SECTION A:	***QUALIFICATION DETAILS***																	
QUALIFICATION DEVELOPER (S)	New Era College of Arts, Science & Technology																	
TITLE	Bachelor of Engineering (Construction)														***NCQF LEVEL***	8		
FIELD	Physical Planning and Construction			***SUB-FIELD***	Construction Engineering										***CREDIT VALUE***	585		
New Qualification														√	*Review of Existing Qualification*			
SUB-FRAMEWORK	*General Education*				*TVET*										*Higher Education*	√		
QUALIFICATION TYPE	*Certificate*	*I*		*II*		*III*		*IV*		*V*		*Diploma*		*Bachelor*	√			
	Bachelor Honours			*Post Graduate Certificate*								*Post Graduate Diploma*						
	Masters											*Doctorate/ PhD*						

RATIONALE AND PURPOSE OF THE QUALIFICATION

RATIONALE:

The development of the Bachelor of Engineering (Construction) qualification in was guided by the findings from the market survey innovations which highlighted the need for this qualification from industry experts, Construction company employees, current and prospective students. Most of the respondents agreed that "the qualification meets with the skills demanded in the industry and also supports infrastructural development projects". The National Development Plan 11 (2017-2023) on infrastructure development projects identifies, that the Construction sector, amongst other sectors, plays a high impact in driving domestic economic growth. Further, NPD 11 asserts that infrastructure development will facilitate increased and inclusive beneficiation and access to the other sectors. For the years 2019/20 and 2020/21, NDP 11 expects the Construction sector growth to be at 4.0 percent and 3.7 percent, respectively. To achieve this growth rate or more beyond 2021 the sector will require skilled construction technicians, artisans and engineers to manage the infrastructure construction projects, hence the development of the qualification. According to HRDC priority occupations list of 2019; the occupations of manufacturing, construction and distribution forecast indicates an increasing deficiency in this occupation. This deficiency projection is from 2019 to 2028. Therefore, the B. Eng. (Construction) qualification would strive to address the country's lagging occupation.

The HRDC- Top occupations in high demand of December 2016 also lists the construction sector as one of the occupations in demand. The construction sector's high demand was informed by its potential to create employment, contributing 6% of total employment, as third largest employer during NDP 10. It has a second highest work permit holders, a significant number of foreign nationals working in this sector. Hence the BEng Construction Engineering qualification will go a long way to create and contribute a skilled labour force in Botswana. It will also assist to reduce over reliance on foreign materials on skills provision, by increasing the quality and numbers of personnel trained in the sector.

PURPOSE

The Bachelor of Engineering (Construction) was developed to equip candidates with knowledge, skills and competences to:

- Perform building construction and workshop Practice.
- Practice Health and safety in work settings.
- Produce and interpret complex engineering drawings.
- Practice professional quantity surveying, estimating and tendering techniques.
- Estimate, Tender and do Quantity Surveying.
- Produce Structural Designs.
- Demonstrate ability to manage construction projects in accordance with Project Management principles and practices.
- Demonstrate knowledge of Professional Practice and Ethics.
- Conduct Research related to Construction.

ENTRY REQUIREMENTS (including access and inclusion)

Minimum entry requirement:

- NCQF Level 4, Certificate IV (General Education or TVET) or equivalent with passes in 6 subjects including English, Mathematics, Physics and Chemistry.

- Access through Recognition of Prior Learning (RPL) and Credit Accumulation and Transfer (CAT) will be provided through ETP policies in line with National RPL and CAT Policies.

SECTION B	***QUALIFICATION SPECIFICATION***
GRADUATE PROFILE (LEARNING OUTCOMES)	***ASSESSMENT CRITERIA***
1. Demonstrate knowledge of health and safety methodologies in the working environment.	1.1 Apply Accident & Emergency Procedures. 1.2 Demonstrate Working Practices relating to Hazards & Control measures. 1.3 Articulate Essentials of Health & Safety Management.
2. Develop learner's imagination and ability to represent the shape size and specifications of physical objects manually and by Computer Aided Design.	2.1 Draw, Read and Interpret engineering drawings 2.2 Apply basic drawing skills in the production of graphical information using Computer Aided Design (CAD).
3. Practice the principles of survey computations and plotting.	3.1 Interpret measurement from maps, layout and engineering plan. 3.2 Use appropriate survey methods in land survey, construction projects and to generate maps. 3.3 Use latest instruments for surveying.
4. Develop an understanding of the scientific principles which determine the behaviour of materials and the relevant technological processes involved in the construction project.	4.1 Apply relevant building technologies in addressing work related situations. 4.2 Demonstrate knowledge of use and properties of materials in construction.
5. Apply scientific and mathematical concepts in the analysis and design of structures.	5.1 Apply the principles of analysis and design of various structural elements.
6. Practice professional quantity surveying, estimating and tendering techniques.	6.1 Build-up estimates and compile the tender documents. 6.2 Use of modern techniques in quantity surveying practice.

	6.3 Apply different contractual arrangements for letting contracts.
7. Display reasoned decision-making processes and self-management strategies leading to professional ethical outcomes	7.1 Assess contemporary, professional career environment through self-reflection and generation of relevant career plans and resources. 7.2 Apply and maintain professional ethics in line with industry and regulatory/ professional bodies.
8. Demonstrate skills required to ensure that a construction project is properly managed in order to achieve the set objectives and alternatives	8.1 Apply planning concepts and techniques in the construction industry. 8.2 Manage an engineering project. 8.3 Supervise and manage resources.
9. Carry out problem solving research and innovation activities in construction related fields.	9.1 Identify a research problem/ topic. 9.2 Conduct research. 9.3 Report writing and presentation.
10. Apply knowledge, skills and competencies gained from real work situations (industrial Attachment).	10.1 Demonstrate ability to work with teams. 10.2 Demonstrate acquisition of practical skills on the job.
11. Demonstrate a range of interpersonal and transferable communication skills.	11.1 Apply critical reasoning and thinking to a range of problem-solving scenarios. 11.2 Express complex ideas accurately in written and spoken formats suited to the workplace contexts.
12. Apply concepts of mechanics to solve engineering problems	12.1 Acknowledge how the core scientific concepts of this course apply to their degree of choice. 12.2 Describe about the behaviour of materials under simple stresses and strains.
13. Demonstrate through the use of advanced simulation tools for environmental performance analyses and identify the correct energy system to use in a specific building.	13.1 Identify and develop technologies for optimizing the building's environmental performance. 13.2 Recognize materials not only for their aesthetic qualities but also in relation to their potential for

	environmental performance and impact on the environment.
14. Acquire of confidence to demonstrate capacity to lead and manage change through collaboration with others	14.1 Relate and use research findings to advance education theory and practice. 14.2 Grasp the importance of analyse data and synthesize research findings.

(Note: Please use Arial 11 font for completing the template)

SECTION C	***QUALIFICATION STRUCTURE***					
COMPONENT	***TITLE***	***Credits Per Relevant NCQF Level***				***Total (Per** Subject/ Course/ Module/ Units)*
		Level [5]	***Level [6]***	***Level [7]***	***Level [8]***	***Credits***
FUNDAMENTAL COMPONENT *Subjects/ Courses/ Modules/Units*	Information and computing Skills	12				12
	Working Environment and essentials of Health and safety	10				10
	Professional practice and ethics				***10***	***10***
CORE COMPONENT *Subjects/Courses / Modules/Units*	Building Construction and Workshop Practice I	14				14
	Engineering mathematics I	10				10
	Engineering Drawing, I	12				12
	Professional Practice and Communication Skills	10				10
	Building Construction and Workshop Practice II	14				14
	Surveying I	14				12
	Engineering Drawing II		12			12
	Engineering Science		12			12
	Engineering Mechanics		12			12
	Engineering Mathematics II	10				10

	Measurement and Specifications		12			12
	Engineering Mathematics III		10			10
	Surveying II		14			14
	Strength of Material		12			12
	Building Technology, I		12			12
	Building Service & Science		12			12
	Estimating and Tendering			12		12
	Geology & Soil Mechanics			12		12
	Engineering Mathematics IV		10			10
	Building Technology II			12		12
	CAD for Civil Engineers		13			13
	Construction Economics			12		12
	Structural Analysis			12		12
	Engineering Mathematics V			10		10
	Construction Materials		12			12
	Site Management			12		12
	Quantity Surveying				12	12
	Law and Building Contracts				10	10
	Fluid mechanics and Hydraulics			12		12
	Industrial Attachment			60		60

	Architectural Design			12		12
	Structural Design			12		12
	Entrepreneurship and Economic Development				10	10
	Project 1				12	12
	Project 2				12	12
	Project Management				14	14
	Environmental Engineering Principles				12	12
	Facility Maintenance, Planning and Management				12	12
ELECTIVE/ OPTIONAL COMPONENT *Subjects/Courses / Modules/Units*	**Choose any two**					
	Highway Engineering		12			12
	Water Supply and Wastewater Engineering		12			12
	Interior Architectural Design		12			12
	Environmental Impact Assessment		12			***12***
	Choose any one					
	Contract Administration and Disputes Resolution				12	12
	Property management and Evaluation				12	12
	TOTAL					**585**

SUMMARY OF CREDIT DISTRIBUTION FOR EACH COMPONENT PER NCQF LEVEL

TOTAL CREDITS PER NCQF LEVEL

NCQF Level	***Credit Value***
Level 5	106
Level 6	193
Level 7	166
Level 8	120
TOTAL CREDITS	***585***

Rules of Combination:

(Please Indicate combinations for the different constituent components of the qualification)

No	Component	Modules	Credits
1	Fundamental Component	3	32
2	Core Component	34	517
3	Elective/ Optional Component Choose 3 Modules	3	36
	Total	40	**585**

ASSESSMENT ARRANGEMENTS

Formative Assessment

Formative assessment or continuous assessment (Course work) include:

Formative assessment contributes to **40%** of the final course grade.

Summative Assessment

Summative assessment shall contribute to **60%** of the final course grade.

Industrial Attachment and Project

MODERATION ARRANGEMENTS

Internal and external moderators to be engaged will be BQA accredited subject specialists in relevant fields with relevant industry experience and academic qualifications. Both internal and external moderation shall be done in accordance with applicable policies and regulations.

RECOGNITION OF PRIOR LEARNING

There will be provision for awarding of the qualification through RPL mode which will be in line with the national RPL Policy.

CREDIT ACCUMULATION AND TRANSFER

Credit Accumulation and Transfer CAT policies which is in line with National Policies.

PROGRESSION PATHWAYS (LEARNING AND EMPLOYMENT)

Horizontal Progression

Graduates of this qualification may consider pursuing related qualification for the purpose of multiskilling, retooling and gain expert knowledge in the Construction Engineering field

- Bachelor's Degree in Surveying.
- Bachelor of Science in Quantity Surveying.
- Bachelor of Science in Architectural Design
- Bachelor's Degree in Civil Engineering
- Bachelor's degree in Highway Engineering

Vertical Progression

Graduates may progress to qualifications such as:

- Post Graduate Diploma in cognate area.
- Honours Degree in Construction.
- Master of Science in Construction Engineering.
- Master's Degree in any cognate area.

Diagonal Progression

Graduates may progress to qualifications such as:

- Post Graduate Diploma in Education if want to pursue lecturing.
- Post Graduate Diploma in Project Management if want to manage projects.
- Research work for those with passion for research in Construction Engineering field.

EMPLOYMENT PATHWAYS

Graduates from the Bachelor of Engineering (Construction) will have requisite competencies and attributes to work as:

- Construction Engineers.
- Building Plan Designers.
- Building Contractors
- Construction and Interior Designers.
- Construction Architecture.
- Building Inspector.
- Building Manager.
- Building maintenance.
- Building Sales and Services.
- Site Manager.
- Project Manager
- Lecturer.

QUALIFICATION AWARD AND CERTIFICATION

Minimum Standard of achievement for the award of the qualification.

To be awarded the qualification the graduate, must complete 32 Credits of the Fundamental Component, 517 Credits of the Core component and 36 Credits of the 3 Elective/ Optional components.

Certification

Candidates will be awarded a certificate for the **Bachelor of Engineering (Construction)** according to the standards prescribed for the award of the qualification and applicable policies.

REGIONAL AND INTERNATIONAL COMPARABILITY

The proposed qualification generally compares well with all the qualifications studied since the exit outcomes cover similar scope and depth and are aligned to exit-level descriptors typical to NCQF level 7 (Botswana) at a minimum of 560 credits and type of qualification as done within the region and beyond as well as competencies required for registration and accreditation with professional bodies such as Botswana Engineers Registration Board (ERB) and Botswana and Botswana Institution of Engineers (BIE). However, what sets it apart from the

other qualifications examined is that there is provision for development of attributes such as Computer Aided Design, Architectural Design, Structural Design, Materials testing and Highway Engineering which are crucial for the Construction Industry. This qualification is outcome based and is anchored on a competency and credit-based qualification framework.

The following aspects clearly stand out for Bachelor of Engineering (Construction) qualification.
Credit value at 585 provides candidates with reasonable time for an in-depth study of a variety of courses, hence acquire a set of requisite knowledge, skills and competencies, as outlined in the HRDC priority occupations list of 2019.

Research and Industrial Attachment takes 84 Credits as compared to 50 Credits and 44 Credits for Southampton and Johannesburg Universities respectively. This gives the candidate more exposure to the real world of work and hence develops a more positive attitude as an engineer.

The Title Bachelor of Engineering (Construction) takes a more focussed, practical outcome-based perspective than the BSc approach offered by Southampton. The double barrel titles of Bachelor of Science (Hons) in Construction and Architectural Engineering & Bachelor of Engineering in Construction and Quantity Surveying dampen the depth of specialisation involved for the programmes.

REVIEW PERIOD

The qualification will be reviewed every 5 years.