TECHNICAL NOTE

RECOGNITION OF APPLIED CIVIL ENGINEERING SKILLS

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ABSTRACT

The demise of the former New Zealand Certificate of Engineering (Civil), (NZCE), left a major gap in the recognition of practical civil engineering skills in New Zealand. In its place there is the now the **National Diploma in Civil Engineering (Applied), (NDCE (Applied)).**

The new qualification is provided by InfraTrain New Zealand, the Industry Training Organisation for the civil infrastructure sector, and was developed in close consultation with IPENZ.

In the following paper we will background the new diploma and outline:

- The pathways available for gaining recognition of applied civil engineering skills and registration as a Certified Engineering Technician and Associate Membership of IPENZ.
- How the **NDCE (Applied)** is achieved.
- Opportunities for experienced engineers to contribute to the professional development of people in the industry.

INTRODUCTION

The demise of the former New Zealand Certificate of Engineering (Civil), (NZCE), left a major gap in the recognition of practical civil engineering skills in New Zealand.

The **National Diploma in Civil Engineering (Applied), (NDCE (Applied)),** launched early in 2008 now provides this recognition and meets the rigorous requirements of today's national qualifications. The **NDCE (Applied)** has been well received, with over 200 people enrolled with InfraTrain across civil engineering consultancies, councils and the civil construction industry.

In the theme of this conference, the **NDCE (Applied)** provides the connection between theory and practice and is the outcome of a unique partnership, connecting InfraTrain, the Institute of Professional Engineers New Zealand (IPENZ), a consortium of polytechnics and the civil infrastructure industry.

RECOGNITION OF APPLIED SKILLS

The **NDCE (Applied)** was developed to meet the civil infrastructure industry's need for a technician level qualification that recognises practical, applied skills.

The diploma builds on the theoretical knowledge gained by completing a pre-requisite or co-requisite New Zealand Diploma in Engineering (Civil), (NZDE (Civil)), which can be studied at a number of polytechnics throughout the country. Study is flexible, with the option of either studying full-time, or attending block courses while working in a cadetship towards the **NDCE (Applied)**.

The applied skills component of the **NDCE (Applied)** is completed through the assessment and recognition of appropriate work experience and the practical application of skills. Most of the evidence required for this component is compiled from work activities and we will discuss this in more detail.

The **NDCE (Applied)** is a Level 6 qualification registered with the New Zealand Qualifications Authority (NZQA), which administers the National Qualifications Framework. The qualification can be tailored specifically to the candidate's area of work – Consulting, Contracting or Local Government.

THE APPLIED DIPLOMA

The two components of the **NDCE (Applied)** – theoretical knowledge and applied skills – improve on the former NZCE (Civil).

The polytechnics delivering the NZDE (Civil) provide quality academic study supported by robust quality assurance and a national moderation system, thus providing an assurance to employers that the competencies of graduates are substantially equivalent.

The applied skills component is more structured and there is a much more rigorous assessment process in place.

IPENZ worked closely with InfraTrain to ensure that the **NDCE (Applied)** is closely aligned with national and international competence standards for engineering technicians (IPENZ

became a provisional signatory in 2006 to the Dublin Accord which is an agreement for the international recognition of engineering technician qualifications).

Enrolment Eligibility

Candidates enrolled in the **NDCE (Applied)** need to have either completed a NZDE (Civil) or be currently studying towards it, and be employed in a civil engineering role in the consulting sector, contracting industry or local government.

A NZDE graduate who does not immediately commence work in civil engineering may enroll in the **NDCE (Applied)** at a later date, providing they can demonstrate currency of their theoretical diploma. The NZCE does not meet the theoretical requirements for the **NDCE (Applied)**.

QUALIFICATIONS PATHWAY

The **NDCE (Applied)** sits within the IPENZ qualifications structure with its defined roles of Engineering Technician, Engineering Technologist and Professional Engineer.

Together, the theoretical and applied qualifications provide a structured pathway to registration as a Certified Engineering Technician through IPENZ and Associate Membership of IPENZ.

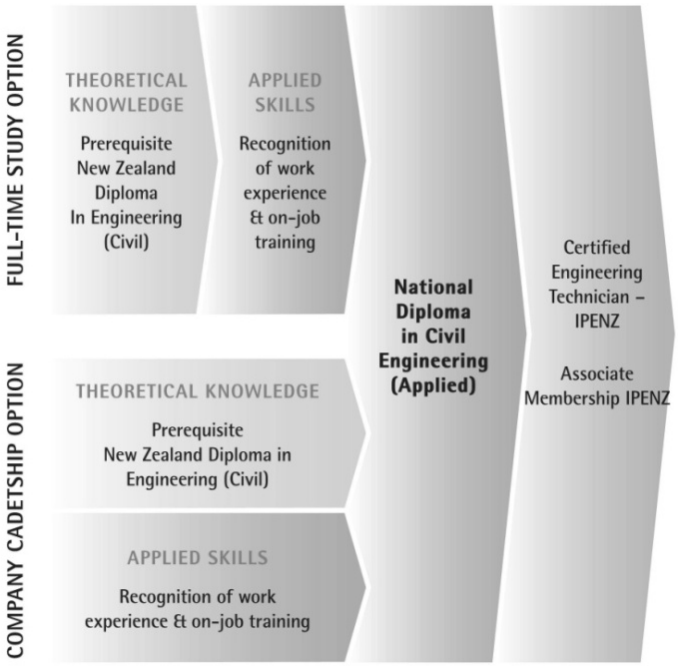

Figure 1 Reproduced from InfraTrain Qualification Brochure

Assessment of the **NDCE (Applied)** is designed to also meet IPENZ requirements and graduates who promptly apply for registration and membership (within six months) are typically able to gain registration and associate membership without further assessment or payment of additional assessment fees.
The **NDCE (Applied)** can “staircase” to the Bachelor of Engineering, however the universities will consider each application individually based on academic records and subjects. Candidates considering this degree pathway are strongly advised to check the university requirements and likely eligibility.

The **NDCE (Applied)** does not staircase to the Bachelor of Engineering Technology however as entry requirements for this qualification are different.

NEW DEVELOPMENTS – THE NATIONAL ENGINEERING EDUCATION PLAN

During the past two years, InfraTrain has participated in discussions between IPENZ, a group of university and ITP engineering deans and other relevant ITOs on the development of a National Engineering Education Plan (NEEP). There has also been wide industry consultation on the plan.

Agreement has been reached on both developing a single New Zealand Diploma in Engineering (NZDE) across all disciplines (Civil, Mechanical and Electrical) and adopting the model of the InfraTrain competency-based applied diploma. This is likely to be renamed an engineering practice diploma, in the relevant discipline. The aim is to have the national structure for the NZDE in place for 2011.

With the single NZDE, it is anticipated there will not be a common first year across all disciplines (unlike the old NZCE), although there may be some common subjects such as mathematics.

There is likely to be some small changes to the present NZDE curriculum, but it is not expected the structure of the **NDCE (Applied)** will change much.

HOW THE QUALIFICATION IS COMPLETED

The **NDCE (Applied)** comprises Unit Standards, totaling 132 credits, which describe knowledge and skills that the candidate must demonstrate competence in. It is expected that the diploma will take 2-5 years to complete, depending on the candidate's experience.

The **NDCE (Applied)** is a competency-based qualification and is completed through the recognition of relevant work skills and knowledge, as these are gained on the job. The candidate collects evidence of this work experience and professional development in a Workbook, for verification and then assessment against the Unit Standards by an approved Assessor. The Workbook is designed to collect evidence necessary to meet the requirements of both the **NDCE (Applied)** and IPENZ registration as a Certified Engineering Technician (CertETn).

Note – while enrolled in the NZDE the candidate is eligible for Student Membership of IPENZ. Once they graduate with the NZDE they are eligible for Graduate Membership.

The Workbook

The Workbook, which is provided by InfraTrain, is specific to the area of the candidate's work – Consulting, Contracting or Local Government. It contains sufficient information to guide the candidate through the process of achieving the qualification.

The Workbook details a number of key tasks that an engineering technician needs to be competent in (see table 2). For each of these tasks the Workbook details the specific requirements that must be completed. It also outlines naturally occurring workplace evidence that needs to be collected to demonstrate the knowledge and skills acquired – this may include pricing schedules, attributes reports, Gantt charts, construction, set-out and as-built plans, project quantities, traffic management plans, health and safety, quality management and environmental plans. This evidence is collected in the Workbook.

Table 1 reproduced from InfraTrain NDCE (Applied) Workbooks

Workbook Experience Tasks		
Consulting	**Contracting**	**Local Government**
Prepare Project Gantt Charts	Prepare Contract Tender Prices	Prepare Project Gantt Charts
Prepare a Feasibility Report	Prepare Tender Non Price Attribute Information	Monitor Trade Waste and Stormwater Discharge Consents
Complete a Topographical Survey and Plan	Perform Construction Survey Set-outs and Control, and compile As-Built Information	Prepare a Feasibility or Scheme Report
Carry Out a Project Site Investigation	Calculate Project Quantities	Complete a Topographical Survey and Plan
Prepare a Scheme Plan Report	Produce a Site Traffic Management Plan (TMP) and conduct an audit	Carry Out a Project Site Investigation
Produce Project Drawings	Produce a Quality Plan	Produce Project Drawings
Prepare Project Specifications	Produce an Environmental Plan	Prepare Project Specifications
Control a Project	Produce a Health and Safety Plan and a set of site instructions	Control a Project
Establish Health and Safety Requirements	Produce a Construction Management Plan and a set of site instructions	Establish Health and Safety Requirements
	Control a Civil Infrastructure Project	
	Prepare a Company Brief for a Capital Purchase or Lease	

WHO IS INVOLVED IN COMPLETING THE QUALIFICATION?

A number of people play a key role in the candidate achieving this qualification. Experienced or senior engineers can make a significant contribution by supporting the candidate to successfully complete the diploma and in turn help the industry grow professionally.

Mentor

The Mentor's role is to provide support and guidance to the candidate as they compile the evidence and complete the workbook, and may be a colleague, advisor or manager. They can be the same person as the Verifier.

Verifier

A Verifier is a person with industry experience who is appointed by the employer. The Verifier's role is to observe and confirm work has been completed by the candidate and they are ready to be assessed. In most cases they will be a supervisor or manager.

Assessor

The Assessor is assigned to the candidate after enrolment and is someone with industry experience and a degree or diploma in civil engineering. The Assessor must have completed training and be registered by InfraTrain as well as endorsed by IPENZ. At present InfraTrain has Assessors available throughout the country that can meet the present demand for assessments. As enrolments in the diploma grow, InfraTrain is committed to training additional Assessors to meet demand.

The Assessor's role is to determine that the candidate is competent in the required skills and knowledge. While the evidence and other information in the Workbook provides a substantial amount of the information for assessment, the Assessor may also confirm work with the Verifier, observe the candidate working or conduct interviews.

The Assessor ensures that the candidate meets the requirements of the qualification's unit standards, which also meet the requirements for IPENZ registration as a Certified Engineering Technician.

Once the Assessor has evaluated the candidate's performance and knowledge and determined they are competent against the Unit Standards, the Assessor will advise the candidate and InfraTrain, who notify the New Zealand Qualifications Authority.

A MODEL FOR SUCCESS

The successful completion of the **NDCE (Applied)** does depend on a commitment by the candidate to complete the workbook, but it equally depends on the full support of the employer to provide the opportunities and training for the candidate to successfully complete the required work.

A best-practice model for successful completion of the diploma involves:

- Candidates completing a task scheduling plan to complete the required experience tasks
- The employer developing a structured plan to provide the required range of work and develop the required competencies
- Regular progress reviews
- Consideration to how any gaps in experience can be completed – can this experience be gained in conjunction with an associated organisation if necessary?
- Pro-active mentoring and support, including peer networks

InfraTrain Support

InfraTrain's regional advisor will explain to both candidate and employer the process for completing the qualification, including the collection of evidence; assist the candidate with planning their training; and with arranging the Verifier(s) and Assessor. They will also provide on-going support and guidance to the employer and candidate.

MODERATION – QUALITY ASSURANCE

The process of Moderation is an important part of InfraTrain's quality assurance programme and provides candidates with the confidence that they will be assessed against the Unit Standards to the same consistently high standard wherever they are in the country.

The peer moderation model is used by InfraTrain for the diploma and this involves all Assessors reviewing assessment samples to check the right level of competency is being achieved by candidates. There is an active network of Assessors throughout the country which facilitates the sharing of information and encouraging consistency in assessments.