore it because the title is not very important.
d) to consult a solicitor and provide evidence the house belongs to you.

36. The bill of quantities for constructing a conservatory includes £5000 for materials, £2000 for labour and £500 for tool hire. The total procurement cost is

a) £7000
b) £7500
c) £8000
d) £5500

37. What is the most important reason to make doors in public buildings wider than in domestic houses?

a) Public buildings are always bigger than domestic houses.
b) Public buildings need better ventilation than domestic houses.
c) Disabled people in wheelchairs need access to public buildings.
d) Private owners have less money than the owners of public buildings.

38. You have adopted an “Access for all” policy for your new school building. This will best be achieved by

a) Providing ramps rather than steps and lifts as well as stairs.
b) Removing locks from the doors.
c) Providing computer terminals in every room.
d) Providing credit cards for all the staff.

39. You run a building company and you are approached by a new client who would like to see a 3D model of the building before it is started. You have put together your team and you need to brief them on

the whole life running costs specified by your client. A good choice of strategy is

a) to get 3D sketches done first and estimate the cost of energy from similar buildings.
b) to take a design you already have and tweak it to fit the customer needs.
c) to do a test build at a scale of 1 to 100 to make sure you have the right skills available before starting for real.
d) implement building information modelling in the design process

40. You are leading a critique session and a member of the team queries your decision to use uPVC windows. Your best response is

a) to challenge the question as they are not an expert.
b) to change the decision to hard wood window frames.
c) to change the subject to something more important.
d) to ask other team members what they think.

41. In order to demonstrate your track record in building design to your clients it would be advisable to

a) Carry all your qualifications around with you.
b) Keep a portfolio of your best work.
c) Take them for a few drinks and talk about what you have done.
d) Borrow designs from colleagues.

42. A client requires his office staff to have 6.50m^2 of space per person, giving each adequate desk space. How many desks will fit into an office space of 143m^2?

a) 10
b) 14
c) 20
d) 22

43. Your building is designed to heat water by passing it through a network of pipes on the roof. For the sun to have the best heating effect what colour should the pipes and surrounds be painted?

a) White
b) Silver
c) Black
d) Yellow

44. A building of historic importance has been “listed”. This is

a) an advantage because being listed will always put the price up.
b) a way of preventing the original character of the building from being changed.
c) a disadvantage because you can’t repair the building.
d) An advantage because it makes the building more eco-friendly

45. Your proposed construction site lies in an SSSI. This could affect your plans if

a) They interfere with the scientific interest in the area
b) They propose to disrupt social integration
c) They involve separation of industry standards
d) They are not protected by selective, site, specific insurance

46. Your client wants a building erected to a straightforward specification in the briefest time possible. A good option to consider is

a) A minimalist building with limited furnishings
b) A new building that is furnished before its occupants move in
c) A prefabricated building
d) A building based on readymix concrete

47. A structural engineer ensures buildings are strong and stable and considers the effect of forces on each design. Which of the following is a gravity force?

a) Wind
b) Snow
c) Waves
d) Earthquakes

48. Your site is prone to erosion from fast running surface water. Your Civil Engineer recommends an attenuation pond. This will

a) prevent any water from reaching your site
b) only be useful when there is light rainfall
c) be of most use in winter when the temperature is below zero
d) capture excess water and allow it to dissipate slowly

49. Your building has air conditioning and an indoor swimming pool. A building services engineer suggests using a heat exchanger to improve energy efficiency. This would

a) take energy from the swimming pool to power the air conditioning
b) take electricity from the cool air produced by the air conditioner to heat the water in the swimming pool
c) take excess heat from the building and use it to produce cool air for the air conditioning
d) take heat output from the air conditioning to warm the water in the swimming pool

50. The average water use per student in a school is 3.5 cubic metres of water per year. If $1m^3$ of water costs £2, how much is the weekly bill for school of 1800 students based on maximum attendance of 40 weeks per year?

a) £242.31
b) £126,000.00
c) £315.00
d) £78.75

Annexe B - Example examination Level 2

The following principles will apply to the design and structure of each exam.

Questions will vary in the general area of the required learning outcomes specified in the units and cover all the assessment criteria in the approximate proportions presented in this document. Questions will reflect a balance of the content listed and explained in the guidance in keeping with Level 2 as defined by the RQF global level descriptors.

Questions

1. A Schedule of Accommodation will include

   a) The number and size of rooms/spaces
   b) Adjacencies/relationships of one part of the building to another
   c) Finishes, furnishings and equipment
   d) All the above

(1 mark)

2. An architectural model is produced at a scale of 1:200. Which of the following is correct?

   a) 2 mm on the model represents 1 m on the actual building
   b) 5 mm on the model represents 1 m on the actual building
   c) 10 mm on the model represents 1 m on the actual building
   d) 50 mm on the model represents 1 m on the actual building

(1 mark)

3. The legislation that ensures people with disabilities have equal rights in their everyday lives is known as:

   a) The Equal Pay Act
   b) The Disability Discrimination Act

c) The Human Rights Act
d) The Disability Living Allowance

(1 mark)

4. Which of the following instruments would be most appropriate for collecting topographical survey data?

a) A periscope
b) A total station
c) A distance measuring wheel
d) A telescope

(1 mark)

5. What are the best absorbers of thermal radiation?
a) Light, dull surfaces
b) Black, shiny surfaces
c) Black, dull surfaces
d) Light, shiny surfaces

(1 mark)

6. What is a TPO?

a) Triple Ply Opening
b) Tree Protection Order
c) Traditional Portico Orthostyle
d) Thermal Performance Objective

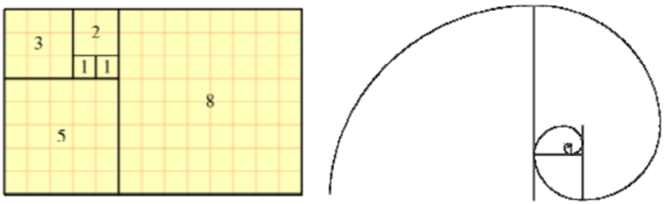
(1 mark)

7. To operate a building to be carbon neutral

a) Insulate the building and use only electricity
b) Insulate the building and only use renewable energy
c) Use only renewable energy
d) Use only electricity

(1 mark)

8. Architects throughout the centuries have used a specific series of ‘Fibonnaci’ numbers in their designs. The first numbers in the sequence are 0, 1, 1, 2, 3, 5, 8,



What are the next two numbers in the sequence?

a) 12, 17
b) 13, 21
c) 11, 16
d) 16, 32

(1 mark)

9. Write down the term that this definition describes:

"development that meets the needs of the present without compromising the ability of future generations to meet their own needs”

(1 mark)

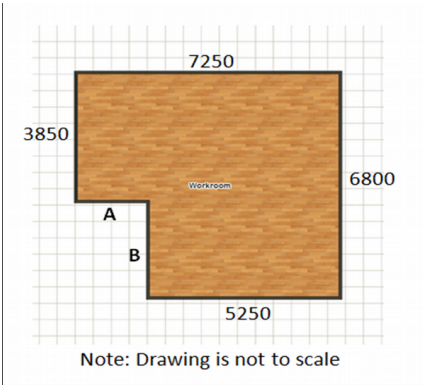
10. Convert the following to the units specified:

a) 1031 mm to metres
b) 10.357 m to millimetres
c) 13959 mm to metres (to 2 d.p.)
d) 36 m^2 to square millimetres

(4 marks)

11. Look at the floor plan below. All corners are right angles. All dimensions provided in mm.

a) Calculate the missing dimensions for wall A and wall B.
b) How many degrees are in a right angle?
c) What is the area of the room in m^2?
d) If the ceiling height is 3000mm, what is the volume (capacity) of the room in m^3?



(4 marks)

12. In the context of planning permission, name three constraints that may be associated with site location?

(3 marks)

13. Why might you generate a shadow study for your building design?

(2 marks)

14. Give two reasons why an efficient lighting strategy is fundamental to good building design

(2 marks)

15. Name two utility services that would be required for a school building project.

(2 marks)

16. Describe a health and safety regulation that would have to be taken into account when designing a school extension.

(2 marks)

17. The Victorians often designed rooms with very high ceilings. Explain how this design impacts energy efficiency.

(2 marks)

18. I have a south facing roof space 10 m x 10 m. The table below provides data about solar panels.

Roof Space in m^2	System Power Output kW/m^2	Quoted Cost to buy and fit $£/m^2$	Estimated Annual Productive Time Hours	Average cost of 1 kWh (Unit) (pence)
100	0.2	200	750	15

a. What will it cost to buy and install the solar panels on my roof?
b. What will the cost saving be in an average year?
c. How many years will be needed before the cost of the panels is paid for by savings?
d. Give one reason why the actual time to recover costs could be more or less than this.

(4 marks)

19. A building project requires the specification for a computer network. A team meeting is setup to set the specification. The Architect, Electrical Engineer and Quantity Surveyor will attend. Who else should be invited?

(1 marks)

20. A building regulations booklet says foundations should be a minimum of 600mm wide and 1m deep. Give two reasons why it might be necessary to increase the depth of the foundations.

(2 marks)

21. What is the purpose of a condition survey?

(2 marks)

22. Describe 3 aspects of poor design in a building with which you are familiar and explain how the design of each aspect could have been improved.

(3 marks)

23. You are required to carry out an aesthetic audit of a building to inform a refurbishment. Explain how you will gather data and the criteria you will use for the audit.

(3 marks)

24. Your structural engineer is designing a large roof span for your building.

a) What shape is she most likely to utilise?

(1 mark)

b) Why does she choose this shape?

(3 marks)

25. Explain the term' Clash Detection' and why it is an important part of the design process. Provide one example of a 'clash'.

(3 marks)

26. What do the letters DPC stand for? Where would you find a DPC? Some old buildings do not have a DPC, what evidence would you look for to see if this was causing problems.

(3 marks)

27. “The location of a building is as important to sustainability as its carbon footprint related to its day to day facilities management”

a. What does sustainability mean in the context of this statement?
b. What is a carbon footprint?
c. What factors about the location of a building determine its sustainability?

(3 marks)

28. Give three examples where BIM and the visualisation of a construction project is beneficial.
(3 marks)

29. Give three examples how you would cut waste from your construction project.

(3 marks)

30. For a building project with which you are familiar, describe the strengths and weaknesses that became apparent in the final project evaluation and say how these will affect your approach to a new project.

(6 marks)

Annexe C - Level 1 Units

Level 1 Design Engineer Construct
Unit 1: Defining a Sustainable Construction Project
3 credits (20 GLH) – J/505/5438

1. understand issues related to sustainability in construction projects	**2. understand issues related to the local community in construction projects**
1.1 define sustainability	2.1 use a range of methods to discover who lives in my local community and suggest ways to demonstrate results
1.2 identify ways in which sustainability affects the local community	2.2 engage my community in the design and planning processes of my building project in their role as ‘client’
1.3 identify the range and depth of knowledge in my local community related to sustainability	2.3 respond to identified community needs with specific solutions
1.4 present sustainability issues to a relevant audience	2.4 research the impact of a construction project on the local community
1.5 identify and communicate ways of improving sustainability in my local community	2.5 understand how a formal meeting should be structured, conducted and recorded

Level 1 Design Engineer Construct
Unit 2: Roles in Construction Teams
7 credits (60 GLH) L/505/5439

1. understand the importance of teams in construction projects	**2. understand the role of the architect**	**3. understand the role of the building services engineer**
1.1 relate successful construction projects to team effort	2.1 outline the role of an architect	3.1 outline the role of the building services engineer
1.2 identify the roles and responsibilities of the key members in a construction team	2.2 explain how the architect works with a client on a building project	3.2 identify services associated with a familiar building
1.3 identify how each team member contributes to the sustainability of the project	2.3 identify the key elements and structure of a design brief	3.3 relate the behaviour of end users to impact on the efficiency of a building
1.4 communicate ideas between the team	2.4 use precedents to inform research	3.4 recognise the symbols that represent building services on a plan
1.5 identify and communicate ways of improving sustainability in my local community	2.5 explain that a design brief requires clear and effective communication with the client	3.5 apply learning to own sustainable building design
	2.6 respond to identified community needs with specific solutions	
	2.7 provide a concept model and sketch scheme	
	2.8 present a case for a specified construction project	

Level 1 Design Engineer Construct
Unit 2 (cont.) - Roles in Construction Teams
7 credits (60 GLH) L/505/5439

4. understand the role of the landscape designer	**5. understand the role of the site engineer**	**6. understand the role of the facilities manager**
4.1 outline the role of the landscape designer	5.1 outline the role of a site engineer	6.1 outline the role of a facilities manager in the context of a school building
4.2 indicate how natural and manmade features impact the layout of a landscape design	5.2 use specific mathematical solutions to inform site engineering problems	6.2 relate the behaviour of people within a building to the success of adoption and subsequent sustainability
4.3 relate the path of the sun to the positioning of natural and manmade garden design features	5.3 follow practical procedures to correctly position and orientate a building	6.3 use empirical evidence to inform the sustainability of a school
4.4 make a water level to determine changes in height		6.4 gather information by interviewing school staff
4.5 relate the outdoor learning environment to the sustainable building project		6.5 relate evidence to the development of a building project
4.6 use characteristics of the school landscape as a basis for a detailed landscape plan		6.6 establish resource efficiency guidelines to support the facilities management role

Level 1 Design Engineer Construct!
Unit 3: Producing a Technical Design for a Construction Project and Sharing Information
3 credits (20 GLH) F/505/5440

1. use building information management (BIM) to produce realistic buildings.	**2. be able to share information effectively**
1.1 identify reasons why BIM is an essential process for development of a construction project	2.1 demonstrate the value of professional collaboration and sharing information in a building project
1.2 set up a 3D model using simple architectural and aesthetic elements	2.2 use tools and techniques to present my building project in a 3D environment
1.3 input, organise and combine information in a 3D environment	2.3 demonstrate the impact of natural and artificial light on my building project
1.4 define and produce floor plans, elevations, sections and visualisations	2.4 communicate detailed information about a building to a client and project team using BIM technology
1.5 create a drawing on a title sheet	

Level 1 Design, Engineer, Construct!
Unit 4: Planning, Costing and Presenting a Sustainable Building Project - 3 credits (20 GLH) J/505/5441

1. understand issues associated with planning legislation and controls	**2. understand issues associated with procurement for a construction project**	**3. be able to make effective presentations**
1.1 describe the importance of planning and planning protocols	2.1 identify the effects of local and global procurement on local and global communities	3.1 support a presentation with appropriate digital technologies
1.2 identify planning requirements related to the design and construction of an Eco Classroom	2.2 identify properties of sustainable building materials	3.2 design supporting media content to have impact and clarity
1.3 identify common problems that arise in planning applications	2.3 select sustainable goods and services from local sources where practicable	3.3 structure a presentation to prioritise the messages
1.4 develop a structured argument to support a given planning application scenario	2.4 produce a bill of quantities for a construction project	3.4 make effective use of the time available while making a presentation
1.5 agree appropriate measures to conclude a successful planning application	2.5 identify the range of industry specific skills available locally	3.5 identify strengths and weaknesses in my presentation

Assessor's guide to interpreting the criteria

General Information

RQF general description for Level 1 qualifications

- RQF general description for Level 1 qualifications
- Achievement at RQF level 1 (EQF Level 2) reflects the ability to use relevant knowledge, skills and procedures to complete routine tasks. It includes responsibility for completing tasks and procedures subject to direction or guidance.
- Use knowledge of facts, procedures and ideas to complete well-defined, routine tasks. Be aware of information relevant to the area of study or work
- Complete well-defined routine tasks. Use relevant skills and procedures. Select and use relevant information. Identify whether actions have been effective.
- Take responsibility for completing tasks and procedures subject to direction or guidance as needed

Requirements

- Standards must be confirmed by a trained Level 1 Assessor or higher
- Assessors must at a minimum record assessment judgements as entries in the online mark book on the tlm.orh.uk certification site.
- Routine evidence of work used for judging assessment outcomes in the candidates' records of their day to day work will be available from their e-portfolios and online work. Assessors should ensure that relevant web pages are available to their Account Manager on request by supply of the URL.
- When the candidate provides evidence of matching all the criteria to the specification, subject to the guidance below, the assessor can request the award using the link on the certification site. The Account Manager will request a random

sample of evidence from candidates' work that verifies the assessor's judgement.

- When the Account Manager is satisfied that the evidence is sufficient to safely make an award, the candidate's success will be confirmed and the unit certificate will be printable from the web site.
- Each unit at Level 1 has recommended guided learning hours based on time required to complete by an average learner.

Assessment Method

Assessors can score each of the criteria N, L, S or H. N indicates no evidence and it is the default setting. L indicates some capability but some help still required to meet the standard. S indicates that the candidate can match the criterion to its required specification in keeping with the overall level descriptor. H indicates performance that goes beyond the expected in at least some aspects. Candidates are required to achieve at least S on all the criteria to achieve the full unit award. Once the candidate has satisfied all the criteria by demonstrating practical competence in realistic contexts they achieve the unit certificate.

Expansion of the assessment criteria

Unit 1: Defining a Sustainable Construction Project

1. The candidate will understand issues related to sustainability in construction projects.

I can:

1.1 define sustainability

Candidates should be able to define sustainability in keeping with personal interpretation of accepted definitions.

Evidence: portfolios of evidence, internal testing.

Additional information and guidance: Candidates should familiarise themselves with the range of definitions of sustainability and sustainable

development, including those most used in the global context (e.g. the Brundtland Report), and those used nationally and locally. They should be able to define sustainability in the sense of what it means to them personally.

1.2 identify ways in which sustainability affects the local community

Candidates should identify several ways in which sustainability issues affect their local community.

Evidence: portfolio of evidence, internal testing.

Additional information and guidance: Candidates should explore ways in which their local community is affected by issues of sustainability. They can investigate how local systems operate and research the environmental, economic and social health benefits of creating a more sustainable future. They can investigate the ways electricity, water, sewage treatment, refuse collection and other council services are provided, and how sustainable these services are. They can analyse human behaviour in their school and community with regard to recycling, litter, wellbeing, tolerance, inclusion and social cohesion.

1.3 identify the range and depth of knowledge in my local community related to sustainability

Candidates should be able to identify specific aspects of strengths and weaknesses in community environmental behaviour and attitudes.

Evidence: community surveys, interview transcripts, reports in portfolio.

Additional information and guidance: Candidates should devise a questionnaire and encourage their community to participate in their research to ensure that a wide range of data is collected. They should investigate how people feel about sustainability, whether they are adopting measures to be more sustainable and indeed whether they value a more sustainable lifestyle. Enquiries should be made to official figures, councillors and community leaders to investigate sustainable leadership. Candidates should evaluate strengths and weaknesses in social, economic and environmental behaviour and conditions in the

community, and where possible, compare this data with other communities.

1.4 present sustainability issues to a relevant audience

Candidates should demonstrate the capacity to make a practical presentation on the subject of sustainability.

Evidence: reports, video, information boards in portfolios.

Additional information and guidance: Candidates should present their findings in an appropriate manner. This can include verbal written and electronic media.

1.5 identify and communicate ways of improving sustainability in my local community

Candidates should communicate methods, strategies and actions that could be used to improve sustainability in the local community.

Evidence: reports, video, information boards, classroom/assembly/community presentations.

Additional information and guidance: Candidates should devise an appropriate method of communication to educate and encourage their local environment to be more sustainable.

2. The candidate will understand issues related to the local community in construction project.

I can:

2.1 use a range of methods to discover who lives in my local community and suggest ways to demonstrate results

Candidates should be supported to find and use appropriate sources of information to discover the nature of their community.

Evidence: Presentation of community surveys, interviews, reports, research, census information in portfolios.

Additional information and guidance: Candidates should devise an appropriate method to research demographic information. They can use web based information such as the UK National Statistics hub via http://www.statistics.gov.uk/hub/regional-statistics/index.html or find other local census information from local authority websites and offices. At level 1 they will need structured guidance.

2.2 engage the community in the design and planning processes of a building project in their role as 'client'

Candidates should devise an appropriate method to engage their local community to contribute towards a vision for a community eco classroom.

Evidence: transcripts/recordings of interviews, role play.

Additional information and guidance: Candidates should devise an appropriate method to engage their local community to contribute towards a vision for a community eco classroom. Parents and other family members may be invited to contribute at this stage. Candidates may devise a social media strategy e.g. using Facebook and Twitter to reach the community. This could be linked to the collaborative technologies unit in the ITQ.

2.3 respond to identified community needs with specific solutions

Candidates should consider the issues related to accessibility of the meeting with targeted solutions.

Evidence: reports in portfolios of evidence.

Additional information and guidance: Candidates should consider how they will engage and include those who may not be able to attend meetings or have access to the internet, e.g. those at work during the day, the elderly, parents with small children, disabled and those who do not speak English.

2.4 research the impact of a construction project on the local community

With structured support in keeping with the Level 1 descriptor, candidates will devise and carry out a small scale research exercise to find the impact of their project on the community.

Evidence: portfolio of evidence.

Additional information and guidance: Candidates should devise an appropriate method to research impact on the local environment and community. They should investigate how to persuade others by building trust and try to empathise, understanding how different members of the community might react to their project. Will they see it as a useful building, or a white elephant? They should provide reasons and justifications, exploring a range of issues. They might investigate other similar established community projects through local media and internet research. At level 1 they will need structured support.

2.5 understand how a formal meeting should be structured, conducted and recorded

Candidates should demonstrate understanding of formal meetings, their structure and the importance of accurate recording.

Evidence: video/recorded discussion in the context of a client meeting and written evidence in portfolios.

Additional information and guidance: Candidates will set up a mock steering group and assign governing roles and responsibilities. They should take minutes, and understand why keeping an accurate record and advising stakeholders is critical to the success of the project. They should establish the aim of the group and prepare a group plan. At the end of a meeting, they should set an agenda and agree a method of publicising the minutes to the community.

Unit 2: Roles in Construction Teams

1. The candidate will understand the importance of teams in construction projects.

I can:

1.1 relate successful construction projects to team effort

Candidates should be able to identify the key benefits of teamwork and relate these to construction projects.

Evidence: from assessor observations, video/recorded discussion.

Additional information and guidance: Candidates will discuss the merits of working as a team and the skills and benefits of integration, communication and sharing ideas. Successful project development and delivery stems from a range of professionals working closely together with the client to achieve a greater outcome than working independently. A successful team collaborates from start to finish. Examples of good teamwork can come from anywhere - sport, expedition, the running of a successful school. Roles will include generic skills such as leadership, researcher, evaluator as well as specific professional skills to make the team work.

1.2 identify the roles and responsibilities of the key members in a construction team

Candidates will investigate a range of professional roles in the built environment and their contribution to the eco classroom project.

Evidence: portfolios and local testing.

Additional information and guidance: Candidates will investigate a range of professional roles in the built environment and their contribution to the eco classroom project. At level 1 candidates should be able to link roles to responsibilities if given a list and work out what might happen if a particular role is missing or weak. Who will be project leader? What special responsibilities do they have?

1.3 identify how each team member contributes to the sustainability of the project

Candidates should appreciate the function of each team member with a focus on sustainability.

Evidence: portfolios of evidence and internal testing.

Additional information and guidance: Candidates will investigate the function of each team member and how each might contribute to the ongoing sustainability of the project. They will promote positive behaviour and excellent governance practices throughout the lifecycle of the project. For example, as an easy target, the team may agree to limit the use of paper, car share to site visits, hold meetings by Skype or similar, and commit to a range of energy efficiency and waste reduction measures. Candidates will encourage the team to lead by example, influencing suppliers and opting for sustainable products and services wherever possible.

2. The candidate will understand the role of the architect.

I can:

2.1 outline the role of an architect

Candidates will be able to write down the key responsibilities of the architect and his/her contribution to the project and to the team.

Evidence: from assessor observations, portfolios and internal testing.

Additional information and guidance: Candidates will be able to describe the key responsibilities of the architect and his/her contribution to the project and to the team. At level 1 structured support can be given with appropriate clues or prompts.

2.2 explain how the architect works with a client on a building project

Candidates will be able to articulate the architect/client relationship in simple terms.

Evidence: recordings or written explanation in portfolios, internal testing.

Additional information and guidance: Candidates will be able to describe the architect/client relationship including the need for the client to specify what is required and the need of the architect to point out implications such as cost, legal issues, aesthetics, environment and other professional issues.

2.3 identify the key elements and structure of a design brief

Candidates should be familiar with the key elements and structure of a design brief.

Evidence: preparation of an outline document.

Additional information and guidance: Candidates will be able to describe the requirements and functions of the eco classroom from previous research and communications with the client (their local community). The brief may include simple sketches and a checklist to reinforce principles and ideas. Level 1 candidates will require structured support in the form of organising their work to add detail to the brief.

2.4 use precedents to inform research

Candidates should understand the term precedent.

Evidence: Sketches, photographic examples and preparation of a brief overview of selected precedents.

Additional information and guidance: Candidates will research local, national and global examples of existing eco structures to help them understand the works of other architects and aid them to create their own eco classroom design.

2.5 explain that a design brief requires clear and effective communication with the client

Candidates should recognise the characteristics of a design brief in terms of simple and clear communication.

Evidence: from assessor observations, video.

Additional information and guidance: Candidates will outline the need for an effective, jargon-free design brief which conveys a client's vision, their goals and their priorities and provides an accurate account of the project's deliverables. They should understand that the brief is the most important piece of information between an architect and a client and effectively form a contract between the two. Time, effort and accuracy is required to create a good brief, which, in the long run, can save time and money, and be the starting point to an effective architect/client relationship. The brief should refer to a budget estimate realistic timeline and should confirm the main point of contact and decision maker(s), referenced to the community steering group.

2.6 respond to identified community needs with specific solutions

The candidate will show the capacity to respond positively to community needs based on objective research.

Evidence: from assessor observations, presentation to client representative(s), role play and content of portfolios.

Additional information and guidance: Candidates will demonstrate they have acknowledged community needs by produce an ideas board which represents and summarises their recommendations identified through previous and ongoing research. They should reflect a sense of community and ownership using graphical solutions. Level 1 candidates will need structured guidance.

2.7 provide a simple concept model and sketch scheme

Candidates demonstrate an ability to communicate broad concepts using a model or models.

Evidence: Sketch scheme, model in portfolios.

Additional information and guidance: Candidates can produce a simple scale model (e.g. cardboard) to give their community a sense of size, space and form. It is recommended that candidates include scale 'people'. Models can be small and not very detailed, but would generally show the entrance, circulation, basic structure and envelope.

A sketch scheme will help communicate ideas visually to the community, and should include mood boards and sketches outlining the proposed project.

2.8 present a case for a specified construction project

The candidate will present a credible case for a construction project backed by evidence.

Evidence: recorded verbal presentation, examples of scheme in portfolios.

Additional information and guidance: Candidates should summarise their research and use their evidence as the basis for their sustainable recommendations and proposed design. At this point, it is recommended that professionals are invited to take part in the preparation and delivery of these presentations, offering constructive criticism to the candidates as they develop their presentation skills. Candidates should be conscious of the language they use, that they do not use over complicated terminology, and so convey their design ideas to every possible member of the community. Presentations should be simple, but relevant - candidates might adopt an 'elevator pitch' style, thereby getting the client excited about their eco classroom in a maximum of 30 seconds and in 130 words or fewer! Most of all, the presentation should be delivered assertively, confident in the knowledge that the project has immense benefits for the local community. At level 1 structured coaching and support is expected.

3. The candidate will understand the role of the building services engineer.

I can:

3.1 outline the role of the building services engineer

Candidates should be familiar with the main tasks undertaken by the building services engineer.

Evidence: research, reporting recorded in portfolio.

Additional information and guidance: Candidates will be able to list the key responsibilities of the building services engineer and his/her contribution to the project and to the team

3.2 identify services associated with a familiar building

Candidates should be able to identify the services provided in their own homes.

Evidence: 2D plan, digital floor plan in portfolio.

Additional information and guidance: Candidates will prepare a floor plan sketch of their homes to identify existing services.

relate the behaviour of end users to impact on the efficiency of a building

Candidates should be able to relate the behaviour of users of the building to its energy efficiency.

Evidence: research, reporting in portfolio.

Additional information and guidance: Candidates will keep a diary for one week which represents service related activity each day of that week. They are encouraged to record each event in a concise format from the moment they get up to the time they go to bed. This diary is used to highlight the impact of human behaviour on energy efficiency in a domestic dwelling. Through simple analysis in the classroom, candidates should devise ways of adapting their everyday habits to support sustainable living, and indeed be able to reflect on the way they operate in other buildings, e.g. school. They are encouraged to consider methods to promote sustainability.

3.3 recognise the symbols that represent building services on a plan

Candidates can identify industry standard symbols and relate the to what they represent.

Evidence: 2D plan, digital floor plan in portfolio.

Additional information and guidance: Candidates will be able to recognise and annotate their drawings with industry standard symbols.

3.4 apply learning to own sustainable building design

Candidates should be able to identify features in their own designs that are a result of their learning on the course.

Evidence: verbal/written presentation in portfolio.

Additional information and guidance: Candidates will be able to describe their own experiences and demonstrate how their discoveries have been implemented in their project. They should recognise that post occupancy behaviour has a critical impact on the success or failure of a building, no matter how energy efficient its design and construction.

4. The candidate will understand the role of the landscape designer.

I can:

4.1 outline the role of the landscape designer

Candidates should be familiar with the main tasks undertaken by the building services engineer.

Evidence: research, reporting in portfolios.

Additional information and guidance: Candidates will be able to identify the key responsibilities of the landscape designer and his/her contribution to the project and to the team

4.2 indicate how natural and man-made features impact the layout of a landscape design

Candidates should use a plan to indicate how natural and man-made features impact the layout of a landscape design.

Evidence: sketch plan in portfolios.

Additional information and guidance: Candidates will identify an area of the school grounds or local community area as a basis for their design. They will sketch and label man-made and natural features and their impact on the overall existing environment in terms of aesthetics

and how the landscape makes them feel. They should consider how a landscape can be designed to promote sustainable living in the local community, and whether the existing space supports this ethos.

4.3 relate the path of the sun to the positioning of natural and man-made garden design features

Candidates should be able to consider the position of the sun and its light when planning a garden.

Evidence: sketch plans in portfolios.

Additional information and guidance: Candidates will mark the position of the sun at various times of the day on their plan, and determine its path from East to West, thereby determining areas of sun and shade and the impact on the installation of natural and manmade features.

4.4 make a water level to determine changes in height

Candidates should be able to make a water level.

Evidence: from assessor observations, recorded results in portfolios.

Additional information and guidance: Candidates will make a simple water level and record changes in height across an existing landscape

4.5 relate the outdoor learning environment to the sustainable building project

Candidates should be able to identify the links between their building project and the wider opportunities to extend the learning space.

Evidence: report documentation in portfolios.

Additional information and guidance: Candidates will demonstrate that the landscape designed for the community eco classroom acts as an extension to the building in terms of learning opportunities. For example, a growing area should determine that preparation and cooking areas should be included in the classroom design, and that it may provide storage space for gardening equipment. Further examples include specific areas which may require exhibition space, e.g. beehives

in the garden supported by an exhibition inside the classroom to raise awareness of the decline in bees.

4.6 use characteristics of the school landscape as a basis for a detailed landscape plan

Candidates will prepare a final sketch plan or digital drawing of their eco garden based on observations, existing features and research.

Evidence: sketch plan, digital drawing in portfolios.

Additional information and guidance:
Candidates at level 1 will need structured guidance in organising their evidence into a landscape plan. Any candidates that can do this autonomously are likely to be operating above level 1 and should be considered for Level 2 work.

5. The candidate will understand the role of the site engineer.

I can:

5.1 outline the role of a site engineer

The candidate should be able to identify the key characteristics of the role of a site engineer.

Evidence: research, reporting documented in portfolios.

Additional information and guidance: Candidates will be able to identify the key responsibilities of the site engineer and his/her contribution to the project and to the team.

5.2 use specific mathematical solutions to inform site engineering problems

Candidates should be able to use simple geometry to support building calculations.

Evidence: calculations in portfolios, internal testing.

Additional information and guidance: Candidates will use Pythagoras Theorem to calculate the hypotenuse of a triangle of specified dimensions adjacent to the right angle i.e the xy dimensions of the eco classroom.

5.3 follow practical procedures to correctly position and orientate a building

Candidates should be able to follow a set of instructions including simple calculations to position a building.

Evidence: from assessor observations, plans and drawings in portfolios.

Additional information and guidance: Candidates will use their Pythagoras calculations to accurately position and mark the four corners of the eco classroom building footprint and orientate the longest baseline along an East-West direction.

6. The candidate will understand the role of the facilities manager.

I can:

6.1 outline the role of a facilities manager in the context of a school building

Candidates will be able to describe the key responsibilities of the facilities manager and his/her contribution to the project and to the team.

Evidence: research, reporting, documentation in portfolios.

Additional information and guidance: Facilities managers are responsible for the management of services and processes that support the core business of an organisation. They ensure that an organisation has the most suitable working environment for its employees and their activities. Duties vary with the nature of the organisation, but facilities managers generally focus on using best business practice to improve efficiency, by reducing operating costs while increasing productivity.

This is a wide field with a diverse range of responsibilities, which are dependent on the structure and size of the organisation. Facilities managers are involved in both strategic planning and day-to-day operations, particularly in relation to buildings and premises. Likely areas of responsibility include:

- procurement and contract management;
- building and grounds maintenance;
- cleaning;
- catering and vending;
- health and safety;
- security;
- utilities and communications infrastructure;
- space management.

6.2 relate the behaviour of people within a building to the success of adoption and subsequent sustainability

Candidates should make an effective presentation in the required context.

Evidence: verbal/written report/presentation files in portfolios.

Additional information and guidance: Candidates should prepare a summary presentation with text and photographs, and present their findings to the whole group. Their research is put into context of the school, student experiences and ambitions. Evidence should be presented to the school's senior management team wherever possible. At level 1 support with structure will be needed.

6.3 use empirical evidence to inform the sustainability of a school

Candidates should know that first hand evidence is available in their own school, how to obtain it and how to use it.

Evidence: records and photographic evidence in portfolios.

Additional information and guidance: Candidates will investigate a number of factors which contribute to the sustainability of their own school. They will research where and why specific issues are found and

who is responsible for its management, how they propose to resolve the issue and in what time scale.

6.4 gather information by interviewing school staff

Candidates should demonstrate the ability to gather information through interviews.

Evidence: interviews recorded and/or documented in portfolios.

Additional information and guidance: Using a notepad, camera and recorder, candidates will interview key school staff and identify key areas to establish a range and impact of factors that contribute to the school's sustainability. At this stage, it is anticipated that identified staff will support the initiative as part of a sustainable development plan for the school.

6.5 relate evidence to the development of a building project

The candidate will identify strengths and weaknesses in their eco classroom based on research evidence.

Evidence: written report. documentation in portfolios.

Additional information and guidance: Candidates will evaluate their project in relation to best practice opportunities in the context of their own eco classroom. Conversely they will identify issues which may be improved or avoided.

6.6 establish resource efficiency guidelines to support the facilities management role

Candidates should be provided the structure to produce a useful community guide in the principles of sustainability.

Evidence: Written report in portfolios.

Additional information and guidance: Candidates, ideally with senior management support, should include their evidence in a guidebook to help parents, staff and students adopt their sustainability principles in the home and the school. This guide in effect becomes an instruction manual for facilities management within the school from the students'

perspective. As an extension possibility, candidates are encouraged to interrogate any existing publications and offer a comparison of their findings. Level 1 candidates will need support in structuring their documentation.

Unit 3: Producing a Technical Design for a Construction Project and Sharing Information

1. The candidate will use building information management (BIM) to produce realistic buildings.

I can:

1.1 identify reasons why BIM is an essential process for development of a construction project

Candidates should recognise BIM as enabling the realistic modelling of buildings and the sharing of critical real-time information.

Evidence: verbal/written report in portfolios.

Additional information and guidance: They should investigate current local, national and international use, and government drivers for adoption across all built environment sectors. The UK Government website dedicated to BIM practice and protocol is http://www.bimtaskgroup.org/.

1.2 set up a 3D model using simple architectural and aesthetic elements

Candidates will use professional software to produce a building model.

Evidence: from assessor observations, creation of a 3D architectural model using Autodesk Revit software.

Additional information and guidance: Candidates, ideally with senior management support, should include their evidence in a guidebook to help community members get an insight into how buildings can be modelled.

1.3 input, organise and combine information in a 3D environment

Candidates will prepare the resources they need in the 3D software environment to realise their model.

Evidence: from assessor observations, creation of a 3D architectural model using Autodesk Revit software.

Additional information and guidance: Candidates will have completed reasonable research by this point and be in possession of the design brief, sketch schemes, building services data and aesthetic information. They are to introduce spaces/rooms which are included in their eco classroom design by drawing walls using specified materials to encompass the rooms which have been identified in the
Brief. Areas should be calculated using standardized units (m3), rooms named, and doors added to demonstrate the flow of the building. Candidates should be encouraged to 'test' their designs by firstly estimating and then physically measuring rooms having a similar function within their school (e.g. disabled toilets, classrooms etc). They should research guidance specific to accommodation and inhabitants. Windows, curtain walling, floors, ceilings, roofs and furniture can be added and the external site can be modelled to include topography.

1.4 define and produce floor plans, elevations, sections and visualisations

Candidates should be able to use the software to produce projections and rendering to provide realistic designs.

Evidence: from assessor observations, creation of a 3D architectural model using Autodesk Revit software.

Additional information and guidance: Candidates will create 2D floor plans, elevations and sections, and also are to produce a realistic visualisation and render.

1.5 create a drawing on a title sheet

Candidates will create their own fully annotated drawing sheet complete with floor plans, elevations and sections at a useful scale.

Evidence: from assessor observations, creation of a 2D drawing sheet using Autodesk Revit software.

Additional information and guidance: Level 1 candidates will require structured support **to achieve this.**

2. The candidate will be able to share information effectively.

I can:

2.1 demonstrate the value of professional collaboration and sharing information in a building project

Candidates should be able to navigate their model, and share ideas and information.

Evidence: from assessor observations, presentation of 3D model using Autodesk Revit software/crit/team presentation in portfolios.

Additional information and guidance: Candidates should demonstrate their appreciation of the client's requirements through comparison to the 3D model. They should navigate around the model, and be able to interrogate each element when asked to do so. Candidates should discuss the merits of collaborative working and sharing ideas and information recognise that BIM plays a key role in reducing construction resource consumption and promoting sustainability.

2.2 use tools and techniques to present my building project in a 3D environment

Candidates should demonstrate their knowledge and ability to use tools and techniques to present their 3D projects.

Evidence: from assessor observations, presentation of 3D model using Autodesk Revit software/crit/team presentation in portfolios.

Additional information and guidance: Candidates will learn the tools and techniques in the 3D software environment through practical experience. The accumulated knowledge and skills should enable them to present their 3D projects. Level 1 candidates will need structured guidance in getting to this point.

2.3 demonstrate the impact of natural and artificial light on my building project

Candidates will be able to demonstrate simple lighting effects to show how they need to be taken into account in their project design.

Evidence: from assessor observations, presentation of 3D model using Autodesk Revit software/crit/team presentation, shadow study in portfolios

Additional information and guidance: Candidates will action, analyse and demonstrate understanding of a shadow study. They should evaluate an artificial lighting schedule concluding in the selection and justification of the most energy efficient solution.

2.4 communicate detailed information about a building to a client and project team using BIM technology

The candidate should be able to use the BIM environment confidently to communicate details of their project.

Evidence: from assessor observations, presentation of 3D model using Autodesk Revit software/crit/team presentation in portfolios.

Additional information and guidance: Candidates should be comfortable and confident in navigating and explaining fundamental principles as they work their way around their eco classroom project. They should include items in the checklist featured in the design brief, and discuss issues and successes. At level 1 templates and structures can be provided to help organise the presentation of work.

Unit 4: Planning, Costing and Presenting a Sustainable Building Project

1. The candidate will understand issues associated with planning legislation and controls.

I can:

1.1 describe the importance of planning and planning protocols

Candidates can identify the reasons for planning and the role of the planning officer in enforcing planning protocols.

Evidence: Verbal/written reports in portfolios.

Additional information and guidance: At level 1 identifying key reasons and aspects of the planning officer role is sufficient but candidates should be encouraged to describe and explain these in as much detail as they are able. This will help develop literacy and communication skills.

1.2 identify planning requirements related to the design and construction of an Eco Classroom

Candidates should possess a sound knowledge of their eco classroom's immediate location and local surrounding area insofar as they could be relevant to planning restrictions.

Evidence: from portfolios of evidence.

Additional information and guidance: They should demonstrate that they have investigated any planning restrictions on their construction project and taken all measures to ensure a positive result.

1.3 identify common problems that arise in planning applications

Candidates will have an understanding of the issues and constraints surrounding planning applications.

Evidence: from portfolios and/or internal controlled tests.

Additional information and guidance: They should be aware of a number of factors that influence a planning decision, particularly where construction will impact the local community and the environment, for example over development, conservation areas or areas of outstanding natural beauty, wildlife habitat or floodplain. They should have a general awareness regarding contaminated land restrictions and tree preservation.

1.4 develop a structured argument to support a given planning application scenario.

Candidates should demonstrate leadership skills in the planning committee room.

Evidence: from assessor observations, portfolios.

Additional information and guidance: They should have prepared and rehearsed a 3 minute statement to counteract an argument and addition to presenting evidence, they should find reliable solutions to potential issues.

Getting the tone of the debate right is critical - being sarcastic or angry puts listeners off immediately. A candidate who is 'pro' development should tell the 'story' of the eco classroom - why it is deemed necessary, for the greater good and the good of the local community. They should include significant facts, avoiding rhetoric, argument or comments that may offend the opposing party. In addition to presenting evidence, they should find reliable solutions to potential issues. Conversely, if the candidate opposes the eco classroom, he/she must return the same justification, clearly explaining why the project should not go ahead. Level 1 candidates will need structured guidance in preparing their piece.

1.5 agree appropriate measures to conclude a successful planning application

Candidates should be prepared to present supporting evidence at a planning committee meeting.

Evidence: Assessor observation and portfolios.

Additional information and guidance: They should have with them all site plans and design drawings (elevations, floor plans, sections) on title blocks if possible. Further information is available on the UK website http://www.planningportal.gov.uk/
Level 1 candidates will need support in organising their resources in keeping with the overall level 1 descriptor.

2. The candidate will understand issues associated with procurement for a construction project.

I can:

2.1 identify the effects of local and global procurement on local and global communities

Candidates should demonstrate they understand some key impacts of ethical and sustainable procurement both locally, nationally and globally.

Evidence: portfolios and/or internal controlled tests.

Additional information and guidance: They will investigate 5 shopping items on a shopping receipt (e.g. the local supermarket) and determine where the goods are coming from (the source), how they are manufactured/grown, by whom, and how do they get to us. The candidate will understand that there is often a fine economic, environmental and social balance between supporting a local economy in one country and not doing so in the very neighbourhood in which they live. Working closely with local suppliers can generate employment, skills and training opportunities, and we can enable small and diverse businesses to share in the delivery of large contracts. And yet, not procuring goods from third world countries that rely on our business can prove disastrous. Procuring solar panels from Eastern Europe may well make our energy cheaper, but in the long run, have we really saved the planet when the lorry that has made its way across the continent has burned a colossal amount of fossil fuels to get them here? UK government's Sustainable Procurement National Action Plan includes initiatives to

- reduce waste, carbon emissions, energy and water consumption
- protect biodiversity
- stop the buying of timber from unsustainable sources
- support fair and sustainable economic growth
- deliver social benefits through procurement

Another excellent resource regarding industry and sustainable procurement can be found at http://www.ciria.org/service/Web_Site/AM/ContentManagerNet/ContentDisplay.aspx?Section=Web_Site&ContentID=19278

2.2 identify properties of sustainable building materials

Candidates should demonstrate their knowledge of sustainable building materials through identifying information in their previous research.

Evidence: portfolios and/or internal controlled tests.

Additional information and guidance: Level 1 candidates should be encouraged to go beyond simple identification where possible. This will help support progression to level 2.

2.3 select sustainable goods and services from local sources where practicable

Candidates should demonstrate knowledge of supplier/source and propose alternatives where impractical.

Evidence: portfolios and/or internal controlled tests.

Additional information and guidance: They will write a letter to a local construction company seeking advice regarding the sustainability of their choice of materials and how they might be procured. They will make enquiries to investigate the availability of a local workforce, the level of skills required and the organisation's capacity to build their particular eco classroom design.

2.4 produce a bill of quantities for a construction project

Candidates should demonstrate their ability to compile a schedule of materials using Autodesk Revit software.

Evidence: Bill of quantities via 3D model schedule.

Additional information and guidance: They will seek local help from a Quantity Surveyor where practicable.

2.5 identify the range of industry specific skills available locally

Candidates should identify a variety of skilled people, companies and businesses relevant to the construction industry in their locality.

Evidence: from portfolios.

Additional information and guidance: Candidates will require structured support in using possible sources of information that can include, survey advertisements, lists of providers in libraries, internet searches or any locally relevant means.

3. The candidate will be able to make effective presentations.

I can:

3.1 support a presentation with appropriate digital technologies

Candidates should support their presentation using appropriate digital tools.

Evidence: Presentation files or links from portfolio.

Additional information and guidance: Candidates will choose an appropriate method to present their project. This will be in a professional way, as though presenting to a professional audience. Encourage experimentation beyond bullet lists in Powerpoint. The best presentations are simple illustrative visuals with very little text.

The text is what you say and can be provided separately. Feeling that it is necessary to read a lot of text can actually be a distraction to the audience as can a lot of unnecessary animation effects. Sound effects are almost always annoying! Link to web resources such as on-line videos to illustrate points. Level 1 candidates will need structured guidance but many adults do stereotypical boring presentations with Powerpoint simply because very few have had any real background or training in using the tool effectively. Also consider the number of powerpoint files that are distributed by e-mail and are simply cluttering folders. Consider that a URL to an on-line resource reaches anyone with the URL without the need to copy a file and if the originator of the file updates it everyone automatically gets the update. File based presentations are really a legacy of the past and we need to prepare children for the future so look into web based presentation tools. Mostly these are free.

3.2 design supporting media content to have impact and clarity

Candidates will design and present appropriate content to demonstrate impact and clarity.

Evidence: from portfolios.

Additional information and guidance: Candidates should prepare supporting content that can be used in their presentation. This can be eg video linked from a site such as You Tube or embedded in the presentation. Video editing tools good enough for this purpose are free so encourage their use as it then opens them up for students to use at home. Check copyright on images. Mediawiki is a good source of free illustrative content that is free for re-use. OpenClipart.org is a free source of images and drawings. Encourage production of their own illustrative drawings and diagrams. Inkscape is a good free resource for this www.inkscape.org.

3.3 structure a presentation to prioritise the messages

Candidates should appreciate the basic principles of structuring a presentation to reinforce a limited number of key messages.

Evidence: Portfolios of evidence.

Additional information and guidance: Candidates will appreciate the importance of prioritising information. They should write a simple, logical outline regarding the key points, and introduce previous sketches and other appropriate visual aids if it helps get the message across. Level 1 candidates will need support in organising the structure of their presentation but should be encouraged to become increasingly self-sufficient in order to progress to Level 2.

3.4 make effective use of the time available while making a presentation

Assessors should check that the candidate has got the intended message across within the allocated time.

Evidence: From assessor observations.

Additional information and guidance: The candidate should aim to finish within an allotted time: and should also be concise. The presentation should include welcoming the client, setting out the key points and bringing about a purposeful conclusion.

3.5 identify strengths and weaknesses in my presentation

Candidates should be able to list strengths and weaknesses in their presentation.

Evidence: Portfolio.

Additional information and guidance: This is a good opportunity for peer review. Candidates should be open to constructive criticism as well as recognition for their good points. Candidates should realise that improvements come from understanding weaknesses and working on them to turn them into strengths.

Annexe D Level 2 Units

Level 2 Design Engineer Construct
Unit 1: Defining a Sustainable Construction Project
5 credits (40 GLH) R/505/5443

1. understand a client's needs	**2. be able to formulate project briefs**	**3. understand the constraints on projects**	**4. be able to draft plans**
1.1 identify the contextual needs of a client	2.1 outline the functional requirements of the project.	3.1 identify constraints associated with the site location and present solutions	4.1 create a draft project plan
1.2 record project requirements and client expectations	2.2 establish quality objectives for the project	3.2 test initial ideas against planning protocol	4.2 match project planning to the human resources of the team
1.3 understand the requirement to establish a budget in relation to the agreed client's needs	2.3 set the sustainability aspirations of the project	3.3 explain the principles of legislation relevant to the project	4.3 create an organogram for the project
		3.4 carry out a feasibility study and present the results	4.4 forecast the lifespan of the completed project
		3.5 make a judgement on project viability based on evidence	4.5 forecast facilities management costs

		3.6 explain how the building design helps minimise energy use	4.6 take account of environmental considerations in planning

Level 2 Design Engineer Construct
Unit 2 Developing a Sustainable Construction Project
4 credits (30 GLH) Y/505/5444

1. be able to develop feasible proposals from needs analysis	**2. produce technical support collateral for the project**	**3. support development of a project concept**
1.1 prepare concept diagrams to demonstrate ideas	2.1 prepare 3D representations of outline information	3.1 explain the importance of compatibility between existing infrastructure and the project proposals
1.2 present the quality of the proposal to a client	2.2 utilise the 3D environment to test the design in virtual locations	3.2 explain the environmental and climate change reduction strategies
1.3 communicate the concept design to the project team	2.3 use quantitative methods to establish the energy requirements, and a lighting strategy	3.3 monitor the execution of the plan to ensure compliance with client requirements taking appropriate action where necessary
1.4 identify procurement options related to key elements of the project	2.4 prepare detailed, scaled drawings that can form the basis of a planning application	3.4 establish strategies for the proposed construction that support health and safety, occupancy, management and operation
	2.5 describe the project in writing to form the basis of a planning application	3.5 relate building design specification to energy efficiency
	2.6 produce a financial model of the budget that aggregates the elemental costs of the project	3.6 inform planning through collaborative working groups

Level 2 Design Engineer Construct
Unit 3: Delivering a Sustainable Construction Project
Delivery 4 credits (30 GLH) D/505/5445

1. able to carry out a project	**2. able to respond to technical issues**
1.1 coordinate a design proposal to ensure mistakes are avoided	2.1 use a 3D model to test a design
1.2 identify potential problems at an early stage and take appropriate action	2.2 validate the design against the brief using a technical investigation
1.3 identify needs that require specialists from outside the team	2.3 ensure that the project complies with building regulations as it progresses
1.4 monitor progress in consultation with peers	2.4 explain how the building works in practice using quantitative monitoring
1.5 ensure the project is developed on time and to budget	2.5 review progress and reflect on technical decisions
	2.6 consult and respond appropriately to peer review

Level 2 Design Engineer Construct
Unit 4: Evaluating a Sustainable Construction Project
3 credits (20 GLH) H/505/5446

1. be able to compare intentions with outcomes	**2. transfer project evaluation to other contexts**
1.1 explain how the building works and what users need to do to optimise performance	2.1 identify issues in existing familiar buildings
1.2 explain how well final outcomes meet original intentions	2.2 make recommendations to improve existing buildings
1.3 evaluate feedback and use it as a basis for improvements in future projects	2.3 carry out a qualitative audit reporting on aesthetics and sensory experiences of users
1.4 analyse data and use it as evidence to inform evaluation	2.4 present a building project to a professional audience
1.5 use data to forecast long term performance of the building	

Assessor's guide to interpreting the Level 2 criteria

General Information

RQF general description for Level 2 qualifications

- Achievement at RQF level 2 (EQF Level 3) reflects the ability to select and use relevant knowledge, ideas, skills and procedures to complete well-defined tasks and address straightforward problems. It includes taking responsibility for completing tasks and procedures and exercising autonomy and judgement subject to overall direction or guidance.

- Use understanding of facts, procedures and ideas to complete well-defined tasks and address straightforward problems. Interpret relevant information and ideas. Be aware of the types of information that are relevant to the area of study or work.

- Complete well-defined, generally routine tasks and address straightforward problems. Select and use relevant skills and procedures. Identify, gather and use relevant information to inform actions. Identify how effective actions have been.

- Take responsibility for completing tasks and procedures subject to direction or guidance as needed.

Requirements

- Standards must be confirmed by a trained Gold Level Assessor or higher

- Assessors must at a minimum record assessment judgements as entries in the on-line mark book on the tlm.org.uk certification site.

- Routine evidence of work used for judging assessment outcomes in the candidates' records of their day to day work will be available from their e-portfolios and on-line work.

Assessors should ensure that relevant web pages are available to their Account Manager on request by supply of the URL.

- When the candidate provides evidence of matching all the criteria to the specification subject to the guidance below, the assessor can request the award using the link on the certification site. The Account Manager will request a random sample of evidence from candidates' work that verifies the assessor's judgement.

- When the Account Manager is satisfied that the evidence is sufficient to safely make an award, the candidate's success will be confirmed and the unit certificate will be printable from the web site.

- This unit should take an average level 2 learner 40 hours of work to complete.

Assessment Method

- Assessors can score each of the criteria N, L, S or H. N indicates no evidence. L indicates some capability but some help still required. S indicates that the candidate can match the criterion to its required specification. H indicates performance that goes beyond the expected in at least some aspects. Candidates are required to achieve at least a S on all the criteria to achieve the full award. Once the candidate has satisfied all the criteria by demonstrating practical competence in realistic contexts they achieve the unit certificate.

Expansion of the assessment criteria

Unit 1 - Defining a Sustainable Construction Project

1. The candidate will understand a client's needs.

I can:

1.1 identify the contextual needs of a client

Candidates should be able to identify the location, building type and end users.

Evidence: from assessor observations, video/recorded discussion in the context of a client meeting and written evidence in portfolios.

Additional information and guidance: Candidates should be encouraged to role play the architect/client relationship and define the project parameters. A member of the local community can provide a more realistic response to a mock interview/meeting. Learners should prepare a checklist of items to be discussed with the client. Level 2 learners should demonstrate some degree of independence and autonomy.

1.2 record project requirements and client expectations

Candidates should be able to provide a written summary outlining the project brief, reaffirming the role of the architect and what he or she will contribute.

Evidence: from check lists, written report and covering letter to the client in portfolios.

Additional information and guidance: Candidates will summarise their meeting with the client, outlining the skills and services he will provide, the high level goals of the project, and setting the scene for the design. Learners should demonstrate and open, collaborative process with their client, remembering that the relationship is a two way process

and therefore requiring a written response to proceed. There should therefore be a formal invitation to the client to agree that items on the checklist are accurately represented in the report and nothing has been missed.

1.3 understand the requirement to establish a budget in relation to the agreed client's needs.

Candidates should be able to evidence research into construction project costs specific to their client's building type.

Evidence: from assessor observation and written documentation in portfolios.

Additional information and guidance: Learners will demonstrate research skills using the internet and other methods, e.g. contact with local professionals, sending questionnaire to design and construction organisations. Learners should demonstrate how they have attempted mathematically to establish what a building might cost.

2. The candidate will be able to formulate a project brief.

I can:

2.1 I can outline the functional requirements of the project

Candidates should be able to present a schedule of accommodation which includes size of rooms/spaces, areas, adjacencies, circulation etc.

Evidence: From written and graphical reports in portfolios.

Additional information and guidance: Candidates should be able to define the spatial requirements of their building and determine what rooms/spaces/ equipment is needed to perform certain functions. They can use buildings known to them to help determine size (by measuring

existing spaces accurately using specific tools), the relationship of one space to another, functionality and use of each room, but must demonstrate good and bad examples of this.

2.2 establish quality objectives for the project

Candidates should be able to present a vision for their project in terms of design, durability, elegance, efficiency and how the building will improve people's lives. They should define what the building will do, how it will perform, the problems it will solve and how the wider community will benefit.

Evidence: From an illustrated report in portfolios.

Additional information and guidance: Learners will present a precedent study evaluating similar buildings using set criteria. A vision document will contain images, drawings, sketches, ideas and written aspirations.

2.3 set the sustainability aspirations of the project.

Candidates should be able to present a vision for their building in terms of social, environmental and economic principles.

Evidence: From an illustrated report in portfolios.

Additional information and guidance: Candidates will present a strategy that will make their building sustainable.

3. The candidate can understand the constraints on the project.

I can:

3.1 identify constraints associated with the site location and present solutions.

Candidates will identify any potential issues or questions relating to the site chosen ensuring they address the potential environmental and community concerns.

Evidence: Report and check list, annotated diagrams in portfolios eg site survey drawing.

Additional information and guidance: Candidates should identify potential issues to help them through the planning process, and also engage with the local community. Early identification of problems leads to better quality planning, and better public engagement. They might consider marking issues on a site plan, particularly as a graphical representation might be easier for the community to comprehend. They can present an additional 'site analysis' study comprising a series of annotated diagrams that investigate and record the key characteristics of the site. Candidates should understand the need for a professionally measured site survey in order to establish the exact size of the chosen site, the exact location of site boundaries and physical constraints and plot any changes in level that will impact on their proposals.

Candidates will consider issues such as:

- Orientation, aspect, exposure - why is it so important to know which direction your site faces? how might this be fundamental to the future energy use of your building?
- topography, geography and geology - how might we use maps to help us understand the location we have chosen. What existing utilities impact the design? How might the rock formations or ground conditions below your site potentially have a bearing on your design? Who will provide this information for us?
- prevailing wind and microclimate - does this site or do the immediate surroundings have particular weather patterns that make this location more or less suitable for your building? Is it prone to regular or repeated episodes of extreme weather? How might this inform your design?

- surrounding buildings and local context / vernacular - is there a specific style of architecture or use of materials that defines this place or site that we need to respond to or respect? What about existing building levels/height restrictions?
- transport and infrastructure - is your site well connected to the local community, amenities and services or do they need to be improved? Why is it so important to consider ALL modes of transport?
- accessibility - are there physical site characteristics that may result in access limitations for certain users? Do they have a bearing on where we might access the building from or locate entrances?

Good site analysis is more than what you see or get from just taking photographs. Learners will apply a critical eye if they are to really understand the site and significance of keys features. Team working and sharing of resources should be encouraged. Physical model making using layers of card to represent contours could help understanding of topography.

3.2 test initial ideas against planning protocol

Candidates will understand how their proposal responds to planning policy and where potential conflicts may exist that may impact on the project brief.

Evidence: written evidence in portfolios.

Additional information and guidance: Candidates will create a 'planning statement' study outlining how their proposal will conform to and respond to particular areas of policy. The planning process can be quite lengthy, however the 'National Planning Policy Framework', which sets out the government's planning policies for England, is an important part of the government's reforms to make the planning system less complex easier to understand. It vastly reduced the number of policy pages about planning. The Framework sets out planning policies for

England and how they are expected to be applied. It provides guidance for local planning authorities and decision-takers, both in drawing up plans and making decisions about planning applications. http://www.planningportal.gov.uk/planning/planningsystem/localplans#nppf

It is important that candidates understand the need to involve the wider community in the process and the introduction of the 'Localism Act' and the new 'Neighbourhood Planning' framework empowers communities to have their say regarding development in their neighbourhoods. A guide to the Act and the powers of communities can be found here: https://www.gov.uk/government/uploads/system/uploads/attachment_data/file/5959/1896534.pdf

If a construction project is classed as a 'major development' it is crucial that the community is involved at an early stage. There may be more evidence required, in particular an environmental impact assessment, a transport study which outlines the impact the site entry and exit will have on existing roads and traffic volumes, and a design & access statement, which outlines the suitability of the design for the particular site, and how users will access it.

Large scale developments often include a commitment from the developer to provide community services such as providing a park for local children. This is called a Section 106 agreements and is a powerful, legally binding agreement between a local council and developer to improve the local area.

Major developments can include:

- Housing developments of more than 10 dwellings
- Housing development on a site of 0.5 hectares or more
- Any other development with a floor area of 1000 m^2
- Any other development on a site of 1 hectare or more
- Waste development or mineral working

Planning applications must also be decided in accordance with the Local Development Framework (LDF), and information regarding this can be found at
http://www.planningportal.gov.uk/planning/planningsystem/localplans

Candidates should consider location specific policy - is the site situated in a green belt, or conservation area? It may be close to listed buildings (or indeed is the proposed project a refurbishment of a listed building?) or be situated in a Site of Special Scientific Interest (SSSI) which gives legal protection to local wildlife and specific geological formations.

3.3 explain the principles of legislation relevant to the project

Candidates will understand that planning legislation must be adhered to and all projects are bound by its principles.

Evidence: written evidence in portfolios.

Additional information and guidance: The Planning process is wide ranging and can be extensive. Candidates can find significant information via the government planning website www.planningportal.gov.uk/ and key points are noted below.
There is a difference between a planning application being approved, and a building being constructed with the health and safety of the end users in mind. Building Regulations approval sets out design standards that focus on issues of health, safety, energy efficiency and disability access. It may also be necessary to notify the Health and Safety Executive (HSE) and may have other duties as well under the Construction (Design and Management) Regulations 2007 (CDM 2007).
Sustainability and the local community should always be the main focus in the development of a construction project and there are a number of Acts and national guidelines to follow.

Natures and Wildlife:

- A Tree Preservation Order (TPO) is used to protect important trees and planning authorities can impose a very large fine for anyone who cuts down or destroys a tree without permission to do so
- The Wildlife and Countryside Act 1981 protects animals, plants and habitats with special protection for particular species e.g. bats, great crested newt - see

http://www.naturalengland.org.uk/ourwork/regulation/wildlife/species/europeanprotectedspecies.aspx#eps

Environmental Policies:
BREEAM (Building Research Establishment Environmental Assessment Method and the Code for Sustainable Homes sets the standard for best practice in sustainable building design, construction and operation. The measures used represent a broad range of categories and criteria and include aspects related to energy and water use, the internal environment (health and well-being), pollution, transport, materials, waste, ecology and management processes. Much of this criteria is covered in Design Engineer Construct! at Level 1. More information about BREAMM can be found at http://www.breeam.org/about.jsp?id=66. There are also a number of local Waste Management policies which should be adhered to.
Also consider:
The Disabled Persons Act 1981 and Disability Discrimination Act 1995 ensures that the needs of disabled persons are provided for in any development schemes.
The Equality Act 2010 ensures that local planning policies need to take into account the particular needs of women, young people and children, older people, ethnic minorities, children and disabled people.
The Party Wall Act 1996 prevents and resolves disputes in relation to party walls (walls of adjoining dwellings e.g. semi detached houses and terraces), boundary walls and excavations near neighbouring buildings.
Right to Light - a private, legally enforceable easement or right to a minimum level of natural illumination through a 'defined aperture', usually a window opening.

3.4 carry out a feasibility study and present the results

Candidates will understand the need to prove their proposals are believable, based on high quality research and fully meet the client's brief.

Evidence: Written report and check list, annotated diagrams.

Additional information and guidance: Candidates should consider that a feasibility study is an opportunity to test all aspects of their early proposals and the first chance to review and refine their emerging ideas. It is also an opportunity to present their work to date both visually and verbally to their clients, good practice for the project stages further ahead! A successful feasibility will clearly demonstrate how the project is feasible in ALL respects and should cover the following areas:

- Function - how do the proposals meet the end-user requirements identified in the project brief?
- Quality - how do the proposals meet the design aspirations identified in the project brief? Students can use precedent images, sketches and models to describe their ideas.
- Policy - how do the proposals broadly fit the relevant policies that have been identified?
- Budget - how do the proposals broadly fit the budget that has been identified?
- Programme - has an outline programme been formulated that we know to be achievable?
- Team - Are the right people with the right skills available and on-board to help us make progress?
- The Way Forward - what needs to happen next and what challenges must be overcome to enable the project to succeed?

3.5 make a judgement on project viability based on evidence.

Candidates will be able to apply objective thinking to assess the merits of a particular proposal against agreed criteria.

Evidence: Student designed compliance matrix.

Additional information and guidance: Candidates should be encouraged to work together in order to discuss and establish the merits of each project. The ability to develop a constructive commentary on the

viability of others work whilst presenting a reasoned justification of their own are both equally valuable skills.

3.6 explain how the building design helps minimise energy use.

Candidates can explain how their design minimises energy use.

Evidence: Student designed criteria matrix.

Additional information and guidance: Candidates will create a set of criteria that will enable every element of their project to be interrogated through a systematic approach in order to understand how the whole building and process must be challenged in terms of embodied energy and energy demand from the outset. They can present an 'environmental and sustainability strategy' comprising a series of criteria annotated with diagrams and images that demonstrate an understanding of different green technologies and passive measures that could potentially be incorporated into their building.
Whilst much information can be found through Internet research, a number of research establishments can be contacted including the UK Green Building Council (http://www.ukgbc.org/) and
Candidates should be encouraged to contact local experts via professional establishments, for example the Chartered Institute of Building Services Engineers (www.cibse.org) who have regional officers and a 'young engineers' programme, and local universities who often have specialist departments in the field of sustainable design and energy efficiency - indeed it is to be encouraged that candidates have access to such institutions.
Guidance is often found via candidates' earlier research into precedent projects. Downloadable pdf format information is often extensive and thorough. However, there is nothing quite like a visit to an existing sustainable building or conference to inspire and motivate. For examples, see http://www.theguardian.com/environment/2007/nov/22/ethicalliving.renewableenergy and http://www.greenbuildexpo.co.uk/

4. The candidate will be able to draft a plan.

I can:

4.1 create a draft project plan.

Candidates will create a draft plan including timescale, deliverables, roles and responsibilities.

Evidence: Gantt chart, project plan in portfolios.

Additional information and guidance: The candidate should determine the client's mission and vision for the building, and also the short, medium and long term strategic plan. Priorities, goals and objectives for future use should be established in terms of scope, schedule and cost.

A space analysis should be carried out. There may be a need to increase facilities or the number of people who use the building in years to come, and this will obviously impact the design. Spaces should be functional, accessible and durable, but may also need to be flexible - easily changed depending on the nature of the activity taking place. The space may need to be inspiring and allow interaction between different user groups. Certainly the space should be efficient and environmentally friendly.

Data obtained by candidates earlier in the syllabus will be useful to outline local community needs, demographics, preferences and concerns regarding the building design. The client may have a steering committee or a number of committees dependent on the size of the project, each with its own responsibility. There may also be an appointed project manager who will be responsible for the coordination and day to day running of the project. Meeting dates should be scheduled and a general project timeline established. The client and/or committee will be responsible for articulating the vision for the building and this meeting is perhaps the most important.

A number of deliverables should be established and candidates should identify the activities needed and time required to produce them. They will develop a Gantt chart which puts all tasks and estimates in a calendar and outlines each stage of the project, how much time each stage is expected to take, and when each stage is scheduled to begin and end.

Once the goals, objectives and tasks and responsibilities have been defined, the building plan can be drafted and evaluated.

4.2 match project planning to the human resources of the team

Candidates will understand the need for a team undertaking a large and complex project to have carefully considered project plan that targets specific expertise.

Evidence: documentation in portfolios.

Additional information and guidance: Candidates will create a resource plan that allocates specific tasks to members of the team and establishes clear lines of communication and key points of contact.

4.3 create an Organogram for the project

Candidates can create a human resource plan defining inter-relationships and responsibilities.

Evidence: Organogram diagram in portfolios.

Additional information and guidance: Candidates will create an annotated diagram that clearly explains the scope of each role and how they relate to one another. Think of cogs in a well oiled machine; the candidate should explain why each team member has a pivotal part to play in the successful development and delivery of the building project.

4.4 forecast the lifespan of the completed project

Candidates should make a forecast of the project lifespan based on evidence.

Evidence: Portfolios of evidence.

Additional information and guidance: The lifespan needs to be based on standard methods including maintenance schedules and the purpose of the building.

4.5 forecast facilities management costs

Candidates should forecast facilities management costs demonstrating an understanding of the most important underlying factors.

Evidence: from portfolios.

Additional information and guidance: Forecasting should include the most significant cost areas related to operational requirements. These will depend on the particular project but they are likely to include fuel costs, buildings maintenance and health and safety checks.

4.6 take account of environmental considerations in planning

Candidates need to demonstrate an understanding of key environmental factors when planning their project.

Evidence: Portfolios

Additional information and guidance: Candidates will use energy analysis and cost software to evaluate their designs for energy efficiency, carbon footprint and lighting. They will check data using mathematical calculation and comparison with precedents. Candidates will investigate ventilation, energy source, water distribution, lighting sources, electrical distribution and the impact of glazing and insulation.

Unit 2 - Developing a Sustainable Construction Project

1. The candidate will be able to develop feasible proposals from needs analysis.

I can:

1.1 Prepare concept diagrams to describe and communicate ideas

Candidates will understand the need to clearly describe their ideas in a short presentation that can very quickly convey the whole project.

Evidence: Visual presentation containing a series of annotated diagrams and drawings in portfolios.

Additional Information and Guidance: Candidates will use analytical skills in order to evaluate their work and distill the project into a series of "key moves" described by diagrams. It is imperative that these diagrams communicate the essence of the project and at this stage, do not refer to unnecessary detail. The process should be simple, methodical and the approach should be that the client knows nothing about the project.

Candidates should also be aware that this presentation is an opportunity to impress. Remember, it is your client's money that you are spending! Have conviction in your ideas and inspire them.

1. What is your USP (unique selling point) / BIG idea that underpins this project?
2. Why should your client invest in YOU and YOUR VISION?
3. What makes YOUR ideas innovative and ground-breaking?

1.2 Present the quality of the proposal to a client

Candidates will demonstrate that their proposal is of high quality in all respects.

Evidence: Verbal and visual presentation / use of communication skills documented and/or stored in portfolios.

Additional Information and Guidance: Candidates should establish ways to measure quality and against agreed standards (which may be derived from the students' own). The Commission for Architecture and the Built Environment (CABE) offers general guidance:

http://www.designcouncil.org.uk/our-work/CABE/Publications-resources/What-makes-a-good-project/

Meeting the brief -	Will the accommodation proposed meet the functional needs of the brief?
Users -	Is it likely that the building's users – of all kinds – will be satisfied with the design?
Operations -	Is the design likely to enhance the efficiency of the operations to be contained in the building?
Orientation -	Can a stranger or visitor find the entrance and then find their way around the building? Is orientation clear enough not to need signs or maps?
Coherence -	Are the plans, sections, elevations and details all of a piece, visibly related to each other and to underlying design ideas?
Design process -	Does the design demonstrate that thinking about the requirements of the buildings structure and construction and environmental services has been an integral part of the design process? Is there evidence that the different design disciplines are working as a team?
Flexibility -	Will the building be easy to adapt or extend when the requirements of the building's users change? Are the floor plates suitable for other uses in the future?
Whole-life costs -	Does the design take into account whole-life costs?
Over time -	What will the project look like in different conditions: in sun and rain; at night; over the seasons? Will it age gracefully?
Setting -	Can one imagine the building becoming a cherished part of its setting?

- Sector specific guidance can also be found relating to particular building types:. For example: education

http://www.education.gov.uk/schools/adminandfinance/schoolscapital/buildingsanddesign/baseline?page=2

1.3 communicate the concept design to the project team

Candidates will effectively communicate the design to team members.

Evidence: Briefing documents in portfolios.

Additional Information and Guidance: An architect requires the client's approval (known as 'sign off') to progress beyond concept stage to delivering a more detailed set of proposals. It is important that the client's comments are appropriately acknowledged and that any changes or issues are addressed. before moving on to the next stage. The concept design can then be worked up into coherent proposal that provides a basis for team briefing. Information must be clear and concise so colleagues can undertaking their required tasks. Candidates should pay particular importance to briefing the structural engineer as it is critical that they fully understand the design intent at this early stage. It is their job to ensure your building will stand up so any misunderstanding could result in significant problems later in the project.

1.4 identify procurement options related to key elements of the project

Candidates will understand the alternatives for procurement related to key elements of the project

Evidence: Portfolios.

Additional Information and Guidance: Candidates need to consider Procurement in terms of social, economic and environmental responsibility in order that the client doesn't just get "a building" but that they get the best possible building within the project constraints. Targets and actions for the entire project (including the whole life of the building) should be clearly communicated between the client, the project team, the contractor and the supply chain. Strong leadership here is critical when sustainability is to be the overarching theme. The UK

government's Sustainable Procurement National Action Plan provides greater guidance, and includes initiatives to:

1. reduce waste, carbon emissions, energy and water consumption
2. protect biodiversity
3. stop the buying of timber from unsustainable sources
4. support fair and sustainable economic growth
5. deliver social benefits through procurement

Another excellent resource regarding industry and sustainable procurement can be found at http://www.ciria.org/service/Web_Site/AM/ContentManagerNet/ContentDisplay.aspx?Section=Web_Site&ContentID=19278

2. The candidate will produce technical support collateral for a project.

I can:

2.1 prepare 3D representations of outline information

Candidates will create a 3D model using industry software.

Evidence: Building Model, portfolio evidence.

Additional Information and Guidance: Candidates can choose their own preferred method to create a concept model. Emphasis must be on detailed thinking, creating a "kit of parts" where each component has a clear purpose and provenance.

2.2 utilise the 3D environment to test the design in virtual locations

Candidates will use industry software to test their design in virtual locations.

Evidence: Report and portfolio evidence.

Additional Information and Guidance: Using industry software, Candidates will specify an exact location for their building by address or latitude and longitude and perform energy/solar/wind analysis. They will consider situation, orientation, impact of adjacent buildings and agree the most suitable positioning for optimum solar gain and seasonal thermal performance in relation to the Sun's path.

2.3 use quantitative methods to establish the energy requirements, and a lighting strategy.

Candidates will assess energy efficiency potential and suggest an appropriate lighting strategy based on measurements and quantities.

Evidence: Report and portfolio evidence.

Additional Information and Guidance: Lighting must be thought of in terms of functional/task lighting, necessity/emergency/safety lighting and from a creative viewpoint in terms of how lighting can enhance the architecture. Candidates should consider alternatives to the obvious lighting hanging from the ceiling, and also ascertain the most efficient light bulb for their particular lighting system calculating potential energy savings and costs in bulbs. Candidates should explore types of lighting and understand how this impacts on the building energy use and maintenance costs. How is brightness measured and how does it relate to perception?
http://www.cns.nyu.edu/~david/courses/perception/lecturenotes/brightness-contrast/brightness-contrast.html

Above is a useful background on lighting and how we perceive it.

2.4 prepare detailed, scaled drawings that can form the basis of a planning application.

Candidates will prepare appropriate drawings for a planning application.

Evidence: portfolio evidence.

Additional Information and Guidance: Candidates should have a clear understanding of the types of document that needs to be submitted with a planning application, and what scale is suitable. Typically, planners require a location plan which defines where the project is situated relative to surrounding properties (usually issued at a scale of 1:1250 and 1:2500) and a site plan which shows the position of the project relative to its boundary (usually issued at a scale of 1:200 or 1:500) and any tress on site. Candidates should be aware of Tree Protection Orders (TPO). The (compass) north point and scale should always be shown clearly on the plan. Candidates should prepare floor plans and elevations at a suitable scale (usually 1:50 or 1:100), and have an understanding of the relationship of the size of the building and the paper size a drawing is to be plotted on. Note: At a scale of 1:100, 10 mm on a plan = 1m in reality and 1:50 = 10mm = 0.5m. Drawings are usually submitted digitally as pdf formats. A Design and Access Statement may also be required. For more information see: http://www.planningportal.gov.uk/ and https://www.gov.uk/government/publications/planning-applications-information-requirements-and-validation

2.5 describe the project in writing to form the basis of a planning application.

Candidates will use appropriate language to describe the project to form the basis of a planning application.

Evidence: Example documents in portfolios.

Additional Information and Guidance: Candidates should establish the type of planning permission they require as there are a number of types for example domestic/household, conversion, listed building, Guidance can be found here: http://www.planningportal.gov.uk/planning/applications/howtoapply/permissiontypes

The project description should be clear and concise with sufficient detail. Planning applications should describe the project's size and

location, how it will function, and its relationship with the immediate surroundings. It should also include information including drainage, vehicle and pedestrian access, materials to be used, design of the building and the direction it faces. It should also include the location of waste and recycling facilities (e.g. where you will situate a bin). A non-residential application will require more details. Planning applications are generally submitted online, and candidates are encouraged to obtain example applications. Further information can be found here: www.planningportal.gov.uk/uploads/appPDF/Help004_england_en.pdf

2.6 produce a financial model of the budget that aggregates the elemental costs of the project

Candidates will produce a baseline costing of the project in the form of a model that can be used to aggregate components and experiment with different component costs.

Evidence: Report in portfolios.

Additional Information and Guidance: Using software tools, Candidates can produce an estimated project costing based on a square metre cost or can calculate the total cost of the project by materials used using scheduling. Accuracy is dependent on the definition of design and engineering data. Candidates should be encouraged to discuss the significance of complete data in producing reliable costings.

3. The candidate will support development of a project concept.

3.1 explain the importance of compatibility between existing infrastructure and the project proposals

Candidates will identify existing infrastructure and outline how their project is compatible with it.

Evidence: Report in portfolios.

Additional Information and Guidance: Infrastructure is the basic physical systems of a country's or community's population, including roads, transport systems, utilities, water, sewage, etc. New buildings should benefit the people who will use them in terms of appeal, health (e.g. air quality) and aesthetics, but to be explicitly functional and minimise the impact on the environment. A building can contribute to energy and water collection, and even food harvesting through green roofs and vertical farms. Accessible transport links and close proximity of public (green) spaces are fundamental to good urban design. Consideration should be given as to whether the building or structure can be re-purposed after it's proposed 'useful' life.

3.2 explain the environmental and climate change reduction strategies

Candidates will be able to demonstrate the green credentials of their proposal.

Evidence: Illustrated environmental strategy report

Additional information and guidance: Candidates should outline their objectives and expectations, and clearly iterating how their low carbon measures are sensitive to the environment and cost effective. They should determine how they will record, review and evaluate their recommendations. Candidates should consider existing local environmental regulations and building codes, and whether there are existing or complimentary programmes which can support their aims. Candidates should be able to prioritise environmental proposals based on the location of their chosen building (for example if the building is by a river, particular attention might be paid to waste management and potential pollutants). The report should focus on all areas of environmental impact including waste, water, energy, transport, supply chain, etc. It may also include a strategy for the community and how they will encourage a cooperative approach to encourage good environmental practice and positive attitudes.

3.3 monitor the execution of the plan to ensure compliance with client requirements taking appropriate action where necessary

Candidates will undertake and record scheduled project compliance checks

Evidence: Compliance checklist, record and recommendations.

Additional information and guidance: Regular meetings with the client are necessary to ensure compliance. Candidates should prepare a list that will enable them to check the progress of the project in accordance with their client's brief (and that outlined in the Architect's Agreement). This list should clearly support the future direction of the project adhering to agreed principles, standards, specifications and functionality. Preparing a compliance list aims to highlight errors quickly and easily, thereby reducing costs and delays due to unforeseen changes as the project develops.

3.4 establish strategies for the proposed construction that support health and safety, occupancy, management and operation

Candidates will formulate a plan to eliminate hazards and minimise risk to health and safety.

Evidence: Construction (Design and Management) (CDM) Plan and designers' risk assessments.

Additional information and guidance: Candidates must demonstrate that they have taken reasonable steps to ensure health and safety is of paramount importance throughout the life cycle of the building, and that a collaborative coordinated approach with others involved in the building can only support the management and control of risk. Preparation of a plan should reflect foreseeable key risks to the health and safety of those involved in or affected by construction, use, maintenance and demolition of the building, e.g. working at height, vehicles, power,

structure instability (especially concerning excavations, refurbishment of existing buildings, etc), slips trips and falls and project specific hazards (fire etc). Candidates can refer to the ERIC model (Eliminate, Reduce, Inform, Control). Health hazards may include those incurred though lifting, exposure to excessive noise, vibration, hazardous materials, dust, vermin and other animal derived hazards, contaminated land, etc.

Candidates should refer to:
Construction (Design and Management) Regulations 2015 (CDM 2015)
Construction (Design and Management) Regulations 2007 (CDM 2007)
Health and Safety at Work Act 1974

3.5 relate building design specification to energy efficiency

Candidates will describe the energy efficient characteristics of their building designs

Evidence: Overview report

Additional information and guidance: Candidates should produce a concise report which outlines the reasoning behind key design decisions relative to achieving optimum energy efficiency requirements including, but not limited to, the use of energy efficient materials, technologies, resources and systems, use of natural resources, and the way their building promotes and sustains positive end user behaviour.

3.6 inform planning through collaborative working groups

Candidates will produce an action plan to implement effective collaboration throughout a construction project

Evidence: Concise report

Additional information and guidance: Candidates will outline their methodology to ensure communication of the project plan and

processes to all team members, and to promote and facilitate effective collaboration throughout the construction project.

Moderation/verification

The assessor should keep a record of assessment judgements made for each candidate and make notes of any significant issues for any candidate. They must be prepared to enter into dialogue with their Account Manager and provide their assessment records to the Account Manager through the online mark book. They should be prepared to provide evidence as a basis for their judgements through reference to candidate e-portfolios and any other sources eg through signed witness statements associated with the criteria matching marks in the online mark book or internal controlled testing.. Before authorizing certification, the Account Manager must be satisfied that the assessors judgements are sound.

Unit 3 - Delivering a Sustainable Construction Project

1. The candidate will be able to carry out a project.

I can:

1.1 coordinate a design proposal to ensure mistakes are avoided

Candidates will coordinate contributions to the design proposal and identify any potential issues that could result in mistakes.

Evidence: Documentation in portfolios.

Additional Information and Guidance: Assessors should look for evidence that the candidates are actively looking for potential problems and communicating with a range of people to ensure that nothing slips through that would have a major adverse effect on the project delivery.

1.2 identify potential problems at an early stage and take appropriate action

Candidates will demonstrate that they have identified potential issues at an early stage and taken appropriate action.

Evidence: Assessor observation, documentation in portfolios.

Additional Information and Guidance: Candidates should be focussed on any issues that could have a significant effect and which, if implemented badly or missed will be difficult to put right. This is a form of risk assessment prioritising things early on that will be difficult to put right subsequently.

1.3 identify needs that require specialists from outside the team

Candidates will use plans to identify tasks that are beyond the knowledge and skills of the established team.

Evidence: Documents in portfolios.

Additional Information and Guidance: This task will need some guidance since the candidate will not be sure of what they don't know before going through the entire project. Work on professional roles at level 1 should be re-visited to help trigger memories.

1.4 monitor progress in consultation with peers

Candidates will keep a diary of their progress making references to consultations with peers.

Evidence Documentation in portfolios.

Additional Information and Guidance: Diary entries should show decisions made as a result of consultations and the degree to which information from peers and any other peer input was used.

1.5 ensure the project is developed on time and to budget

Candidates should demonstrate that they have taken actions that ensure the project meets its targets.

Evidence: Assessor observation, overall project outcomes.

Additional Information and Guidance: The main evidence for this criterion will come from the project outcomes and the assessor observations of the attitude and behaviour of the candidate.

2. The candidate will respond to technical issues.

I can:

2.1 use a 3D model to test my design

Candidates will use a 3D computer based modelling to test their designs.

Evidence: Model files and documentation in portfolios.

Additional Information and Guidance: Candidates should use the model to experiment with variations to improve their model and document successful and unsuccessful changes.

2.2 validate the design against the brief using a technical investigation

Candidates should check the key aspects of their design against the brief criteria and document their results**.**

Evidence: Report in portfolio.

Additional Information and Guidance: Candidates should adopt a systematic approach to validation using a technical investigative approach.

2.3 ensure that the project complies with building regulations as it progresses

Candidates will check their project against the building regulations at specific points and document their findings.

Evidence: portfolio evidence.

Additional Information and Guidance: Candidates should make any necessary adjustments to their project as a result of building regulations checks. If none are required they should document the procedure they have adopted and report their decision that the project is compliant with the regulations.

2.4 explain how the building works in practice using quantitative monitoring

Candidates will provide explanations of the functional fitness for purpose of their building and include quantitative data to support their views.

Evidence: portfolio evidence.

Additional Information and Guidance: Assessors should provide guidance to candidates on the level of quantitative data required.

2.5 review progress and reflect on technical decisions

Candidates will review their progress at regular intervals and record their findings including any decisions that they would with hindsight have taken differently and any actions taken.

Evidence: Documents in portfolios.

Additional Information and Guidance: Candidates should focus on technical issues and their solutions.

2.6 consult and respond appropriately to peer review

Candidates will consult with peers throughout the process and receive criticism graciously.

Evidence: Documentation in portfolios.

Additional Information and Guidance: Taking criticism and giving it constructively are the main purpose of this criterion. It might take some time for some candidates to be able to deal with this and assessors will need to set the ground rules so that review is focused on objectivity and improvement.

Unit 4 - Evaluating a Sustainable Construction Project

1. The candidate will be able to compare intentions with outcomes.

I can:

1.1 explain how the building works and what users need to do to optimise performance

Candidates will evaluate their final product and provide recommendations for use to optimise benefits.

Evidence: Documentation in portfolios.

Additional Information and Guidance: Evaluations of the practical aspects of the building need to be related to user behaviour. Planning seating arrangements, circulation space, use of storage. Can users contribute to energy efficiency, improving aesthetics?

1.2 explain how well final outcomes meet original intentions

Candidates will use strengths and weaknesses in outcomes related to intentions to support their explanations.

Evidence: Documentation in portfolios.

Additional Information and Guidance: Candidates should be guided to be analytical in their approach to evaluation using strengths and

weakness classifications to compare and contrast aspects of their design in relation to original intentions. They should realise the importance of clarity at the planning stage so that their final evaluation can be decisive and rational rather than vague and subjective.

1.3 evaluate feedback and use it as a basis for improvements in future projects

Candidates will receive feedback from a range of sources and use it to inform their formal evaluations.

Evidence Documents in portfolios.

Additional Information and Guidance: Candidates should receive (and give) feedback graciously and objectively. It is difficult to remove emotion from criticism and a good part of this criterion is to demonstrate emotional intelligence in the form of maintaining control and being constructive in order to foster improvement rather than destructive and precipitating withdrawal or resistance to change.

1.4 analyse data and use it as evidence to inform evaluation

Candidates should gather data from a range of sources including software models, measurements and surveys and use this as a basis for making their evaluations objective.

Evidence Documentation in portfolios.

Additional Information and Guidance: While there are always grounds for subjective elements in evaluation, there needs to be at least some dimensions of backing evaluation judgements with clear evidence. eg I think the aesthetics of my design worked because 83% of the people in my survey said aesthetics was a strong aspect of the building. Or my original costings were poor as the final cost of the building was 10% over budget. Assessors should deter candidates from vague and subject statements like “I think my design was good because I liked it” or “My friends said the room was a bit small”. Highlight the difference between vague anecdotal comments and evidence that has reasonable

substance. Candidates should realise that they will have to work to gather evidence for objective evaluation, it doesn't just appear on its own. They need to understand that a representative sample is enough data that is typical of the entire set of data that could be sampled to be confident in the result.

1.5 use data to forecast long term performance of the building

Candidates should be able to use simple forecasting based on quantitative data from their modelling.

Evidence: project portfolios.

Additional Information and Guidance: As a specific example, the energy consumption needed to operate the building will be available from modelling. Overall energy consumption will depend on extrinsic as well as intrinsic factors. Candidates could provide a study of possible variations in energy costs in the long term depending on how the building is used and environmental conditions outside. This could be complex and at Level 2 straightforward simplifications are enough that illustrate principles. eg energy consumption is likely to go up in the winter as temperatures fall. Air conditioning could be a significant cost in hot days when large glass areas in the building cause a greenhouse effect. Such conclusions should be supported by data from the modelling.

2. The candidate will transfer project evaluation to other contexts.

I can:

2.1 identify issues in existing familiar buildings

Candidates should be able to make observations in existing familiar buildings and record aspects that are less than optimal from a user perspective.

Evidence Documentation in portfolios.

Additional Information and Guidance: Candidates can be given check lists as prompts of what to look for. Typical examples in schools are computer rooms that get too hot through lack of ventilation and too much south facing glass. Bottlenecks in circulation space. Ineffective sound insulation, plastic sinks or easily marked work surfaces in science labs, leaking flat roofs, asbestos used in construction, lack of adequate parking space, lack of adequate play areas, entrances that are not at all obvious to anyone new to the site, poorly sited WCs, inaccessible spaces for disabled people, lack of suiting of rooms in logical subject areas, bells that deafen people waiting to enter a room. High maintenance wooden window frames, impractical aesthetics eg galleries where students can drop things on people below or throw themselves off. Inadequate display space to encourage a learning environment.

2.2 make recommendations to improve existing buildings

Candidates should choose specific issues related to the building that would have a significant impact but low cost.

Evidence Report in portfolio.

Additional Information and Guidance: Candidates will identify many possibilities that are too expensive to rectify with existing resources. They should appreciate that there is always going to be a tension between cost and benefit and that issues related to health and safety are going to get the highest priority. Some solutions will have running cost implications eg installing air conditioning or carpeting an area. Some capital cost implications will make eg replacing a flat roof with a pitched roof prohibitively expensive. The best solutions are ones that have a significant impact but do not cost anything or perhaps even save money eg better energy efficiency.

2.3 carry out a qualitative audit reporting on aesthetics and sensory experiences of users

C**andidates will check a building for its aesthetic and sensory impact on its users.**

Evidence: portfolio evidence.

Additional Information and Guidance: Candidates can draw up a questionnaire for users of the building based on an inspection of the building and identification of issues related to aesthetics and sensory impact. They should be provided with guidance to ensure that their questionnaire is free from bias and targeted on getting valid and targeted responses from the users. A significant aspect of this criterion is learning how to transfer learning about evaluation to other contexts. Assessors should make it clear to the candidate that the methods being used can be employed in other situations including outside the Design, Engineer and Construct domain.

2.4 present the building project to a professional audience

Candidates will make a summative presentation of their project and present it to a professional audience and respond to subsequent questions.

Evidence: Assessor observations, portfolio evidence.

Additional Information and Guidance: Candidates should have the opportunity to make a short presentation of their project to a knowledgeable audience. The questions and comments should be used to help inform the final project evaluation. Assessors should bring out the basic principles for this type of presentation so that candidates appreciate that the learning can be transferred to other contexts.

Moderation/verification

The assessor should keep a record of assessment judgements made for each candidate and make notes of any significant issues for any candidate. They must be prepared to enter into dialog with their Account

Manager and provide their assessment records to the Account Manager through the online mark book. They should be prepared to provide evidence as a basis for their judgements through reference to candidate e-portfolios and any other sources eg through signed witness statements associated with the criteria matching marks in the online markbook or internal controlled testing.. Before authorizing certification, the Account Manager must be satisfied that the assessors judgements are sound.

Annexe E – Summary of the units and assessment

Level 1

Unit 1 - 3 credits - 20 GLH
Unit 2 - 7 credits - 60 GLH
Unit 3 - 3 credits - 20 GLH
Unit 4 - 3 credits - 20 GLH

120 GLH in total for the full certificate. Units can be assessed concurrently or consecutively enabling the school to decide how to organise teaching.

There is a unit certificate available for each unit and all units must be assessed as satisfactory through coursework at level 1 or higher for a level 1 pass and before and exam entry is permitted. The exam will then differentiate pass with merit, pass with distinction and pass with distinction*.

Level 2

Unit 1 - Project Definition - 5 credits - 40 GLH
Unit 2 - Project Development - 4 credits - 30 GLH
Unit 3 - Project Delivery - 4 credits - 30 GLH
Unit 4 - Project Evaluation - 3 Credits - 20 GLH

120 GLH in total for the full certificate. Units can be assessed concurrently or consecutively enabling the school to decide how to organise teaching. The exam covers all unit and the 120 GLH content.

There is a unit certificate available for each unit and all units must be assessed as satisfactory through coursework at level 2 or higher before an exam entry is permitted. The exam will then differentiate grades A*, A, B, C.

Annexe F - Useful links and supporting information

The TLM community learning site www.tlm.org.uk has a wealth of supporting information and practical tools for managing evidence, progress tracking and reporting. These are all free for participating schools. Contact TLM for further details or training if required. We will update and add to supporting materials as time goes on.

The TLM web site supports multiple languages and it is not very difficult to provide new translations. If you want to teach in the context of a modern foreign language it is possible and we will provide support where we can.

Making the transition from existing qualifications

It is rarely necessary to abandon all of the course-ware of existing courses. The flexibility of the TLM approach means that most centres find they can map a great deal of their current learning to the assessment criteria and avoid major upheaval. This means that you can start gently and at more or less any time in the year. All we are interested in is the assessment outcome, the process to get there is up to the Principal Assessor and colleague assessors in the centre. So we can start by using evidence already available or in existing systems and you can decide for yourself how quickly you transition to TLM's evidence management if at all. We are not a software company trying to sell you technology, we are simply providing tools to make administration of our quality assurance service more convenient to users. If you think a different system is better for you, you are free to use it. All we need is ready access to evidence supporting the assessment criteria.

Annexe G - Coursework assessment flowchart