Higher National Project-based Graded Unit Specification

General Information

This Graded Unit has been validated as part of the HNC Civil Engineering award. Centres are required to develop a project-based assessment in accordance with this validated specification.

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Graded Unit code: H73Y 34

Type of Project: Investigation

Publication date: July 2014

Source: Scottish Qualifications Authority

Version: 02

Graded Unit purpose

This Graded Unit is designed to provide evidence that the learner has achieved the following principal aims of the HNC Civil Engineering award.

General Aims — to develop:

- Skills of study, research and analysis
- Ability to define and solve problems
- Transferable skills
- Ability to be flexible and work cooperatively with others
- Responsibility for own learning
- Planning, organisational and review/evaluation skills
- Technical skills — broadening and deepening
- Oral, written and pictorial communication skills
- Numerical and ICT skills
- Resource management ability
- Flexibility, knowledge, skills and motivation as a basis for progression to graduate and postgraduate studies

Higher National Project-based Graded Unit Specification: General Information (cont)

The principle aims are to:

- Prepare learners for employment as engineering technicians in the civil engineering industry with a range of employers who design, manage, maintain or adapt infrastructure elements such as bridges, railways, roads, water and sewerage installations including consulting civil engineers, civil engineering contractors and the owners/managers of infrastructure components.
- Provide learners with a range of contemporary vocational skills utilising modern equipment and techniques available for basic design procedures, surveying and material testing, thus enabling learners to make an immediate contribution in their role as engineer technicians.
- Provide a choice of optional Units that will allow learners to develop in other areas relevant to future employment in civil engineering, or progression via an HND in Civil Engineering.
- Provide learners with a range of skills to support learning in the SVQ 3 and SVQ 4 Construction: Technical Modern Apprenticeship Frameworks.
- Enable learners to achieve EngTech professional body recognition by the Institution of Civil Engineers.

Credit points and level

1 Higher National Unit credit at SCQF level 7: (8 SCQF credit points at SCQF level 7)

Recommended entry to the Graded Unit

It is recommended that the learner should have completed or be in the process of completing the following Units relating to the above principal aims prior to undertaking this Graded Unit:

Unit title	Unit code	SCQF credit points	SCQF level	SQA credit
Mandatory Units				
Geotechnics A	DW5L 34	8	8	1
Civil Engineering Contract and Project Management A	H72H 34	8	7	1
Civil Engineering Material and Testing	DW5C 34	8	7	1
Civil Engineering Specialisms	DW5G 34	8	7	1
Construction Site Surveying A	DW5H 34	8	7	1
Construction Technology: Substructure	H72A 34	8	7	1
Maths for Construction	H72L 33	8	6	1
Structural Mechanics	DW45 34	8	7	1

Higher National Project-based Graded Unit Specification: General Information (cont)

Core Skills

Achievement of this Unit gives automatic certification of the following:

Complete Core Skill	Problem Solving at SCQF level 6
Core Skill component	None

There are also opportunities to develop aspects of Core Skills which are highlighted in the Support Notes of the Unit Specifications for this Course.

Assessment Support Pack

The Assessment Support Pack for this Unit provides assessment and marking guidelines that exemplify the national standard for achievement. It is a valid, reliable and practicable instrument of assessment. Centres wishing to develop their own assessments should refer to the Assessment Support Pack to ensure a comparable standard. Assessment Support Packs are available on SQA's secure website.

Equality and inclusion

This Graded Unit has been designed to ensure that there are no unnecessary barriers to learning or assessment. The individual needs of learners should be taken into account when planning learning experiences, selecting assessment methods or considering alternative evidence.

Further advice can be found on SQA's website:
www.sqa.org.uk/assessmentarrangements

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Assessment

This Graded Unit will be assessed by the use of a project-based investigation developed by centres. The project should provide the learner with the opportunity to produce evidence that demonstrates she/he has met the aims of this Graded Unit.

The project undertaken by the learner must be a complex task which involves:

- variables which are complex or unfamiliar
- relationships which need to be clarified
- a context which may be unfamiliar to the learner

The project must require the learner to:

- analyse the task and decide on a course of action for undertaking the project
- plan and organise work and carry it through to completion
- reflect on what has been done and draw conclusions for the future
- produce evidence of meeting the aims which this Graded Unit has been designed to cover.

The Graded Unit will be assessed in the context of an Investigation. The investigation, analysis and development of solutions should provide the learner with the opportunity to produce evidence that demonstrates she/he has met the aims of the Group Award that this Group Award Graded Unit covers.

The investigation should allow learners to demonstrate valid and realistic responses to the current and future needs of an ongoing development including, where appropriate, issues of Health and Safety and sustainability. Safe working practices should be looked at in accordance with current safety codes of practice and regulations. Sustainability should include reference to criteria affecting sustainability, impact of not implementing sustainability on the environment and the legislation promoting sustainability.

NOTE:

Where learners are progressing from a HNC to a HND programme the centre may wish to consider whether the *HND Graded Unit 2* task/s might be an extension of the tasks for the *HNC Graded Unit 1*. A similar progression might also be considered for learners progressing through the three Graded Units credits of a HND.

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Conditions of assessment

The learner should be given a date for completion of the project. However, the instructions for the project should be distributed to allow the learner sufficient time to assimilate the details and carry out the project. During the time between the distribution of the project instructions and the completion date, assessors may answer questions, provide clarification, guidance and reasonable assistance. The project should be marked as soon as possible after the completion date. The final grading given should reflect the quality of the learner's evidence at the time of the completion date.

The evidence for the project is generated over time and involves three distinct stages, where each stage should be achieved before the next is undertaken. Thus any re-assessment of stages can be undertaken before proceeding to the next stage.

If a learner fails the project overall or wishes to upgrade, then this must be done using a substantially different project, ie all stages are undertaken using a new project, assignment, case study, etc. In this case, a learner's grade will be based on the achievement in the re-assessment.

The learner should be given a date for submission of each Stage and for final completion of the case study. Parameters should be agreed with the tutor/supervisor by the learner(s) on a continuing basis providing clarification, guidance and reasonable assistance.

Each assessment task should be marked as soon as possible after the submission date. The final grading given should reflect the quality of the learner's evidence at the time of the completion date, including any oral examination. Re-assessment of this Graded Unit should be based on a significantly different assessment task.

At this level, learners should work independently within the context of a typical working environment. It is up to centres to take reasonable steps to ensure that the learner bring their specialist knowledge and experience to the project. For example, centres may wish to informally question learners at various stages on their knowledge and understanding of the project/case study on which they have embarked. Centres should ensure where research, etc is carried out in other establishments or under the supervision of others that the learner does not receive undue assistance. Learners should be allowed to use appropriate technology within and outwith the college environment.

To ensure authentication of work it is advisable for learners to complete a log or diary recording progress and tasks completed. There should be regular meetings between the tutor and learner(s) to review progress and these meetings should be recorded.

The final evaluation should include an oral examination of each learner's understanding of the evidence submitted. Where possible the involvement of an employer in the oral examination is encouraged.

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Evidence Requirements for this Graded Unit

The project undertaken by learners will consist of three stages: planning; developing; and evaluating. The following table specifies the minimum evidence required to pass each stage.

Project stage	Minimum Evidence Requirements	% Mark Allocation
Stage 1 — Planning	Develop a brief for the investigation. The brief must include: ♦ Title ♦ Statement of the issues/topics to be investigated. ♦ Objectives of the investigation ♦ Reasons for choice of issue/topic and relationship to the HNC Civil Engineering ♦ Identification of sources of information to be used and rationale for choice/s ♦ Statement of criteria to be used to assess the implications of the issue/topic, reasons for choice of criteria and relationship to the HNC Civil Engineering. ♦ A plan to carry out the investigation including timescales and resources required.	20%
	*The learner **must** achieve all of the minimum evidence specified above in order to pass the Planning stage.*	
Stage 2 — Developing	Production of a report of the investigation. The report must include: ♦ Details of how data was gathered/collated ♦ Actual data ♦ Analysis of data ♦ Explanation of how the issues/topics are supported by the data collected and the concepts covered within the HNC Civil Engineering ♦ Assessment of the implications of the conclusions in terms of the criteria selected during the planning process ♦ Statement of the conclusions and recommendations drawn from the investigation	60%
	*The learner **must** achieve all of the minimum evidence specified above in order to pass the Developing stage.*	

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Project stage	Minimum Evidence Requirements	% Mark Allocation
Stage 3 — Evaluating	Provide a report of the evaluation of the effectiveness of all parts of the investigation. The evaluation should include: ♦ A brief summary of the investigation ♦ Assessment of the extent to which each of the original objectives has been met, including any modifications made during the course of the investigation, supported with rationale ♦ Comment on aspects of the planning and development stages which worked well or deviated from the set plan ♦ Assessment of the research methods used ♦ Assessment of the strengths and weaknesses of the findings of the report of the investigation ♦ Identification of feedback to inform future investigations	20%
	*The learner **must** achieve all of the minimum evidence specified above in order to pass the Evaluating stage.*	

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Assessing and grading learners

The overall project will be marked out of **200**. Only whole marks should be used.

The percentage of marks allocated to each stage of the project is outlined in the **Evidence Requirements**.

It is a requirement that learners must meet the minimum *Evidence Requirements* for the *Planning* stage *before progressing to the Developing stage before progressing to the Evaluating* stage. Learners may produce evidence over and above that specified in the minimum *Evidence Requirements* and deserve more than half the available marks for that stage. Assessors should use the Grade Related Criteria outlined below to judge learner performance.

Learners are required to work independently to meet the *Evidence Requirements* of the Graded Unit. At the same time, learners need appropriate support. SQA uses the term reasonable assistance to describe the balance between supporting learners in their project and not providing too much assistance.

At the end of *each* stage there should be opportunities for remediation and re-assessment of learners for that particular stage. This includes the final *Evaluation* stage. Any re-assessment should be carried out in line with the centre's own assessment policy.

Grade Related Criteria	
Grade A	**Grade C**
Is a seamless, coherent piece of work which: ♦ has sufficient evidence for the three essential phases of the project, is produced to a high standard, and is quite clearly inter-related ♦ demonstrates an accurate and insightful interpretation of the project brief ♦ is highly focused and relevant to the tasks associated with the project brief ♦ is clear and well-structured throughout and language used is of a high standard in terms of level, accuracy and technical content ♦ effectively consolidates and integrates required knowledge and skills ♦ demonstrates the learner's ability to work autonomously	Is a co-ordinated piece of work which: ♦ has sufficient evidence of the three essential phases of the project, is produced to an adequate standard ♦ demonstrates an acceptable interpretation of the project brief ♦ is focused and relevant to the tasks associated with the project brief ♦ is satisfactorily structured and language used is adequate in terms of level, accuracy and technical content ♦ consolidates and integrates knowledge and skills but this may lack some continuity and consistency ♦ demonstrates independent learning with minimum support and revision during project

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

The assessment task is a project. The project undertaken by the learner must be a complex task which involves:

- variables which are complex or unfamiliar
- relationships which need to be clarified
- a context which may be familiar or unfamiliar to the learner

The assessment task must require the learner to:

- analyse the task and decide on a course of action for undertaking the project
- plan and organise work and carry it through to completion
- reflect on what has been done and draw conclusions for the future
- produce evidence of meeting the aims which this Graded Unit has been designed to cover

The assessment task must be an investigative task within the context of a specific civil engineering project or of general application to civil engineering practice. The task to be undertaken should be defined in relation to the context of particular topic/s, and what it is reasonable to expect of learners in the time scales available for a single credit Unit. Learners may select or be given a topic, but the topic/issues selected should focus on the main aims of the award and the need to demonstrate an ability to integrate knowledge and skills across the mandatory Units in the award.

The task should allow the learners (s) to demonstrate valid and realistic responses to the current and future needs of civil engineering technology and include, where appropriate, issues of Health and Safety and sustainability. Safe working practices should be looked at in accordance with current safety codes of practice and regulations. Sustainability should include reference to criteria affecting sustainability, impact of not implementing sustainability on the environment and the legislation promoting sustainability.

The task might, for example, require the learner to assume a work based role in design, project management, manufacture, installation or maintenance consistent with the level of this award. The task should involve elements of work planning, identification of data, research and investigation with selection and presentation of alternative Outcomes. A technical report including feedback to inform future similar activities is required. Alternatively, the task might require a more detailed analysis and evaluation of a smaller element of civil engineering technology.

At this HNC level the scope of the task should be clearly defined, the learner should have access to readily available data and analytical tools including hardware/software. Learners should not be expected to develop innovative Outcomes from fundamental principles but to apply existing information and techniques.

Higher National Project-based Graded Unit Specification: Designing the project and assessing learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

The marks allocated to each stage will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to the learner for this Graded Unit based on the following grade boundaries.

A = 70%–100%
B = 60%–69%
C = 50%–59%

These grade boundaries are fixed and should **not** be amended.

If a learner does not achieve a pass or wishes to upgrade, then this must be done using a substantially different project, ie all stages are undertaken using a new project (case study, investigation or practical assignment). In these circumstances, the highest grade achieved should be awarded.

More information on reasonable assistance, remediation and re-assessment may be found in the SQA publication *Guidance for the Implementation of Graded Units in Higher National Certificates and Diplomas* (SQA, 2008, Publication code: CA4405).

Higher National Project-based Graded Unit Support Notes

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Guidance on approaches to delivery and assessment of this Graded Unit

- How to plan within a course team.
- Sequence of delivery of the Graded Unit in relation to the subject Units that underpin it.
- Useful recommendations such as the use of progress interviews with learners.

It is intended that this Unit will integrate and consolidate the skills and knowledge gained through study of the other constituent Units in the HNC Civil Engineering framework. As a result, the learner should be introduced to the investigation only after the introductory Units have been completed. The delivery of the Graded Unit can run concurrently with that of the specialism Units. In this way the learner should be adequately prepared to meet the challenges presented by the case study.

It is possible that the tutor/assessor may have to recapitulate some of the content of the other Units in order to reinforce the learning and knowledge of the learner in specific areas. This recap of previous work would be entirely appropriate, but must be left to the discretion of the tutor/assessor to decide to what extent any review would be required.

The investigation brief/assessment instructions must be issued to allow the learner sufficient time to assimilate the details and carry out the assessment tasks. During the time between the issue of the project brief and the submission date, the tutors/assessors may answer questions, provide clarification, guidance and ‘reasonable assistance’.

As the investigation is produced in three distinct stages, it is recommended that regular progress/guidance interviews are scheduled with each learner to ensure that actual progress is apparent and valid evidence is in production. These should enhance student experience and performance, but also allow early identification of misinterpretation or disengagement.

Higher National Project-based Graded Unit Support Notes (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Opportunities for developing Core and other essential skills

Throughout the natural processes of preparation and production of evidence for this investigation, the learner will develop and demonstrate many elements of each Core Skill as follows:

Communication — Analysis of research materials to prepare both written and oral presentations.

Numeracy — Through Dead and Imposed Loading calculations.

Information and Communication Technology (ICT) — Accessing information for base research purposes. Assimilation and analysis of research information. Creation of graphical and narrative materials for presentation purposes.

Working with Others — Co-operatively, as part of a team in practical situations.

Problem Solving — Critical Thinking, Planning and Organisation, Review and Evaluation are fundamental to all elements of the investigation.

The investigation will allow the learner to develop a variety of supplementary skills and attributes which enhance life skills and the educational experience. Such skills tied to enterprise, employability, sustainable development and citizenship are deemed essential to success in learning, life and work. The learner should be nurtured wherever possible. The wide range of work to be completed within the investigation will provide the learner with opportunity to reflect upon collateral soft skills found, for example, in career development, developing self-confidence, team working, inter-dependence, problem solving, understanding rights and responsibilities, etc.

This Unit has the Core Skill of Problem Solving embedded in it, so when candidates achieve this Unit their Core Skills profile will be updated to show that they have achieved Problem Solving at SCQF Level 6.

History of changes to Graded Unit

Version	Description of change	Date
02	Core Skill Problem Solving at SCQF level 6 embedded.	24/07/2014

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General information for learners

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

This Unit is suitable for learners with limited experience in the construction industry aiming for a career as a Civil Engineering technician. The Unit forms part of a Group Award designed to provide learners with technical and professional knowledge and skills when working within civil engineering disciplines.

The principle aims are to:

- Prepare learners for employment as engineering technicians in the civil engineering industry with a range of employers who design, manage, maintain or adapt infrastructure elements such as bridges, railways, roads, water and sewerage installations including consulting civil engineers, civil engineering contractors and the owners/managers of infrastructure components.
- Provide learners with a range of contemporary vocational skills utilising modern equipment and techniques available for basic design procedures, surveying and material testing, thus enabling learners to make an immediate contribution in their role as engineer technicians.
- Provide a choice of optional Units that will allow learners to develop in other areas relevant to future employment in civil engineering, or progression via an HND in Civil Engineering.
- Provide learners with a range of skills to support learning in the SVQ 3 and SVQ 4 Construction: Technical Modern Apprenticeship Frameworks.
- Enable learners to achieve EngTech professional body recognition by the Institution of Civil Engineers.

Assessment of the Unit takes the form of an investigation. You will develop your ability to apply knowledge and skills, gained through study of other component parts of the course, to the solution of real or hypothetical civil engineering problems. These will simulate real life scenarios where technicians have to respond positively to a range of factors and provide valid and coherent solutions to a range of challenges.

You will investigate the planning and design strategies for a civil engineering project. You will produce sketch designs and construction drawings of the proposed design solution. You will also develop numerical skills by producing calculations relevant to the choice of investigation. Opportunity exists to support design proposals with technical investigations on the environmental impact of the project. An evaluation stage towards the end of the project will allow you to reflect on project development and to provide a written explanation of performance, progress and product.

The Graded Unit investigation is considered to be the culmination of a formal course of study leading to an HNC or HND Qualification. As such, the assessment will normally be issued towards the end of that study programme with submission of the completed work being the final element of the Qualification. You will be given a date for completion of the Investigation. Parameters should be agreed by you and tutor/supervisor on a continuing basis. The tutor/supervisor will provide clarification, guidance and reasonable assistance.

General information for learners (cont)

Graded Unit title: Civil Engineering: Graded Unit 1 (SCQF level 7)

Assessors will mark each stage of the project, taking into account the criteria outlined. The marks will then be aggregated to arrive at an overall mark for the project. Assessors will then assign an overall grade to you for this Graded Unit based on the following grade boundaries.

A = 70%–100%
B = 60%–69%
C = 50%–59%

NOTE: You must achieve all of the minimum evidence specified for each Stage of the project in order to achieve the Graded Unit.

Throughout the natural processes of preparation and production of evidence for this case study, you will develop and demonstrate many elements of each Core Skill, such as, *Communications, Numeracy, Information and Communication Technology (ICT), Working with Others* and *Problem Solving*.