

# OVERVIEW OF QUALIFICATIONS: ROAD CONSTRUCTION, MATERIALS TESTING, CIVIL ENGINEERING AND CONSTRUCTION MANAGEMENT QUALIFICATIONS REGISTERED ON THE NATIONAL QUALIFICATIONS FRAMEWORK

J P L JANSE VAN RENSBURG

KwaZulu Natal Department of Transport, Private Bag X 9043, Pietermaritzburg, 3200.

## ABSTRACT

The Engineering, Civil Engineering Construction and the Building Construction Standard Generating Bodies have developed and continue to develop various outcome-based qualifications that impact on the development of Human Resources required for the provisioning of Transportation and Transport Infrastructure. This paper will report on the status, work in progress and deal with various related issues such as Professional Registration Categories, the registration process and career paths for specialized fields of learning.

## 1. STATUS OF QUALIFICATIONS DEVELOPMENT

### 1.1 Qualification Development Process

#### *1.1.1 Standard Generating Bodies*

The Engineering Council of South Africa (ECSA), initiated the establishing of the Engineering Standards Generating Body (ESGB), with the objective to develop generic outcomes - based qualifications for registration on the National Qualifications Framework (NQF for NQF Levels 5 to 8 (now proposed to be 10).

The focus of the ESGB work is developing qualifications that will enable learners to become professionally registered in the various registration categories administered by ECSA.

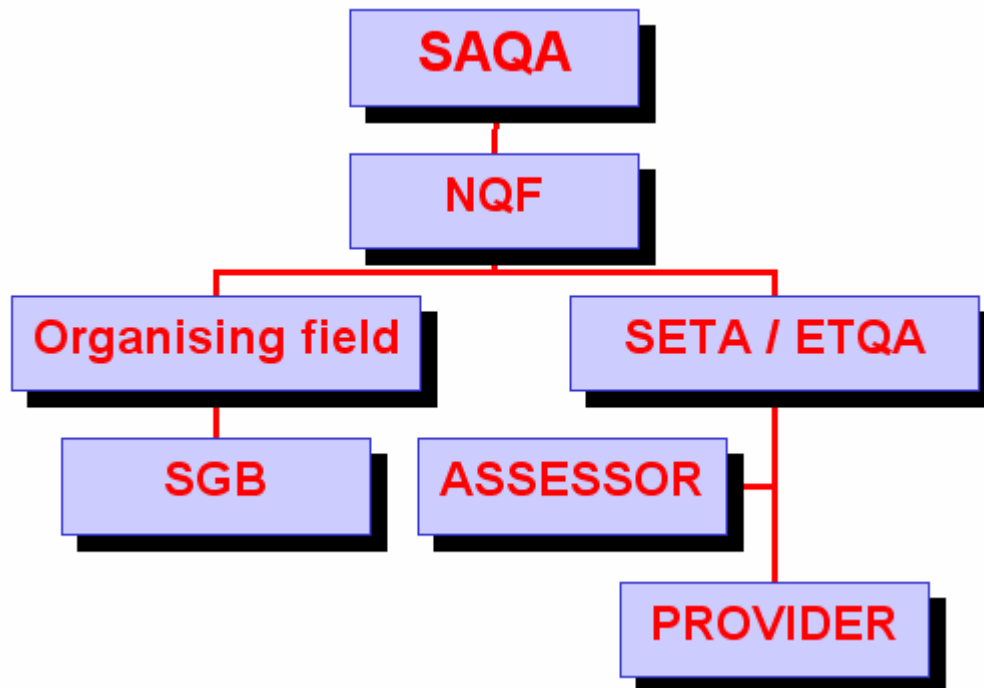
The Civil Engineering Construction Standard Generating Body focuses on the development of qualifications related to the construction and maintenance of Civil Engineering infrastructure.

The Building Construction Standards Generating Body focuses on Building Construction trades but also in consultation with the South African Council for the Project & Construction Management Professions (SACPCMP), develops qualifications at the Higher Education Band that will enable learners to become professionally registered with that Council.

This new council was established in terms of the Professions Act 48 of 2000. This act is very similar to Act 46 of 2000 in terms of which the ECSA operates.

### 1.1.2 The South African Qualifications Authority (SAQA ) Process

The following diagram indicates the SAQA process for the development of qualifications and the implementation process of developed qualifications.



**Figure 1. SAQA flow diagram.**

The Standard Generating Bodies submit draft qualifications to the co-ordinator for the relevant Organising field for scrutiny and placement in the Government Gazette and SAQA Web page in order to obtain public comment.

Approved qualifications are then registered on the National Qualifications Framework. (NQF). This process falls under the Department of Education.

Learnerships are registered with the Department of Labour via the Sector Education Training Authority (SETA) process. These Learnerships are based on qualifications registered on the NQF.

Training Providers must obtain program accreditation with the relevant SETA – Education Training Quality Assurance Body (ETQA) – for the Further Education Training band of qualifications – NQF Levels 1 to 4.

The Council for Higher Education (CHE) via memorandums of understanding (MOU) with Professional Bodies like ECSA and SACPCMP performs the ETQA function.

## 1.2 The Current Status of Outcomes –Based Qualifications Relevant to Transportation

### 1.2.1 Qualifications Developed Via the Engineering SGB

**Table 1. Status of qualifications developed by the engineering SGB.**

<b>Qualification Title</b>	<b>NQF Level</b>	<b>Credits</b>	<b>NQF Status</b>	<b>SGB Status</b>
Stage 1: BSc.(Eng) or equivalent competence	8. (7)	560	Whole qualification registered	Whole Completed. Unit Standard version still to commence.
Stage 2: competence to enable professional Engineer registration	Not determined yet	Not determined yet	Not submitted yet.	Draft whole and unit standard versions available
Stage 1 B.Tech or equivalent competence	7 (7)	480	Whole qualification registered	Whole Completed. Unit Standard version still to commence.
Stage 2 competence to enable professional Technologist registration	Not determined yet	Not determined yet	Not submitted yet.	Draft whole and unit standard versions available
Stage 1 Diploma or equivalent competence	6	360	In submission phase	Whole Completed. Unit Standard version still to commence.
Stage 2 competence to enable professional Technician registration	Not determined yet	Not determined yet	Not submitted yet.	Draft whole and unit standard versions available
Stage 1 Higher Certificate	6	240	Work in progress	Standards Generating group (SGG) to commence work
Stage 1 Certificate	5	120	Work in progress	SGG to commence work

Note: The NQF Levels in the table refers to the newly proposed 10 levels of competence on the NQF. ( levels in brackets indicate the current level descriptor levels )

### 1.2.2 Qualifications Developed by the Civil Engineering Construction SGB

**Table 2. Status of qualifications developed by the civil engineering construction SGB.**

<b>Qualification Title</b>	<b>NQF Level</b>	<b>Credits</b>	<b>NQF Status</b>	<b>SGB Status</b>
National Diploma in the Management of Civil Engineering Construction Processes	5	240	registered	completed
National Certificate in the Supervision of Construction Processes	4	210	registered	completed
National Certificates in Construction : Road works	1 to 3	120 - 160	registered	Completed. Level 1 up for revision.
National Certificate in Construction Materials Testing	2 to 4	120 - 170	registered	Qualifications needs some revision

**Table 2. (Continued)**

<b>Qualification Title</b>	<b>NQF Level</b>	<b>Credits</b>	<b>NQF Status</b>	<b>SGB Status</b>
National Certificate in Structures: Concrete / Reinforcing / Structural Steel	3	120 - 180	registered	completed
National Certificate in Construction: Rail	3	160	In process of registration	completed
National Certificate in Plant operations	2 & 3	120 - 133	registered	completed
National Certificate in Crane operations	2 & 3	120	registered	completed
National Certificate in Construction: Geotechnical	3	160	In process of registration	completed
National Certificate in Construction.	1 and 2	120	registered	completed

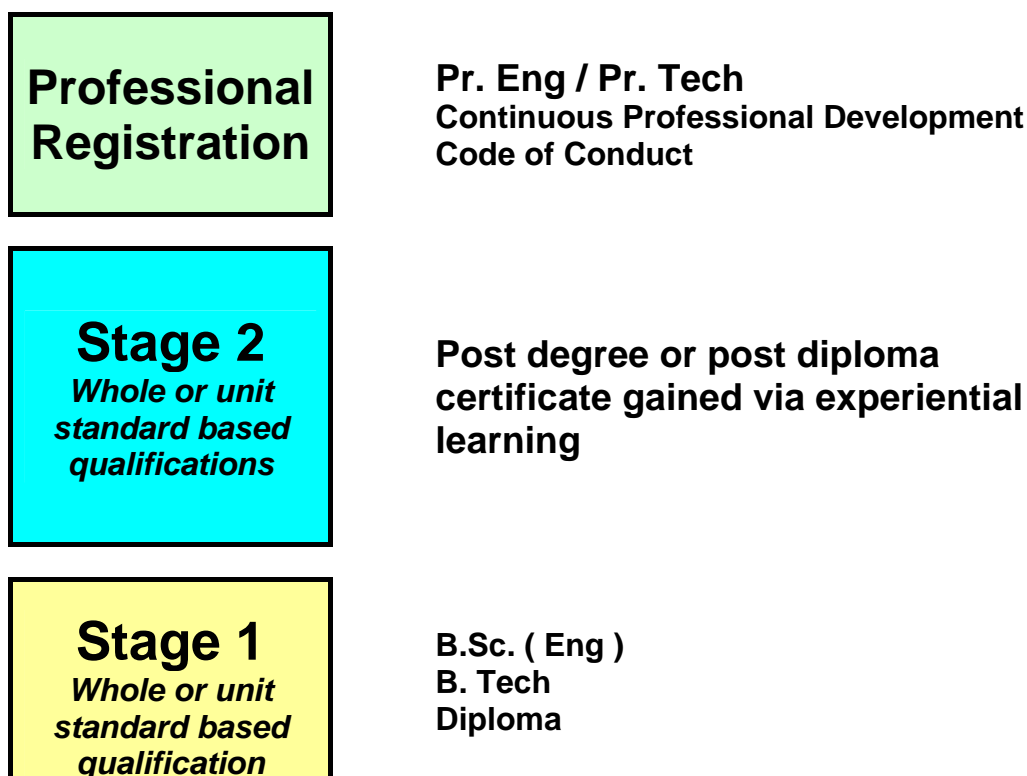
## **2. STATUS OF WORK IN PROGRESS**

### 2.1 Work by the Engineering SGB

#### *2.1.1 Rationale for a Stage 1 and Stage 2 Qualification Framework*

The current practise in the Engineering Industry for learners to obtain Professional Registration with ECSA, is for learners to complete a tertiary qualification in Engineering followed by some relevant practical experience.

The recommended practise is that this relevant practical experience will be gained via a Commitment of Undertaking with ECSA, by which the employer undertakes to expose the learner to a structured workplace development program under the mentorship of professionally registered persons.



**Figure 2. Pathways and standards within a registration category.**

With the development of outcomes –based qualifications, a proposal was made and subsequently accepted in principle by ECSA – that a two stage process of development is required

The first stage of development deals with the theoretical mostly classroom based learning.

The second stage deals with developing the learner’s competence.

The competent person is awarded a stage 2 qualification indicating the learner’s competence – a prerequisite for Professional Registration.

The Professional Registration process is however separated from the process to evaluate the learner’s competence to work in Industry.

The issue of compulsory Professional Registration and work reserved for such registered person, is currently in the public debate phase before implementation.

### *2.1.2 Recognition of Stage 1 Status*

A person may achieve Stage 1 status in a competency category by the attainment of:

1. A Stage 1 Qualification accredited by ECSA for the competency category as satisfying the standards;
2. A qualification recognized under a mutual recognition agreement applicable in the category. For example, graduates of programmes accredited by Washington Accord signatories are recognized as meeting Stage 1 in the Engineer track and are not required to fulfil further requirements.
3. A non-accredited but recognised qualification (both South African and foreign) may be judged against the standards for accredited programmes to be substantially equivalent to an accredited degree, in outcomes achieved and content. If a programme is judged to be deficient in some respect, the holder must be assessed in the deficient areas, as in 4.
4. Assessment of the candidate against the set of Unit Standards (U.S.) prescribed for stage 1.

### *2.1.3 Recognition of Stage 2 Status*

A candidate must be assessed against the standards prescribed for Stage 2. These standards represent a planned combination of outcomes learning against which a candidate is assessed. Successful assessment against the Stage 2 is therefore recognised by the award of a national qualification. While the attainment of such a qualification demonstrate the competency requirements for registration, it does not confer registration in any category. Possession of a Stage 2 qualification does not in itself ensure currency of competence or enforce professional behaviour as in the case of registration.

Stage 2 qualifications may be used for other purposes. For example, in a particular industry, the requirement for appointment to a particular post may require the Stage 2 qualification that is: eligibility to practice as a competent engineering practitioner.

### *2.1.4 Level Descriptors*

Level Descriptors are an essential feature of the National Qualification Framework and serves to aid the pegging of qualifications at NQF Levels. Saga’s intention is that a single set of level descriptors guide the pegging of standards across the entire spectrum of learning. In the HET band, learning falls into two main areas: workplace learning and higher education institutional learning. SAQA and the New Academic Plan have issued Draft Level Descriptors. In drawing up standards for Engineers, Engineering Technologists,

Engineering Technicians and Certificated Engineers at the level of competence required for registration and competent practice, it was found that the Draft Level Descriptors were only partially helpful in distinguishing the level of performance required in the four categories.

The Engineering Standards Generating Body therefore carried out a study with the aid of several of its Standards Generating Groups to define the level of competent performance for each of the categories. The resulting Level Descriptors are given below. The principal use will be to ensure that the levels of the various unit standards that define Stage 2 Competence are appropriate to the accepted function of each category. These descriptors will also be fed into the SAQA process as a contribution toward finalising the question of whether a single set of Level Descriptors adequately define levels in the HET band.

**Table 4. Level descriptors.**

The Level Descriptors are grouped under five headings			
A Type of Engineering Activities			
B Level of Problem solving			
C Knowledge Underpinning Engineering Activities and Problem Solving			
D Skills needed			
E Responsibility for Engineering Activities			
Stage 2 Engineer	Stage 2 Technologist	Stage 2 Technician	Stage 2 Certificated Engineer
Complex Engineering Activities characterised by	Broadly-defined Engineering Activities characterised by	Well-defined Engineering Activities characterised by	All items at least at level of Engineering Technologist added detail shown below
<i>Activities</i> involve one or more of: design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; engineering operations; project management; research, development and commercialisation.	Activities involve one or more of: design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; engineering operations; project management; research, development and commercialisation.	Activities contribute to one or more of: design; planning; investigation and problem resolution; improvement of materials, components, systems or processes; engineering operations; project management; project implementation; research, development and commercialisation.	Activities specifically include operations, plant maintenance, application of company policy, procedures and best practice subject to applicable health and safety legislation.

The concept of defining engineering work as *Complex, broadly-defined and well-defined* – for the registration categories of Engineer, Engineering Technologist and Engineering Technician – is in line with International best practice.

Signatories of the Washington, Sydney and Dublin accords – that is for Engineers, Technologist and Technicians - supported these Level descriptors for the different registration categories.

## 2.2 Work by the Civil Engineering Construction SGB

Formal National qualifications / apprenticeships for various trades existed for several decades in South African – but not for the Road Construction worker or Construction Materials Tester.

Various Government Departments and Local Authorities did have internal learning programs and efforts where made to align these on a National basis.

The introduction of the NQF and qualification development work via the SGBs – facilitated the development of various qualifications at the different NQF levels as outlined in table 2.

One of these qualifications – The National Certificate in Construction – Road Works – NQF Level 1 – is now up for review. A workshop was conducted on 12<sup>th</sup> July 05 at the SATC 2005 conference to review this and other related road construction qualifications.

## 2.3 Work by the Building Construction SGB

In consultation with the South African Council for Project and Construction Management Professions (SACPCMP), the SGB developed Construction Management qualifications and is in the process of developing a qualification in Construction Project Management. Table 3 reflects qualification development that directly impacts on Transportation.

**Table 3. Status of qualifications developed by the building construction SGB.**

<b>Qualification Title</b>	<b>NQF Level</b>	<b>Credits</b>	<b>NQF Status</b>	<b>SGB Status</b>
Masters: Construction Management	8	120	registered	Completed: Whole qualification
Bachelor of Science: Construction Management	7	120	registered	Completed: Whole and unit standard based
Bachelor of Science Construction Project Management	7	120	Not submitted	Work in progress
Bachelor of Science: Construction Management	6	360	registered	Completed whole and unit standard based
National Certificate : Management of Building Construction processes	5	204	registered	Request to have the qualification upgraded.
National Certificate in the Supervision of Construction Processes	4	210	registered	completed

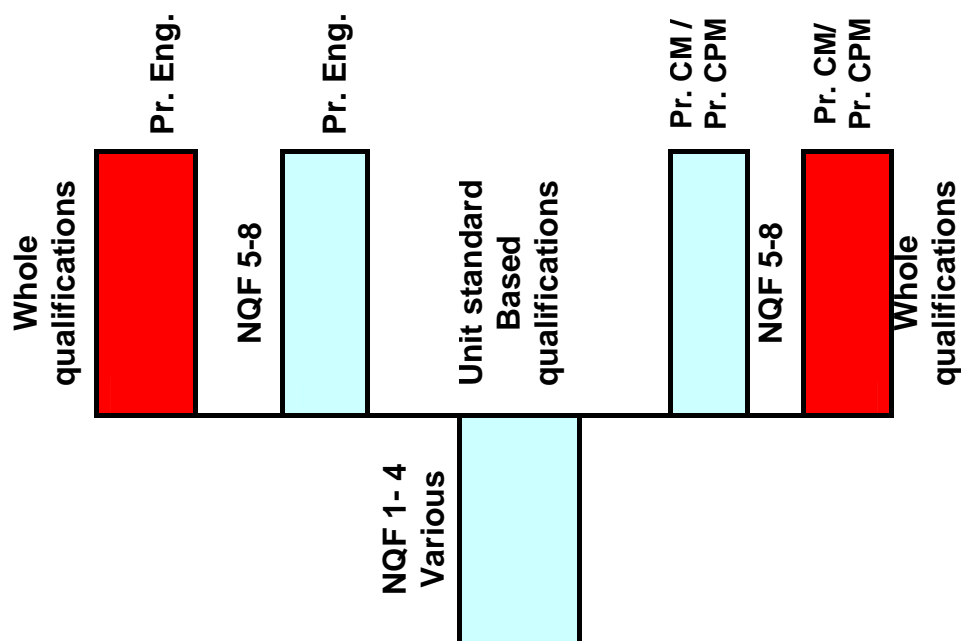
Note: The NQF Levels in the table refers to the existing 8 levels of competence on the NQF.

## **3. ENGINEERING VS CONSTRUCTION / PROJECT MANAGEMENT LEARNING PATHWAYS AND PROFESSIONAL REGISTRATION**

### 3.1 Learning Pathways

#### *3.1.1 Engineering vs. Construction*

Figure 3 illustrates the different alternate learning pathways for a student with an alternative Further Education Training (FET) certificate than the current grade 12 school leaving certificate.



**Figure 3. Engineering vs. Construction learning pathways.**

The FET certificate in Construction Supervision or Construction Materials Testing at NQF Level 4, has fundamental unit standards such as Mathematics and Literacy.

This provides for a seamless progression from the FET to the HET Band for those individuals who developed their competence via an Industry Learnership / skill program route.

The current DOE draft policy document on Higher Education lacks detail on the mechanism and criteria for acknowledging FET Certificates at NQF Level 4 being the equivalent for tertiary admission purposes.

The issue is compounded by the fact that Learnerships (vocational training) fall under the control of DOL whereas the grade 12 certificate – fall under the control of DOE. (Education).

When the grade 12 certificate is replaced with a FET certificate - a process still to be completed – this will facilitate comparison with different new FET Level 4 certificates.

#### **4. PROGRESS WITH IMPLEMENTING LEARNERSHIPS**

##### 4.1 Whole and Unit Standard Based Qualifications at Higher Education Band

The author is not aware of any signed learnership agreements to implement the available registered learnerships in Construction or Engineering at the NQF Levels 5 and higher.

The Engineering Council of South Africa (ECSA) is in the process of signing memorandums of agreements (MOU) with various Sector Education Training Authorities (SETAs) with the objective to facilitate learnerships in various fields of Engineering.

##### 4.2 Unit Standard Based Qualifications at the Further Education Band

A few hundred learnerships agreements in Road Construction and Construction Contracting have been signed with mostly Government related departments such as Municipalities and Provincial Government Departments.



Some learnerships have been completed and qualifications awarded.

#### 4.3 Communication Problem

Communication from SAQA and the SETAS was and remains a key problem in getting Industry to participate in the implementation of Learnerships.

The general public still remains largely uninformed on the NQF process and the implementation of Learnerships.

### **5. A PLATFORM FOR FAST-TRACKING SKILLS AND CAPACITY DEVELOPMENT IN THE TRANSPORT SECTOR IN SOUTH AFRICA**

#### 5.1 Proposed Strategy to Fast-Track Skills Development with Respect to Civil Engineering, Construction and Construction Project Management

##### *5.1.1 Civil Engineering: B.Sc. (Eng) B.Tech and Diplomas*

The following strategy is proposed:

- Communicating the advantages of Learnerships to employers and learners.
- The signing of a memorandum of agreement between the Engineering Council of South Africa (ECSA) and Construction Sector Education Authority (CETA) for the implementation of learnerships resulting in qualifications at the Higher Education Band.
- Expand distant learning to cover the award of B.Sc. Engineering degrees (currently restricted to Diplomas and B.Tech degrees in Engineering)
- Developing of unit standard based equivalent engineering qualifications to facilitate the transportability of credits between accredited training providers and between accredited programmes (e.g. between B.Tech and B.Sc. Eng. Programmes)
- Development of transitional 120 and 240 credit qualifications (certificates and advanced certificates) offered by both FET and HET accredited training providers. This also allows for early specialization in fields like Materials Technology, Design drawing.

##### *5.1.2 Construction and Construction Project Management*

The following strategy is proposed:

- Acknowledgment by the Engineering profession that Construction Management and Construction Project Management are specialized disciplines.
- Encouraging more learners to study in this field.
- Make provision in the stage 2 Engineering qualification for Project Management and other related fields of learning in Construction Project Management to ensure competence in this field.

### **6. REFERENCES**

- [1] Working documents for the Engineering SGB prepared by Professor Hu Hanrahan of the Witwatersrand University.
- [2] Internal working documents of the Building Construction and Civil Engineering Construction Standard Generating Bodies.
- [3] The SAQA Web site: [www.saqa.org.za](http://www.saqa.org.za).