



Arrangements for:

HNs in Civil Engineering

G89T 15 — HNC Construction Engineering

G89R 15 — HNC Structural Engineering

G89V 15 — HNC Civil Engineering

G8A8 16 — HND Civil Engineering

Validation date: July 2006

Date of original publication: August 2006

Version: 1

Acknowledgement

SQA acknowledges the valuable contribution that Scotland's colleges have made to the development of Higher National qualifications.

Contents

History of changes	1
1 Introduction	2
2 Rationale for the development of the award.....	2
3 Rationale for the Proposed Award Framework	3
3.2 HNC Construction Engineering	3
3.3 HNC Civil Engineering and HNC Structural Engineering.....	4
3.4 HND Civil Engineering.....	4
3.5 Summary	4
4 Aims of the awards	5
4.1 General aims.....	5
4.2 Specific aims	5
4.2.1 HNC Construction Engineering	5
4.2.2 HNC Civil Engineering	5
4.2.3 HNC Structural Engineering	6
4.2.4 HND Civil Engineering.....	6
4.3 Target groups.....	7
4.3.1 HNC Construction Engineering	7
4.3.2 HNC Civil Engineering	7
4.3.3 HNC Structural Engineering	7
4.3.4 HND Civil Engineering.....	7
4.4 Employment opportunities	8
5 Recommended Access.....	8
5.1 Access to HNC Construction Engineering	8
5.2 Access to HNC in Civil Engineering.....	8
5.3 Access to HNC in Structural Engineering.....	8
5.4 Access to HND in Civil Engineering	9
5.5 Work Experience.....	9
5.6 Accreditation of Prior Experiential Learning (APEL)	9
6 Structure of the HNC and HND Awards	10
6.1 Conditions of the award.....	11
7 Core Skills	13
7.1 The Core Skills recognised by SQA are at SCQF levels 3 to 6 in:	13
7.2 Recommended exemplar Core Skill entry profile for HNC and HND:.....	13
7.3 Recommended exemplar output Core Skill profiles.....	13
7.4 Opportunity for development of Core Skills	14
8 Mapping Information.....	15
9 Articulation, professional recognition and credit transfer	15
9.1 Articulation.....	15
9.2 Professional recognition	15
9.3 Credit Transfer Transition Arrangements	16
10 Approaches to delivery and assessment	16
10.1 Content and context.....	16
10.2 Delivery	16
10.3 Assessment	16
11 Graded Units.....	20
12 General information for centres.....	21
13 General information for candidates	21
14 Glossary of terms.....	21

History of changes

It is anticipated that changes will take place during the life of the qualification, and this section will record these changes. This document is the latest version and incorporates the changes summarised below.

Version number	Description	Date	Authorised by

1 Introduction

This is the Arrangements document for the *new Group Awards in Construction Engineering, Structural Engineering and Civil Engineering which were validated in July 2006*. This document includes: background information on the development of the Group Award, its aims, guidance on access, details of the Group Award structure, and guidance on delivery.

Civil Engineering embraces Construction Engineering, Civil and Structural Engineering.

‘FutureSkills Scotland’, a Scottish Sector Skill Profile 2005, was published by the Engineering Construction Industry Training Board, Highlands and Islands Enterprise and Scottish Enterprise. The FutureSkills report embraces Civil Engineering within the categories of both Construction and Engineering Construction. The data available at www.futureskillscotland.org.uk provides a broad skill analysis indicating generally that:

There are around 17,300 **engineering construction** sector workplaces in Scotland, employing 151,200 people — about 7% of all Scottish jobs.

There are around 17,300 **construction** sector workplaces in Scotland, employing 137,900 people — about 6% of all Scottish jobs.

Civil Engineering practice is closely linked with disciplines forming The Built Environment eg Construction, Architectural Technology, Building Surveying, Construction Management, Quantity Surveying and Facilities Management. In order to maximise the potential for commonality of objective, structure and delivery, development in these areas has been very closely linked.

Since the previous implementation of SQA awards in Civil Engineering and The Built Environment there have been many changes in technology and practice arising from socio-economic, environmental and cultural factors.

Consultations evidenced a need for the following qualifications to satisfy the requirements of employers, full and part-time college markets and articulation to Higher Education:

Civil Engineering	HNC Construction Engineering (Cons Eng)
	HNC Structural Engineering (Struct)
	HNC Civil Engineering
	HND Civil Engineering

This document is primarily concerned with the Civil Engineering awards, but includes reference to the Built Environment framework where it is felt beneficial to understanding of commonality.

2 Rationale for the development of the award

Recent assessment strategies have been at the expense of a focus on teaching and learning, and resulted in a perceived reduction in standards. The development of these new qualifications attempts to redress the balance, with a focus on teaching and learning, coupled with a suitably rigorous, but not onerous, assessment strategy.

Each Unit of study has a defined summative assessment strategy allowing assessment of individual Outcomes, combinations of Outcomes or an holistic assessment covering all Outcomes. In parallel with the writing of Unit descriptors an assessment exemplar has been commissioned from the Unit writer, or an appropriate alternative source. Development of

the exemplar assessment instrument, in parallel with the Unit descriptor, has helped considerably to define and refine Evidence Requirements Outcomes in the Unit of study.

3 Rationale for the Proposed Award Framework

3.1 The Higher National Certificates Construction Engineering, Civil and Structural Engineering and the Higher National Diploma in Civil Engineering are designed to provide:

- ◆ national qualifications, with detailed common standards, learning outcomes and unit
- ◆ grading recognisable to centres, candidates, employers and professional bodies
- ◆ a common core of study
- ◆ a choice of optional Units appropriate to the main career disciplines of the Civil Engineering sector
- ◆ flexible approach within a national framework
- ◆ the opportunity to preserve and build upon existing good practice
- ◆ compatibility with feeder qualifications
- ◆ a response to changing training and educational needs
- ◆ a preparation for employment
- ◆ a contribution to the skills, knowledge and understanding required to underpin relevant occupational standards and SVQs
- ◆ progression to degree programmes

In the design of the programme, employer needs are balanced with the necessity to provide candidates with the opportunity to maximise their potential, to achieve widely recognised qualifications and to progress within the industry.

A sustainable education and training provision relies on a credible mix of occupational alternatives, maximising the opportunity for common teaching across different occupational areas, but maintaining an adequate level of coherence for each candidate group. In this context the opportunity has been taken to maximise commonality of Units within and across the Civil Engineering and Built Environment awards.

The need for technician awards to be enabling, relevant, and to add value is recognised in the recent Malpas and Hawley reports. The proposed suite of awards offers this and in addition presents maximum flexibility for learners, employers, and educational establishments. This should increase the attractiveness and availability of the proposed qualifications.

3.2 HNC Construction Engineering

This course is designed for candidates who are capable of achieving an HNC after one year of full time, or two years part time, study. This is a 'generalist' course covering the increasingly overlapping areas involving building, infrastructure, environment and modern methods of construction. Thus the course provides candidates with key skills of Construction Communication, Site Surveying and 2D CAD. The course will prepare candidates for a variety of roles in construction and civil/structural engineering and in related sectors of prefabrication and heavy engineering. It is anticipated that the award will attract candidates with other 'Built Environment' awards who have migrated to construction engineering and are seeking further Continuing Professional Development. In common with the other HNC awards in the framework this HNC will attract recognition for Eng Tech registration with ECUK and professional bodies.

3.3 HNC Civil Engineering and HNC Structural Engineering

These courses are designed for candidates following mainly the traditional part time but also full time routes, with underpinning knowledge gained from NC type programmes together with skills gained in relevant employment. Such skills might permit the granting of Accreditation of Prior Experiential Learning (APEL) from some of the units of the HNC Construction Engineering and would thus provide a route for progression to the HND Civil Engineering on both part time and full time routes. Both the HNC Civil Engineering and the HNC Structural Engineering qualifications would advance learning in areas such as Site Surveying but mainly the Civil Engineering qualification includes specialist areas such as water, roads, and railways, and the Structural Engineering qualification provides the opportunity for those students from design offices requiring further advanced structural design units.

HNC Civil Engineering and HNC Structural Engineering qualifications contain a common core of units and consequently, the two specialist areas, together with areas common with the Built Environment awards in Construction Management, Architectural Technology, Quantity Surveying and Building Surveying, would encourage common delivery and teamwork with a range of specialist areas.

3.4 HND Civil Engineering

The HND in Civil Engineering provides both part time and full time study opportunities. The new structure of awards presents opportunities for candidates on a part time programme to obtain an HND. For example on the basis of a candidate awarded 6 Units APEL from the HNC Construction Engineering, and gaining the 12 Unit HNC Civil Engineering or HNC Structural Engineering, requires a further 12 Units from the HND programme to obtain the HND. The flexibility extends to full time HNC Construction Engineering (HND year 1) who may be successful in obtaining employment, and could then elect to do HND Civil Engineering on a part time basis. It is also envisaged that some Units might be delivered and assessed on a flexible and distance learning basis.

3.5 Summary

The new awards present centres with maximum opportunity to satisfy industry and candidate demands in their particular market economy by providing:

- ◆ maximum flexibility of opportunity for learners, employers, and educational establishments
- ◆ variety of modes for delivery
- ◆ opportunities for credit for learners at various stages
- ◆ progression for candidates striving towards I.Eng via HND and further study
- ◆ stimulation of the demand for Civil Engineering technician courses to meet the needs of industry
- ◆ recognition of the change from a craft to a technology based industry

4 Aims of the awards

4.1 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

4.2 Specific aims

4.2.1 HNC Construction Engineering

Specific aims are to:

- ◆ Prepare candidates for employment as engineering technicians in the construction engineering industry with a range of employers including developers, contractors, designers and prefabricators for industrial commercial and housing developments.
- ◆ Provide candidates with a range of contemporary vocational skills utilising modern equipment and techniques available for surveying, setting out, monitoring quality.
- ◆ Testing, detailing, fixings and interfaces thus enabling candidates to make an immediate contribution in their role as engineering technicians.
- ◆ Provide a choice of optional Units that will allow candidates to develop in other areas relevant to future employment in structural or civil engineering, or progression via an HND in Civil Engineering.
- ◆ Enable candidates to achieve appropriate professional body recognition, in particular but not exclusively, the Chartered Institute of Building, the Institution of Civil Engineers or the Institution of Structural Engineers.

4.2.2 HNC Civil Engineering

Specific aims are to:

- ◆ Prepare candidates 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 candidates with a range of contemporary vocational skills utilising modern equipment and techniques available for basic design procedures, surveying and material testing, thus enabling candidates to make an immediate contribution in their role as engineer technicians.
- ◆ Provide a choice of optional Units that will allow candidates to develop in other areas relevant to future employment in civil engineering, or progression via an HND in Civil Engineering.
- ◆ Enable candidates to achieve appropriate professional body recognition, in particular but not exclusively, the Institution of Civil Engineers

4.2.3 HNC Structural Engineering

Specific aims are to:

- ◆ Prepare candidates for employment as engineering technicians in the structural engineering industry with a range of employers who design and/or maintain, adapt or manage structures including consulting structural engineers, contractors and the owners/managers of industrial and commercial buildings.
- ◆ Provide candidates with a range of contemporary vocational skills utilising modern equipment and techniques available for basic structural design procedures and material testing, thus enabling candidates to make an immediate contribution in their role as engineering technicians.
- ◆ Provide a choice of optional Units that will allow candidates to develop in other areas relevant to future employment in structural or civil engineering, or progression via an HND in Civil Engineering.
- ◆ Enable candidates to achieve appropriate professional body recognition, in particular but not exclusively, the Institution of Civil Engineers or the Institution of Structural Engineers.

4.2.4 HND Civil Engineering

Specific aims are to:

- ◆ Prepare candidates for employment as senior 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 candidates with a range of contemporary vocational skills utilising modern equipment and techniques available for basic design procedures, surveying and material testing, thus enabling candidates to make an immediate contribution in their role as engineer technician.
- ◆ Provide a choice of optional Units that will allow candidates to develop in other areas relevant to future employment in civil engineering, or progression to higher level qualifications in Civil Engineering.
- ◆ Enable candidates to achieve appropriate professional body recognition, in particular but not exclusively, the Institution of Civil Engineers.

4.3 Target groups

4.3.1 HNC Construction Engineering

The HNC Construction Engineering programme is suitable for a wide range of candidates including:

- ◆ school leavers
- ◆ candidates progressing from a lower level award in Civil Engineering or a closely related discipline
- ◆ adults returning to education
- ◆ candidates in employment with lower level qualifications who wish to enhance their career prospects

4.3.2 HNC Civil Engineering

The HNC Civil Engineering programme is suitable for a wide range of candidates including:

- ◆ school leavers
- ◆ candidates progressing from a lower level award in Civil Engineering or a closely related discipline
- ◆ adults returning to education
- ◆ candidates in employment with lower level qualifications who wish to enhance their career prospects

4.3.3 HNC Structural Engineering

The HNC Structural Engineering programme is suitable for a wide range of candidates including:

- ◆ school leavers
- ◆ candidates progressing from a lower level award in Civil Engineering, Structural Engineering or a closely related discipline
- ◆ adults returning to education
- ◆ candidates in employment with lower level qualifications who wish to enhance their career prospects

4.3.4 HND Civil Engineering

The HND programme in Civil Engineering is suitable for a wide range of candidates including:

- ◆ school leavers
- ◆ candidates progressing from an HNC in Civil Engineering, Structural Engineering, Construction Engineering or a closely related discipline
- ◆ adults returning to education
- ◆ candidates in employment with lower level qualifications who wish to enhance their career prospects

4.4 Employment opportunities

These awards will suit the employment requirements of a range of employers including:

- ◆ developers, contractors, designers and prefabricators for industrial commercial and housing developments
- ◆ those 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
- ◆ those who design, maintain, adapt or manage structures including consulting structural engineers, contractors and the owners/managers of industrial and commercial buildings

5 Recommended Access

As with all SQA qualifications, access to the awards will be at the discretion of the centre. The following recommendations are for guidance only.

5.1 Access to HNC Construction Engineering

Higher National programmes are intended primarily for people who are in, or plan to enter employment. Candidates who enter with at least one of the following qualifications are likely to benefit more readily from the programme:

- ◆ an HNC or NC in a related discipline
- ◆ at least one Higher level pass, with appropriate supporting passes at Standard Grade Credit in appropriate subjects, which should include science and/or technology
- ◆ an SVQ in Civil Engineering or a related discipline
- ◆ those with other entry qualifications who demonstrate a realistic chance of success
- ◆ a craft qualification combined with appropriate further study, prior to, or in parallel with, the HNC programme

5.2 Access to HNC in Civil Engineering

Higher National programmes are intended primarily for people who are in, or plan to enter employment. Candidates who enter with at least one of the following qualifications are likely to benefit more readily from the programme:

- ◆ an HNC or NC in a related discipline
- ◆ at least one Higher level pass, with appropriate supporting passes at Standard Grade Credit in appropriate subjects, which should include science and/or technology.
- ◆ a SVQ in Civil Engineering or a related discipline
- ◆ those with other entry qualifications who demonstrate a realistic chance of success
- ◆ a craft qualification combined with appropriate further study, prior to, or in parallel with, the HNC programme

5.3 Access to HNC in Structural Engineering

Higher National programmes are intended primarily for people who are in, or plan to enter employment. Candidates who enter with at least one of the following qualifications are likely to benefit more readily from the programme:

- ◆ an HNC or NC in a related discipline
- ◆ at least one Higher level pass, with appropriate supporting passes at Standard Grade Credit in appropriate subjects, which should include mathematics and science and/or technology
- ◆ a SVQ in Civil Engineering or a related discipline
- ◆ those with other entry qualifications who demonstrate a realistic chance of success
- ◆ a craft qualification combined with appropriate further study, prior to, or in parallel with, the HNC programme

5.4 Access to HND in Civil Engineering

Higher National programmes are intended primarily for people who are in, or plan to enter employment. Candidates who enter with at least one of the following qualifications are likely to benefit more readily from the programme:

- ◆ an HNC in Construction Engineering, Structural Engineering, Civil Engineering or a related discipline
- ◆ at least one Higher level pass, with appropriate supporting passes at Standard Grade Credit in appropriate subjects, which should include mathematics and science and/or technology
- ◆ a SVQ in Civil Engineering or a related discipline
- ◆ those with other entry qualifications who demonstrate a realistic chance of success
- ◆ a craft qualification combined with appropriate further study, prior to, or in parallel with, the HNC programme

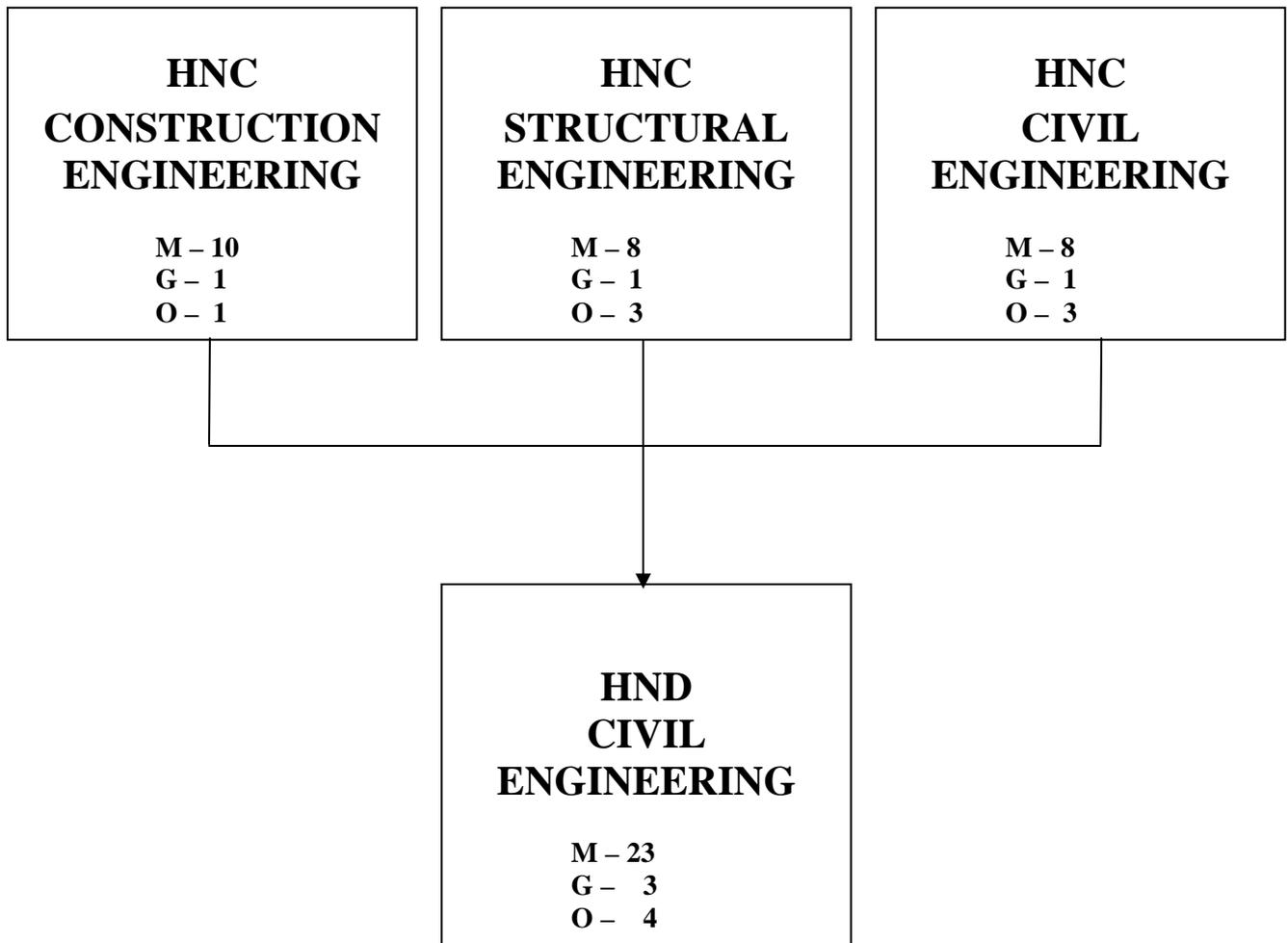
5.5 Work Experience

Mature candidates with suitable relevant work experience may be accepted for entry, or advanced entry; provided the enrolling centre believes that the candidate is likely to benefit from undertaking the awards. Centres may wish to use Core Skills profiling to assist them in this process.

5.6 Accreditation of Prior Experiential Learning (APEL)

Candidates may be granted Accreditation of Prior Experiential Learning (APEL) in respect of underpinning knowledge previously gained or skills developed in relevant employment. Such APEL might allow a candidate entry to, or advanced entry in, an HNC or HND. All such decisions should be referred to a Moderator.

6 Structure of the HNC and HND Awards



M — Mandatory Unit credits (excluding Graded Unit credits)
G — Mandatory Graded Unit credits
O — Optional Unit credits

6.1 Conditions of the award

Candidates must satisfy the following SQA design criteria for HNC and HND awards:

Design criteria	HNC	HND
SCQF level	7	8
Min Credits	12	30
Min total Credit Points	96 * (12 Credits)	240 * (30 Credits)
Min points by level	48 at level 7	64 at level 8
Min mandatory Credit Points	48 *	96 *
Graded Unit	8 points at 7	8 points at 7 + 16 points at 8
* Including Graded Units		

Note:

One HN Credit = 8 SCQF points at the appropriate level.

Each SQA single credit Unit carries a notional contact time allocation of 40 hours, with additional candidate self-directed study time of 40 hours. Hence the minimum contact time for an HNC is 480 hours and for an HND is 1,200.

HNC

Candidates will therefore be awarded an HNC on successful completion of 96 SCQF credit points including successful achievement of all mandatory Units and the Graded Unit.

HND

Candidates will be awarded an HNC on successful completion of 240 SCQF credit points including successful achievement of all mandatory Units and the Graded Unit.

Table 6.2 — Mandatory and Optional Units

See below.

Unit title	Unit code	SQA credit	SCQF level	HNC Con Eng	HNC Struct	HNC Civil	HND Civil
Applied Mathematics for Civil Engineers	F02N 35	1	8				O
CAD 2D 1	DW1E34	1	7	M	M	M	M
CAD for Civil Engineering	DW5F34	1	7		O	O	M
Civil Engineering Contract and Project Management A	DW5934	1	7	M	M	M	M
Civil Engineering Contract and Project Management B	DW5A35	1	8				M
Civil Engineering Fluid Mechanics	DW5K35	1	8			O	M
Civil Engineering Materials and Testing	DW5C34	1	7	O	M	M	M
Civil Engineering Specialisms	DW5G34	1	7	M		M	M
Civil Engineering Technology	DW5D35	1	8	M	M	O	M
Computer Applications for Civil Engineering	DW5835	1	8			O	M
Construction Materials and Specification	DW5334	1	7	M	O	O	M
Construction Site Surveying A	DW5H34	1	7	M	O	M	M
Construction Site Surveying B	DW5J34	1	7			O	M
Construction Site Surveying C	DW4435	1	8				O
Construction Technical Communication Skills	DW4D34	1	7	M	O	O	M
Construction Technology: Substructure	DW5734	1	7		M	M	M
Geotechnics A	DW5L35	1	8		O	O	M
Geotechnics B	DW5M35	1	8				O
HNC Civil Engineering Graded Unit 1	F03N 34	1	7			M	M
HNC Construction Engineering Graded Unit 1	F03P 34	1	7	M			or M
HNC Structural Engineering Graded Unit 1	F03R 34	1	7		M		or M
HND Civil Engineering Graded Unit 2	F08H 35	2	8				M
Health and Safety in Construction	DW4E34	1	7	M			M
Highway Engineering	DW5N35	1	8			O	O
Mathematics for Construction	DW4F33	1	6	M	M	M	M
Mathematics for Construction Engineering	F02P 34	1	7	O	O	O	M
Personal Development Planning	DE3R334	1	7	O			O
Public Health Engineering	DW5P35	1	8			O	O
Quality in Construction	DW4G34	1	7				O
Railway Civil Engineering An Introduction	DW4834	1	7			O	O
Railway Permanent Way Engineering	DW4735	1	8				O
Railway Permanent Way Engineering Computer Design	DW4635	1	8				O
Reinforced Concrete Design and Detailing	DW5E35	1	8		O		M
Structural Analysis A	DW70 34	1	7		M		M
Structural Analysis B	DW6Y 35	1	8		O		M
Structural Masonry Design and Detailing	DW4935	1	8		O		O
Structural Mechanics	DW4534	1	7	M	M	M	M
Structural Steel Design and Detailing	DW4A35	1	8		O		M
Structural Timber Design and Detailing	DW4C35	1	8		O		O
Traffic Engineering	DW5R35	1	8			O	O
Water Supply Engineering	DW5T35	1	8			O	O
Work Role Effectiveness	DG6E34	3	7				O
Required Credits				12	12	12	30
Mandatory Credits				11	9	9	26
Optional Credits				3	11	14	17
Level 6 Mandatory Credits				1	1	1	1
Level 7 Mandatory Credits				9	7	8	15
Level 8 Mandatory Credits				1	1	0	10
Level 6 Mandatory Credit Points				8	8	8	8
Level 7 Mandatory Credit Points				72	56	64	120
Level 8 Mandatory Credit Points				8	8	0	80
Total Mandatory Points				80	72	72	208

7 Core Skills

7.1 The Core Skills recognised by SQA are at SCQF levels 3 to 6 in:

- ◆ Communication
- ◆ Information Technology
- ◆ Numeracy
- ◆ Working with Others
- ◆ Problem Solving

Applied problem solving, including creative thinking and on-going evaluation of proposed and actual design solutions are essential elements in all Civil Engineering activities. There are also ample opportunities within the award to develop key numerical and graphical competencies in the context of applied knowledge and skills. The focus in the award on technology as a current industry tool in the design process ensures sound competence and understanding of its applications and uses. Access to technology, with appropriate support systems, is available all centres for reference, research and the production and presentation of accurate written and graphic materials. As candidates undertake the award, formative activities will replicate group problem solving approaches using the communication techniques required in the industry today.

Awareness and development of Core Skills is also incorporated into the award by the fact that candidates, supported by assessors, have to take responsibility for their own learning programmes and produce and present a project.

The Qualifications Design Team has agreed, therefore, that the delivery of mandatory and optional Units should provide many opportunities for tailoring relevant elements of the Core Skills to the specific demands of the vocational area.

7.2 Recommended exemplar Core Skill entry profile for HNC and HND:

Input Profile for HNCs and HND **NOTE:** SCQF level = ()

Core Skill	Construction Engineering	Structural Engineering	Civil Engineering
Communication	Int 2 (5)	Int 2 (5)	Int 2 (5)
IT	Int 1 (4)	Int 1 (4)	Int 1 (4)
Numeracy	Int 2 (5)	Int 2 (5)	Int 2 (5)
Problem Solving	Int 2 (5)	Int 2 (5)	Int 2 (5)
Working with others	Int 1 (4)	Int 1 (4)	Int 1 (4)

7.3 Recommended exemplar output Core Skill profiles

Candidates who achieve the award will have opportunities to develop relevant aspects of Core Skills to the following levels as a minimum.

Output Profile for HNCs

Core Skill	Construction Engineering	Structural Engineering	Civil Engineering
Communication	Higher (6)	Higher (6)	Higher (6)
IT	Int 2 (5)	Int 2 (5)	Int 2 (5)
Numeracy	Higher (6)	Higher (6)	Higher (6)
Problem Solving	Higher (6)	Higher (6)	Higher (6)
Working with others	Int 2 (5)	Int 2 (5)	Int 2 (5)

Output Profile for HND

Core Skill	HND Civil Engineering
Communication	Higher (6)
IT	Int 2 (5)
Numeracy	Higher (6)
Problem Solving	Higher (6)
Working with others	Int 2 (5)

7.4 Opportunity for development of Core Skills

Given the various access routes available to candidates it is possible that some candidates in each cohort will not meet the exemplar entry profile. It will be for centres to enable these candidates to take maximum advantage of opportunities within the programme to raise their Core Skill achievement levels.

The general aims of the Higher National awards in Civil Engineering include developing a range of personal and key skills that will improve ability, confidence and employability. All practical teaching and learning activities of the HNC/HND programmes provide a context for developing and enhancing the five Core Skills to a significant level beyond those recommended at entry. Many discrete Core Skill elements are included within the context of assessments. The use of technology as a tool to research, analyse and present complex reports and to synthesize statistical information is essential to the course. Planning, organising and evaluating work and listening and talking with a wide range of people is critical.

Each Unit Descriptor indicates the Core Skills likely to be able to be developed within that Unit. Appendix 1 provides a Core Skills Sign Posting Guide which details opportunities for the development of Core Skills, through the learning and teaching assessment process, in the Mandatory Units of the HNCs. This signposting guide focuses on indicating specific Outcomes that offer opportunities for Core Skills development. This guidance is not intended to be exhaustive, particular learning and teaching programs, the remaining Mandatory Units of the HND and the Optional Units, may well provide additional opportunities.

Additional skills recognised as critical by employers and Higher Education, such as meeting deadlines, attention to detail, personal target setting, enterprise and effective dealing with clients are not precisely reflected in the SQA Core Skill specifications. Awareness and opportunity for development of these skills exists within this award. The Graded Units integrates knowledge and skills developed, and provides further opportunities for candidates to demonstrate transferable skills and a high level of achievement.

8 Mapping Information

It is the intention to map the award content, against appropriate UK Spec Competence Criteria which are derived from appropriate Occupational Standards, subsequent to Award Validation. See also 10.

9 Articulation, professional recognition and credit transfer

9.1 Articulation

These awards, in accordance with the aims, have been designed to enable candidates to gain admission to degree programmes at Higher Education Institutions (HEIs). Advanced entry standing to degree programmes is possible, the degree of recognition depending on the particular HEI. Some HEIs will admit HNC holders to the first year of degree programmes and those possessing a HND to second or third year.

Admission Tutors at HEI's delivering Civil Engineering in Scotland have been consulted. Some HEIs have responded to indicate that they will consider individual candidate applications and are not prepared to make general statements of policy.

A number of HEI Admission Tutors have yet to address the change to Graded Units in SQA awards, and are continuing to state requirements in terms of 'Merits' gained in individual Units of study.

9.2 Professional recognition

The Higher National qualifications in Civil Engineering have been developed with both career progression and professional development in mind. It is essential that students gain the maximum benefit from their programme of study.

The 'Higher Level and Technician Qualification Sub-committee' of the Joint Board of Moderators representing the Institution of Civil Engineers, the Institution of Structural Engineers, the Institute of Highways Incorporated Engineers, and the Institution of Highways & Transportation, accepted that the proposed HNCs and HND are appropriate for Engineering Technician registration purposes with ECuk.

The HNC in Structural Engineering and the HNC and HND in Civil Engineering should therefore satisfy:

- (a) the educational base for registration as an Engineering Technician (Eng Tech), and part satisfaction of requirements for registration as an Incorporated Engineer (IEng).
- (b) within the Engineering Council (UK) specification of competences, UKSpec.

The awards should also be recognised as underpinning knowledge to S/NVQ level 4.

Having achieved a particular registration level, candidates may progress by achieving the educational requirement for the next level, or by satisfying a Technical Report requirement, and, in addition to gaining the appropriate professional experience.

9.3 Credit Transfer Transition Arrangements

Some new Units are very similar to existing Units, some have the same structure but with updated and/or new content, and in some cases content of existing Units has been redistributed amongst other Units to make a more coherent provision.

In principle candidates can be given credit transfer between current HNC Units, or Units from other appropriate qualifications, and the Units of the new award.

Specific credit transfers for Mandatory and Optional Units are listed in Appendix 2.

Centres will have access to the SQA Moderator in order to validate Credit Transfer applications other than those listed in Appendix 2.

During the period of transition from existing qualifications to the new HNCs and HND candidates might be eligible for credit transfer. Such eligibility is discussed further in Appendix 2.

Candidates who are given credit transfer between current HNC Units and the new HN Units must still satisfy all other conditions of the award of the new principles HNC including the mandatory Units and the correct number of credits at the correct SCQF level.

10 Approaches to delivery and assessment

10.1 Content and context

The HN qualifications in Civil Engineering are designed to equip students with the knowledge, understanding and skills required for success in current and future employment as technicians, design engineers or project managers in Civil or Structural Engineering.

10.2 Delivery

The structure of the qualifications allows for a high degree of flexibility in the delivery mode. The awards could be offered on full-time, block-release, day release or evening modes. A distance learning delivery mode is possible providing adequate materials, tutorial support and assessment facilities exist. Combination of delivery modes is also a possibility. Such combined mode study may enable candidates to complete the awards within a shorter time period.

There are many opportunities for integrative delivery of Units within each of the awards. Teaching and learning for mathematics and science Units could be integrated with technology Units, and assessment should be encouraged to be within the application of technology Units. Graded Units provide the opportunity for integration of knowledge and skills across the Units in an award. Supporting Notes with each Unit identify specific opportunities for integration with other Units.

Centres will define which order Units are undertaken based on candidate recruitment patterns, mode of delivery, resource issues and logical progression dictated by topic and Unit content. Suggested sequences of delivery for the awards are provided in Appendix 3.

Provided that adequate material and tutorial expertise existed the HNC could be delivered by Open/Distance learning as well as on an online basis. Centre devised supervision agreements should detail controlled conditions to ensure authenticity of evidence.

10.3 Assessment

The assessment strategy is designed to ensure an appropriate level of rigour whilst not imposing excessive demands on centres or candidates.

The new design principles for HN awards encourages a more holistic approach to assessment and this has been adopted in this award. The new HN specification places the emphasis on assessing the whole Outcome or a combination of Outcomes rather than on individual Performance Criteria. There is also the intention to reduce the assessment loading for both candidates and centres and Unit definitions allows the use of ‘sampling’ of knowledge and /or skills where appropriate.

Each Unit Descriptor includes guidance on delivery and assessment and, where appropriate, any relationship with delivery and assessment of other Units. Requirements for knowledge, skills, sampling, evidence and conduct of assessments is provided for each Outcome in the Unit. Opportunities for integrative assessment across Units is provided and it is generally recommended that topics such as mathematics and fluid mechanics are assessed within Units which apply fundamental theory to practical applications. Assessment guidance includes a variety of conditions including open/closed-book, case study etc.

Exemplar assessment instruments are available for all mandatory Units and optional Units. The Exemplar provides guidance on content, conduct, evidence required and marking and grading. Centres are expected to use these exemplars as templates when producing further assessment instruments.

An analysis of assessment modes included in the Unit descriptors is shown in table 10.3:

Table 10.3 Analysis of assessment models included in Unit descriptors

Unit title	Credit value	SCQF level	OCs	O	C	S	P	G	CS	Time
Applied Mathematics for Civil Engineers	1	8	3	Y		Y				2
CAD 2D 1	1	7	4	Y			Y			5
CAD for Civil Engineering	1	7	3	Y			Y			8
Civil Engineering Contract and Project Management A	1	7	4	Y		Y	Y			3
Civil Engineering Contract and Project Management B	1	8	3	Y		Y	Y			3
Civil Engineering Fluid Mechanics	1	8	4	Y		Y				2
Civil Engineering Materials and Testing	1	7	4	Y		Y	Y			
Civil Engineering Specialisms	1	7	4	Y		Y				2
Civil Engineering Technology	1	8	5		Y	Y			Y	2
Computer Applications for Civil Engineering	1	8	4	Y	Y		Y			
Construction Materials and Specification	1	7	3	Y			Y			2
Construction Site Surveying A	1	7	4	Y		Y	Y	Y		
Construction Site Surveying B	1	7	3	Y			Y	Y		
Construction Site Surveying C	1	8	4	Y		Y	Y	Y		
Construction Technical Communication Skills	1	7	4	Y		Y	Y		Y	2
Construction Technology: Substructure	1	7	4		Y	Y				3
Geotechnics A	1	8	4	Y		Y	Y	Y		3
Geotechnics B	1	8	4	Y		Y	Y	Y		3
Health and Safety in Construction	1	7	3	Y	Y	Y				2
Highway Engineering	1	8	4	Y		Y	Y	Y		3
Mathematics for Construction	1	6	3		Y	Y				
Mathematics for Construction Engineering	1	8	4	Y		Y				2
Personal Development Planning	1	7	3	Y		Y	Y	Y		
Public Health Engineering	1	8	4	Y		Y		Y		3
Quality in Construction	1	7	3	Y		Y		Y	Y	2
Railway Civil Engineering an Introduction	1	7	4	Y	Y	Y	Y	Y		3
Railway Permanent Way Engineering	1	8	4	Y		Y		Y	Y	3
Railway Permanent Way Engineering: Computer Design	1	8	5	Y				Y	Y	3
Reinforced Concrete Design and Detailing	1	8	2	Y		Y		Y		2
Structural Analysis A	1	7	4		Y	Y				2
Structural Analysis B	1	8	3		Y	Y				2
Structural Masonry Design and Detailing	1	8	3	Y		Y		Y	Y	2
Structural Mechanics	1	7	4	Y		Y				2
Structural Steel Design and Detailing	1	8	3	Y		Y		Y	Y	3
Structural Timber Design and Detailing	1	8	3	Y		Y			Y	2
Traffic Engineering	1	8	4	Y		Y		Y	Y	3
Water Supply Engineering	1	8	4	Y		Y		Y	Y	3
Work Role Effectiveness	3	7	3	Y					Y	

Legend:		
OCs = Number of Outcomes	P = Practical work	S = Short answer questions
O = Open-book	G = Group work	
C = Closed-book	CS = Case Study	

Re-assessment strategy

Process

The way that centres re-assess candidates is integral to the way that they manage assessment as a whole and as such, will be subject to internal moderation. In order to ensure that the assessment process is as holistic as possible and that assessors are able to effectively judge candidates' performance in the Outcome or Unit as a whole, it may not always be possible to re-assess only those parts of the performance in which candidates have not satisfactorily demonstrated competence. Scenarios where candidates may require to re-do the whole assessment include:

- ◆ assessments which test knowledge and other cognitive skills and where it may not be possible to extract some of the items for re-assessment
- ◆ where parts of several Outcomes are involved
- ◆ where a project has been designed as an integrated assessment and where there is a requirement to complete the project as a single complex task

Candidates may be required to do only part of an assessment, where their evidence has been generated over a period of time and/or a discrete part of the Unit, such as an Outcome, has been assessed originally. This is particularly relevant in the case of Project, Case Study and Investigative assessment activities.

Re-assessment opportunities

SQA advises that there should normally be one, or in exceptional circumstances two, re-assessment opportunities. (Please refer to *SQA's Guide to Assessment and Quality Assurance for Colleges of Further Education*, for details).

Eligibility

Candidates who have not satisfactorily demonstrated their attainment of knowledge and/or skills and/or competence in the whole or only part of an assessment may be considered for re-assessment.

Developing alternative assessments

The design of the original assessments inform the re-assessment process to a large extent, as these determine the type of assessment instruments used and the purpose of the assessment. Normally, centres build up banks of assessments that can be used in whole or part for re-assessment purposes.

Assessment writers should refer to the Unit specification when developing an alternative assessment and ensure that it is of equal demand to the original assessment and that it covers all necessary criteria — for example Core Skill achievement. Where candidates have not provided satisfactory evidence for knowledge and/or skill items which have been sampled, they would normally be re-assessed on a different sample.

HN Graded Units

Applying the above general policy to re-assessing HN Graded Units means that reassessing an examination-based Group Award Graded Unit would normally be based on an alternative examination and re-assessment of a project-based Graded Unit would normally be based on an alternative assessment task. For the latter, centres would be encouraged to set the parameters at the start of the project class giving details of the draft (one only) submission date and final submission date. Candidates must pass each section of the project/investigation. The overall grade is derived from the total number of marks across all the sections. The Conditions of Assessment section on the Graded Unit specification gives additional guidance.

11 Graded Units

There are four Graded Units in the framework:

HNC Construction Engineering	1 Credit Unit of 8 points at SCQF level 7
HNC Structural Engineering	1 Credit Unit of 8 points at SCQF level 7
HNC Civil Engineering	1 Credit Unit of 8 points at SCQF level 7
HND Civil Engineering	2 Credit Unit of 16 points at SCQF level 8

Full Graded Unit descriptors are available on the SQA website (www.sqa.org.uk).

The Graded Units are designed to test knowledge and skills across the Units of the award in the context of a typical work related activity.

The Graded Units specifications require candidates to undertake a Project, as a Case study or Investigation, involving:

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

The Graded Unit will test the candidates' ability to meet the General and Specific aims of the Group Award (see Section 6.3 and 6.4) by requiring the candidate to:

- ◆ *analyse* the task and decide on a course of action before undertaking the project
- ◆ undertake *research* and *evaluate* data
- ◆ *decide* best fit solution/s or Outcomes
- ◆ *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 Group Award Graded Unit has been designed to cover

Candidates are required to work independently within the context of a typical working environment. Where candidates are progressing from a HNC to a HND the HND Graded Unit 2 might be an extension, in depth or breadth, of the HNC Graded Unit 1.

Exemplars have been produced to guide centres in the design of Graded Unit tasks.

12 General information for centres

Candidates with disabilities and/or additional support needs

The additional support needs of individual candidates should be taken into account when planning learning experiences, selecting assessment instruments, or considering alternative Outcomes for Units. Further advice can be found in the SQA document *Guidance on Assessment Arrangements for Candidates with Disabilities and/or Additional Support Needs* (www.sqa.org.uk).

Internal and external moderation

All instruments of assessment used within this/these Group Award(s) should be internally moderated, using the appropriate policy within the centre and the guidelines set by SQA.

External moderation will be carried out by SQA to ensure that internal assessment is within the national guidelines for these qualifications.

Further information on internal and external moderation can be found in SQA's Guide to Assessment and Quality Assurance for Colleges of Further Education (www.sqa.org.uk).

13 General information for candidates

The HNCs in Construction Engineering, Structural and Civil Engineering and the HND in Civil Engineering are designed to equip you with the knowledge, understanding and skills to allow you to gain employment in the construction, construction engineering, structural and civil engineering fields or to progress to a higher education or professional body qualification.

Each of the HNCs comprise of 12 credits, of which 9, including the Graded Unit, are mandatory. You will also need to successfully complete 3 Units from a range of optional Units.

The HND comprises 30 credits, of which 26, including the Graded Unit/s, are mandatory. You will also need to successfully complete 4 Units from a range of optional Units.

For each Unit, except the Graded Unit, you will need to perform sufficiently well to achieve a Pass. The Graded Units are designed to assess your ability to retain and integrate the knowledge and skills gained in the award and also to grade your overall achievement. There are three grades — 'A' if you achieve 70% or over; 'B' if you achieve between 60% and 69% and 'C' if you achieve between 50% and 59%. The Graded Unit task at HNC and HND will be a Project which might take the form of a Case Study or Investigation.

14 Glossary of terms

SCQF: This stands for the Scottish Credit and Qualification Framework, which is a new way of speaking about qualifications and how they inter-relate. We use SCQF terminology throughout this guide to refer to credits and levels. For further information on the SCQF see Appendix 2 or visit the SCQF website at www.scqf.org.uk.

SCQF credits: One HN credit is equivalent to 8 SCQF credit points. This applies to all HN Units, irrespective of their level.

SCQF levels: The SCQF covers 12 levels of learning. HN Units will normally be at levels 6–9. Graded Units will be at level 7 and 8 (see Section 6 for further information on this).

Subject Unit: Subject Units contain vocational/subject content and are designed to test a specific set of knowledge and skills.

Graded Unit: Graded Units assess candidates' ability to integrate what they have learned while working towards the Units of the Group Award. Their purpose is to add value to the Group Award, making it more than the sum of its parts, and to encourage candidates to retain and adapt their skills and knowledge.

Dedicated Core Skill Unit: This is a Unit that is written to cover one or more particular Core Skills, eg HN Units in Information Technology or Communications.

Embedded Core Skills: This is where the development of a Core Skill is incorporated into the Unit and where the Unit assessment also covers the requirements of Core Skill assessment at a particular level.

Signposted Core Skills: This refers to the opportunities to develop a particular Core Skill at a specified level that lie outwith automatic certification.

Qualification Design Team: The QDT works in conjunction with a Qualification Manager/Development Manager to steer the development of the HNC/D from its inception/revision through to validation. The group is made up of key stakeholders representing the interests of centres, employers, universities and other relevant organisations.

Consortium-devised HNCs and HNDs are those developments or revisions undertaken by a group of centres in partnership with SQA.

Specialist single centre and specialist collaborative devised HNCs and HNDs are those developments or revisions led by a single centre or small group of centres who provide knowledge and skills in a specialist area. Like consortium-devised HNCs and HNDs, these developments or revisions will also be supported by SQA.

Core Skills Sign Posting Guide

The Core Skills Sign Post Guide identifies opportunities for the development of Core Skills through the learning and teaching assessment process. The guide focuses on specific areas that offer opportunities for Core Skills development in the Mandatory Units of the three HNCs, at the levels shown. The Units identified in the guide are therefore mandatory for those candidates taking the HND.

The guide is neither exclusive nor exhaustive, the remaining Mandatory and Optional Units may well provide additional opportunities for Core Skill development at the levels indicated in the guide or at other levels.

Additional skills recognised as critical by employers and Higher Education, such as meeting deadlines, attention to detail, personal target setting, enterprise and effective dealing with clients are not precisely reflected in the SQA Core Skill specifications. Awareness and opportunity for development of these skills exists within this award. The Graded Units integrate knowledge and skills developed, and provides further opportunities for candidates to demonstrate transferable skills and a high level of achievement.

Communication (SCQF level 6)

Skill component Written Communication (Reading)

- a Identify and summarise significant information, ideas and supporting detail.
- b Evaluate effectiveness in meeting purpose and needs of readership.

Core Units	Knowledge and Skills/Evidence	a	b
Construction Technical Communication Skills	Identify the purpose and method of a particular communication	✓	
	Select the most appropriate medium for a particular communication		✓
Civil Engineering Materials and Testing	Undertake an information survey of relevant materials.	✓	
Site Surveying A	Carry out information gathering from Ordnance Survey plans	✓	
HNC Graded Unit 1	Reading and interpreting graphical and written communication defining the assessment tasks	✓	✓
<p>Identifying, interpreting and applying information from a range of specifications and plans is an essential skill in the majority of Units. Understanding and applying terminology across a range of civil engineering Units will develop industry skill. Candidates will also refer to a range of sources to research and reference underpinning complex background information on vocational issues.</p>			

Written Communication (Writing)

Produce well-structured Written Communication

- a Present essential ideas/information in a logical order.
- b Use a structure which takes account of purpose/links points for clarity and impact.
- c Use conventions which are effective for audience.
- d Use accurate spelling, punctuation, sentence structures.
- e Vary sentence structure, paragraphing, vocabulary to suit purpose and target audience.

Unit	Knowledge/Skills/Evidence	a	b	c	d	e
Construction Technical Communication Skills	Prepare accurate written site instructions and records of site activities	✓	✓	✓	✓	✓
Civil Engineering Materials and Testing	Report on the properties of a variety of materials	✓	✓	✓	✓	
	Report on the properties of a variety of soils	✓	✓	✓	✓	
Civil Engineering Specialisms	All Outcomes require descriptive evidence	✓	✓	✓	✓	✓
Civil Engineering Technology	All Outcomes require descriptive evidence	✓	✓	✓	✓	✓
Construction Materials and Specifications	Prepare sample specifications for construction materials	✓	✓	✓	✓	
HNC Graded Unit1	Preparation of portfolio, report etc	✓	✓	✓	✓	✓

All Units require the ability to select the most appropriate medium and format for conveying textual and/or graphic information effectively. Skills developed during the course will include production and presentation of accurate, coherent written and graphic data to industry standards.

Oral Communication

Produce and respond to oral Communication

- a Use vocabulary and a range of spoken language structures consistently and effectively with appropriate formality.
- b Convey all essential ideas/information/opinions accurately and coherently with appropriate varied emphasis.
- c Structure to take account of purpose and audience.
- d Take account of situation and audience during delivery.
- e Respond to others taking account of their contribution.

Unit	Knowledge/Skills/Evidence	a	b	c	d	e
Construction Technical Communication Skills	Satisfactorily communicate in one-to-one and group situations	✓	✓	✓	✓	✓
HNC1 Graded Unit	Presentation of portfolio, report, oral examination	✓	✓	✓	✓	✓
	Interaction with supervisor and other candidates	✓	✓	✓	✓	✓
Site Surveying A and B	Communication with members of the group during survey activities	✓	✓	✓	✓	✓
Civil Engineering Materials and Testing	Communication with members of the group during material testing activities	✓	✓	✓	✓	✓
<p>Planning for and undertaking discussions with colleagues and interviews with supervisor and/or assessor. Coursework will emphasise and require listening skills and the ability to maintain tone and language which is appropriate for purpose and audience.</p>						

Using Information Technology (SCQF level 5)

Use an IT system effectively and responsibly to process a range of types of data

- a Make effective and responsible use of IT equipment.
- b Apply a range of skills from more than one software application.
- c Integrate different types of data using three types of software.
- d Carry out two searches to find and present information from electronic sources.

Unit	Knowledge/Skills/Evidence	a	b	c	d
CAD for Civil Engineers	Work in different drawing environments.	✓	✓	✓	✓
	Create, edit, save and print a 2D Orthographic drawing	✓			✓
	Create, save and print a 2D Pictorial drawing	✓			✓
Construction Technical Communication Skills	Non paper-based forms of recording written site instructions and activities	✓		✓	✓

Most technology Units offer the opportunity for the use of IT to solve numerical/graphical problems. Internet research on current building services information and practice will provide essential underpinning knowledge for the award. Professional presentation of business materials will involve access to and use of technology. Security, consideration and the managing of any technical problems will be a routine aspect of good practice.

Numeracy (SCQF level 6)

Skill component -Using Number

Apply a wide range of numerical, statistical and other skills to process complex information

- a Work confidently with a numerical or statistical concept.
- b Decide on steps and operations to be carried out.
- c Carry out a number of sustained complex calculations.

Unit	Knowledge/Skills/Evidence	a	b	c
Mathematics for Construction	Apply algebraic techniques to manipulate expressions and solve equations	✓	✓	✓
	Solve common surveying problems		✓	✓
Applied Mathematics for Civil Engineers	Define and solve problems involving integration of functions	✓	✓	✓
	Define and solve problems using statistical techniques.	✓	✓	
Structural Mechanics	Solve systems of linear and differential equations	✓	✓	✓
	Evaluate loads on elements of structures	✓	✓	✓
	Calculate shear forces, bending moments and deflections	✓	✓	✓
<p>Accuracy and confidence in work with a wide range of numerical concepts and the ability to apply complex numerical information to practical solutions in civil engineering is integral to most Units and achievement across the award.</p>				

Using Graphical Information (SCQF level 6)

Apply a wide range of graphical skills in everyday and generalised contexts

- a Analyse and interpret significant features of graphical information in relation to underlying variables.
- b Select appropriate forms — tables, graphs, diagrams or qualitative form to communicate information.

Unit	Knowledge/Skills/Evidence	a	b
CAD for Civil Engineering	Create, edit, save and print a 2D Orthographic drawing	✓	✓
	Create, save and print a 2D Pictorial drawing		
Mathematics for Construction	Create and interpret graphs and charts	✓	✓
Site Surveying A	Carry out a levelling survey	✓	✓
	Carry out the measurement of angles and distances for survey purposes	✓	✓
Site Surveying B	Carry out a traverse survey	✓	✓
	Carry out a total station detail survey	✓	✓
	Set out horizontal and vertical curves.	✓	✓
Construction Technical Communication Skills	Use freehand sketching to communicate	✓	✓
<p>The ability to analyse, interpret, apply and present graphical information in a range of situations relating to civil engineering applies in most Units and is integral to achievement across the award.</p>			

Problem Solving (SCQF level 6)

Skill components

- a Critical Thinking — analyse a situation or issue.
- b Planning and Organising.
- c Reviewing and Evaluating.

Unit	Knowledge/Skills/Evidence	CT	PO	RE
Civil Engineering Materials and Testing	Compare alternative materials for proposed civil engineering applications		✓	✓
Construction Technology: Substructure	Select and describe appropriate forms of foundation construction	✓		✓
Structural Mechanics	Analyse and evaluate pin jointed frames and problems relating to stress and strain	✓		✓
HNC Graded Unit 1	Planning, organizing and development of tasks	✓	✓	✓
<p>All elements of this Core Skill will be integral to the award. All Units require an analytical and evaluative approach to practical problem solving. Critical thinking, review and evaluation are integral to all technology Units. Planning and implementation involving communication, co-operation and negotiation with others, and evaluative activities are fundamental to many Units.</p>				

Working with Others (SCQF level 5)

Work with Others in a group to analyse, plan and complete an activity

- a Analyse the activity and identify the component tasks and roles.
- b Agree allocation of responsibilities taking account of strengths and weaknesses.
- c Support co-operative working.
- d Evaluate and draw conclusions on own contribution to group activity.

Unit	Knowledge/Skills/Evidence	a	b	c	d
Civil Engineering Materials and Testing	Carry out a concrete mix design.	✓	✓	✓	✓
	Carry out standard soils tests.	✓	✓	✓	✓
Site Surveying A	Carry out a levelling survey	✓		✓	✓
Site Surveying B	Carry out a traverse survey	✓		✓	✓
	Carry out a total station detail survey	✓		✓	✓
	Set out horizontal and vertical curves.	✓		✓	✓
<p>All teaching and learning activities will involve group discussion of practical and theoretical issues and problems relevant to civil engineering. Evaluation of individual contribution to design solutions will be considered as an aspect of personal development with assessor support and guidance, particularly in relation to Graded Unit assessments.</p>					

Credit Transfer

Credit Transfer Transition Arrangements

Compared with existing awards, some Units in the new awards might contain new or updated content, whilst for others the distribution of content between similar Units might have been changed.

In principle candidates can be given credit transfer between old HNC Units, or Units from other appropriate qualifications, and the Units of the new award.

Specific credit transfers for Mandatory and Optional Units are listed in the following table.

Centres may consider that there are opportunities for partial credit transfer within some, or all, of the remaining Units in the award. Centres will have access to the SQA Moderator in order to validate Credit Transfer applications for such partial credit transfer claims.

Candidates who are given credit transfer between old HN Units and the new HN Units must still satisfy all other conditions of the award of the new principles HNC including the mandatory Units and the correct number of credits at the correct SCQF level.

Unit title	Credit value	SCQF level	Credit transfer
An Introduction to Railway Civil Engineering	1	7	D9A9 04 The Railway Industry: An Introduction
CAD 2D 1	1	7	
CAD for Civil Engineering	1	7	
Applied Mathematics for Civil Engineers	1	8	
Civil Engineering Contract and Project Management A	1	7	
Civil Engineering Contract and Project Management B	1	8	
Civil Engineering Fluid Mechanics	1	8	D5SG 04 Introduction to Fluid Mechanics AND D5TJ 04 Civil Engineering: Fluid Mechanics
Civil Engineering Materials and Testing	1	7	
Civil Engineering Specialisms	1	7	D5SF 04 Civil Engineering Specialisms
Civil Engineering Technology	1	8	
Computer Applications for Civil Engineering	1	8	
Construction Communication Skills	1	7	
Construction Materials and Specification	1	7	
Construction Site Surveying A	1	7	D5TA 04 Civil Engineering Construction Surveying or D602 04 Construction Site Surveying
Construction Site Surveying B	1	7	D5TA 04 Civil Engineering Construction Surveying AND D5SV 04 Advanced Surveying or D602 04 Construction Site Surveying AND D5SV 04 Advanced Surveying
Construction Site Surveying C	1	8	
Construction Technology: Substructure	1	7	
Geotechnics A	1	8	See note 1.
Geotechnics B	1	8	See note 1.
Graded Unit HNC Civil Engineering	1	7	See note 2
Graded Unit HNC Construction Engineering	1	7	See note 2
Graded Unit HNC Structural Engineering	1	7	See note 2
Graded Unit HND Civil Engineering	2	8	See note 2
Health and Safety in Construction	1	7	
Highway Engineering	1	8	D5SP 04 Highway Engineering
Mathematics for Construction	1	6	D5TD 04 Mathematics 1 for Civil Engineering
Mathematics for Construction Engineering	1	8	D5T9 04 Mathematics for Construction Engineering

Unit title	Credit value	SCQF level	Credit transfer
Personal Development Planning (DDE3R34)	1	7	
Public Health Engineering	1	8	D5TM 04 Public Health Engineering
Quality in Construction	1	7	D5VT 04 Quality Assurance in Construction
Railway Permanent Way Engineering	1	7	D9AA 04 Railway Permanent Way Engineering: Design Theory and Practice
Railway Track Engineering: Computer Design	1	7	D9AC 04 Railway Permanent Way Engineering: Computer Design
Reinforced Concrete Design and Detailing	1	8	
Structural Analysis B:	1	8	
Structural Analysis A:	1	7	
Structural Masonry Design and Detailing	1	8	
Structural Mechanics	1	7	
Structural Steel Design and Detailing	1	8	
Structural Timber Design and Detailing	1	8	
Traffic Engineering	1	8	D5SR 04 Traffic Engineering
Water Supply Engineering	1	8	D5SS 04 Water Supply Engineering
Work Role Effectiveness (DG6E34)	3	7	

Note 1:

Credit Transfer for Geotechnics A and Geotechnics B is available with: D5SF 04 Civil Engineering Specialisms AND 5T 04 Geotechnics AND D5TS 04 Geotechnics 2. But there are no credits for these Units considered separately.

Note 2:

Graded Units do not exist in current awards. Credit might be considered for a candidate who can show evidence of success in an Investigative Project, providing that the scope, Evidence Requirements and rigour of the assessment regime complies with that of the Graded Unit descriptor/s.

The following table provides credit transfer information from the Mandatory Units of the old HNC Civil Engineering and Units in the new framework:

Candidates possessing existing Unit:	Credit transfer for new Unit Outcomes:	Credit transfer for new Unit Outcomes:
Advanced Maths for Civil Engineering	LO2 of Applied Mathematics for Civil Engineers	Mathematics s for Construction Engineering
Civil Engineering Project	LO2 of Civil Engineering Computer Applications (If presentation was carried out).	
Civil Engineering Computer Applications	LO1, 3,4 of Civil Engineering Computer Applications	
Civil Engineering Specialisms	LO1,2,3,5 of Civil Engineering Specialisms	
Structural Analysis & Design	LO1,2,3 of Structural Analysis A	LO1,2,3 of Structural Analysis B LO 1,2,3,4 of Structural Mechanics
Construction Management	LO3,4 of Civil Engineering Contract & Project Management A	
Construction Methods Safety & Quality	LO1 of Quality in Construction	LO1,3 of Health & Safety in Construction
Civil Engineering: Introduction to Fluid Mechanics	LO1,2 of Fluid Mechanics	

Sequencing of Delivery

HNC and HND Civil Engineering — Unit delivery sequence guidance

The following table indicates prerequisite Units which are shown in bold, advisory prior learning is indicated in italics.

Prior Knowledge	Unit title	SCQF level
Maths for Construction Engineering or equivalent	Applied Mathematics for Civil Engineers	8
<i>Higher IT etc</i>	CAD 2D 1	7
CAD 2D1	CAD for Civil Engineering	7
	Civil Engineering Contract and Project Management A	7
Civil Engineering Contract and Project Management A	Civil Engineering Contract and Project Management B	8
<i>Basic structural mechanics</i>	Civil Engineering Fluid Mechanics	8
Construction Materials and Specification	Civil Engineering Materials and Testing	7
	Civil Engineering Specialisms	7
<i>Building sub-structures</i>	Civil Engineering Technology	8
<i>Basic CE design and planning</i>	Computer Applications for Civil Engineering	8
<i>Basic building materials, appropriate Higher</i>	Construction Materials and Specification	7
<i>Basic trigonometry and map reading</i>	Construction Site Surveying A	7
Construction Site Surveying A	Construction Site Surveying B	7
Construction Site Surveying B	Construction Site Surveying C	8
Basic drawing concepts	Construction Technical Communication Skills	7
<i>Basic substructure construction</i>	Construction Technology: Substructure	7
Civil Engineering and Testing (or equiv)	Geotechnics A	8
Geotechnics A	Geotechnics B	8
<i>Basic construction technology and methods</i>	Health and Safety in Construction	7

Prior Knowledge	Unit title	SCQF level
Civil Engineering Specialisms, Construction Site Surveying A Construction Site Surveying B	Highway Engineering	8
<i>NC Mathematics or SCE Standard Grade Maths at 3</i>	Mathematics for Construction	6
Mathematics for Construction	Mathematics for Construction Engineering	8
	Personal Development Planning (DDE3R34)	7
Civil Engineering Specialisms	Public Health Engineering	8
<i>Basic mathematical and statistical concepts</i>	Quality in Construction	7
	Railway Civil Engineering An Introduction	7
Railway Civil Engineering An Introduction Construction Site Surveying A Construction Site Surveying B	Railway Permanent Way Engineering	8
Railway Civil Engineering An Introduction Railway Permanent Way Engineering	Railway Permanent Way Engineering Computer Design	8
Basic structural mechanics	Reinforced Concrete Design and Detailing	8
<i>Basic structural mechanics</i>	Structural Analysis A	7
Structural Analysis A	Structural Analysis B	8
Structural Mechanics	Structural Masonry Design and Detailing	8
<i>NC Mathematics or SCE Standard Grade Maths at 3</i>	Structural Mechanics	7
Structural Mechanics	Structural Steel Design and Detailing	8
<i>Mathematics, structural mechanics and analysis.</i>	Structural Timber Design and Detailing	8
Civil Engineering Specialisms	Traffic Engineering	8
Civil Engineering Specialisms	Water Supply Engineering	8
	Work Role Effectiveness (DG6E34)	7

The following sequence indicates **possible** delivery sequences for the Units in each award. The listing includes both mandatory and named optional Units together with further optional Unit choices where appropriate.

HNC Construction Engineering	1st Semester	1st Year	day release
Construction Technical Communication Skills			
Construction Materials and Specification			
Construction Site Surveying A			
Mathematics for Construction			
Structural Mechanics			
CAD 2D 1			
HNC Construction Engineering	2nd Semester	2nd Year	day release
Health and Safety in Construction			
Civil Engineering Contract and Project Management A			
Civil Engineering Specialisms			
Civil Engineering Technology			
Graded Unit			
Optional Unit 1			
Optional Unit 2			
HNC Civil Engineering/ HNC Structural Engineering	1st Semester	1st Year	day release
Construction Technical Communication Skills			
Construction Materials and Specification			
Construction Site Surveying A			
Mathematics for Construction			
Construction Technology: Substructure			
Structural Mechanics			
CAD 2D 1			

HNC Civil Engineering

Civil Engineering Materials and Testing
Civil Engineering Contract and Project Management A
Construction Site Surveying B
Civil Engineering Specialisms
Graded Unit
Optional Unit 1
Optional Unit 2

2nd. Semester 2nd Year day release

HNC Structural Engineering

Civil Engineering Materials and Testing
Civil Engineering Contract and Project Management A
Structural Analysis A
Civil Engineering Technology
Graded Unit
Optional Unit 1
Optional Unit 2

2nd Semester 2nd Year day release

HND Civil Engineering

Health and Safety in Construction
Structural Analysis A or Civil Engineering Specialisms
Civil Engineering Technology or Construction Site Surveying B
Reinforced Concrete Design and Detailing *
CAD for Civil Engineers
Geotechnics A
Structural Analysis B

1st Semester 2nd Year

HND Civil Engineering**2nd Semester 2nd Year**

Civil Engineering Fluid Mechanics

Computer Applications for Civil Engineers

Civil Engineering Contract and Project Management B

Structural Steel Design and Detailing *

Graded Unit (2 credits)

Optional Unit 3

Optional Unit 4

*If these two Units were chosen as options for the HNC Structural Engineering then two additional options must be chose

The following diagram attempts to identify the inter-relationship between Units and provide some guidance in respect of timing of delivery earlier or later in a programme. It is not intended to be definitive and Centres will establish their individual delivery sequence dependant on availability of resources, candidate co-hort and overall logic of the teaching and assessment plan.

