Qualification details

<table>
<thead>
<tr>
<th>Title</th>
<th>New Zealand Certificate in Civil Engineering Laboratory (Level 4) with strands in Aggregate, Asphalt, Bitumen, Concrete, Field Investigations, and Soil</th>
</tr>
</thead>
<tbody>
<tr>
<td>Version</td>
<td>1</td>
</tr>
<tr>
<td>Level</td>
<td>4</td>
</tr>
<tr>
<td>Qualification type</td>
<td>Certificate</td>
</tr>
<tr>
<td>Credits</td>
<td>70-85</td>
</tr>
<tr>
<td>NZSCED</td>
<td>030999 Engineering and Related Technologies &gt; Civil Engineering &gt; Civil Engineering not elsewhere classified</td>
</tr>
<tr>
<td>Qualification developer</td>
<td>Infrastructure ITO</td>
</tr>
<tr>
<td>Next review</td>
<td>December 2020</td>
</tr>
<tr>
<td>Approval date</td>
<td>July 2015</td>
</tr>
<tr>
<td>Strategic purpose statement</td>
<td>The purpose of this entry-level qualification is to provide the infrastructure civil engineering industry with people who have the knowledge and skills to maintain, calibrate and operate civil engineering laboratory testing equipment for the testing and sampling of materials, to ensure that materials and construction comply with industry standards and customer requirements. Civil engineering testing laboratories provide a vital service for engineers in the design and quality control of infrastructure works projects. This is a technical qualification within a specialised area of work. It is intended for people wanting to work in, or who are currently working in a civil engineering laboratory. Graduates will be capable of operating at a technical level with limited supervision.</td>
</tr>
</tbody>
</table>

Graduate profile

Graduates of this qualification are able to:
- operate, maintain and calibrate civil engineering laboratory and test equipment
- plan, prepare and conduct day-to-day civil engineering laboratory activities
- apply quality standards and material specifications to civil engineering laboratory testing activities
- quantify and validate the uncertainty in measurement in test results.

Graduates of the **Aggregate Strand** will be able to:
- complete aggregate sampling and perform aggregate source property, or aggregate production tests.

Graduates of the **Asphalt Strand** will be able to:
- complete asphalt sampling and perform asphalt tests.

Graduates of the **Bitumen Strand** will be able to:
- complete bituminous binder sampling and perform bitumen or modified bitumen, or bitumen emulsion tests.

Graduates of the **Concrete Strand** will be able to:
- complete concrete sampling and perform concrete tests.

Graduates of the **Field Investigations Strand** will be able to:
- perform field investigation tests.

Graduates of the **Soil Strand** will be able to:
- complete soil sampling and perform either soil classification, soil density and compaction, or soil strength tests.

| Education pathway | This qualification can lead to the New Zealand Certificate in Civil Engineering Laboratory (Level 5) with strands in Aggregate, Asphalt, Bitumen, Concrete, Field Investigations, and Soil. [Ref: 2693]. |

| Employment pathway | Graduates of this qualification will likely be employed in a civil engineering laboratory as civil laboratory technicians, (sampling and testing) in the following contexts: aggregate; asphalt; bitumen; concrete; soil; or undertaking field investigations. |

### Qualification specifications

#### Qualification award
This qualification can be awarded by the Infrastructure ITO, or any organisation with an approved programme or accredited to deliver a programme leading to the qualification.

The certificate will display the logos of the NZQF; and the Infrastructure ITO, or the programme owner, or the accredited provider.

#### Evidence requirements for assuring consistency
Core evidence requirements for demonstrating consistency for the qualification will include:
- internal and external moderation results relating to the assessment of graduate outcomes
- feedback and actions taken in response to feedback
- programme completion data and results
- any other relevant evidence.

For more information on evidence for consistency relating to this qualification, contact the Quality Assurance team at info@connexis.org.nz; and refer to ‘Guidelines for assuring national consistency of graduate outcomes for qualifications listed on the New Zealand Qualifications Framework’ at www.nzqa.govt.nz.
Minimum standard of achievement and standards for grade endorsements

Achievement of all of the outcomes in the graduate profile, including the outcomes for at least one strand.

Other requirements for the qualification (including regulatory body or legislative requirements)

None.

General conditions for the programme leading to the qualification

| General conditions for programme | Tertiary Education Organisations (TEOs) offering programmes leading to this qualification must maintain currency with amendments to, and replacements of, legislation, regulations, rules, and Australia/New Zealand standards relevant to the range of civil engineering laboratory activities undertaken within this qualification. The following standard specifies the general requirements for the competence to carry out tests and/or calibrations, including sampling. It covers testing and calibration performed using standard methods, non-standard methods, and laboratory-developed methods: ISO/IEC 17025:2005 General requirements for the competence of testing and calibration laboratories. New Zealand standards specific to the sampling and testing of aggregates, asphalt, bitumen, concrete, field investigations, and soil must be followed. For more detailed guidelines for programme development (including recommended unit standards), contact the qualification developer at: qualifications@connexis.org.nz. |

Conditions relating to the Graduate profile

<table>
<thead>
<tr>
<th>Qualification outcomes</th>
<th>Conditions</th>
</tr>
</thead>
</table>
| 1 Operate, maintain and calibrate civil engineering laboratory and test equipment. Credits 15 | Programmes must include: 
  - operating, maintaining and calibrating basic civil engineering laboratory equipment, including: mass, temperature, length, and volume measurement equipment; and a temperature controlled cabinet. |
| 2 Plan, prepare and conduct day-to-day civil engineering laboratory activities. Credits 15 | Programmes must include: 
  - planning, organising and conducting daily civil engineering laboratories activities; including monitoring and updating of work plan, assembling required resources such as documentation, personnel, equipment, and, where necessary, sub-contractors 
  - preparation requirements and procedures for taking, handling and transporting field samples. |
3 Apply quality standards and material specifications to civil engineering laboratory testing activities.
Credits 4

Programmes must include:
- management and technical requirements of laboratory quality systems.

4 Quantify and validate the uncertainty in measurement in test results.
Credits 6

Must include:
- operating and maintaining pressure and force measurement equipment.

**Aggregate Strand:** Candidates must choose either: aggregate source property, or aggregate production tests.

5 Complete aggregate sampling and perform aggregate source property, or aggregate production tests.
Credits 30

Programmes must include:
- completing civil engineering laboratories aggregate sampling
  - an understanding of test methods, and the reporting requirements and meaning and applicability of test results
  - performing tests and calculating and reporting test results which must include:

  **For aggregate source property tests:**
  A minimum of three source property tests, such as – crushing, weathering, LA – Los Angeles Abrasion, soundness, solid density, density and absorption (fine), density and absorption (coarse), clay index, polished stone value.

  **For aggregate production tests:**
  A minimum of five aggregate production tests, such as – California Bearing Ratio, NZ standard, NZ heavy, NZ vibrating hammer, maximum density, minimum density, wet sieve (particle size), dry sieve (particle size), average least dimension, rip rap grading, broken faces, sand equivalent, liquid limit cone, liquid limit casagrande, plastic limit, lightweight, aggregates, unit density.

**Asphalt Strand**

6 Complete asphalt sampling and perform asphalt tests.
Credits 45

Programmes must include:
- completing civil engineering laboratories asphalt sampling which may include prepared materials and test materials such as standards and reagents.
- an understanding of test methods, and the reporting requirements and meaning and applicability of test results
- performing tests and calculating and reporting test results which must include:

  **A minimum of four tests used in asphalt design such as –**
  specific gravity and density, maximum specific gravity, specimen compaction, tensile strength ratio, cantaboro, fatigue, wheel tracking, resilient modulus.
A minimum of two tests used in asphalt manufacture such as – binder content, grading, maximum specific gravity, air voids.
A minimum of two tests used in asphalt construction such as - pavement density (cores and nuclear density meter), NAASRA (ride), permeability, texture.

**Bitumen Strand:** Candidates must choose either: bitumen/modified bitumen, or bitumen emulsion tests.

| 7 | Complete bituminous binder sampling and perform bitumen or modified bitumen, or bitumen emulsion tests. | Programmes must include:
|   | Credits 30 | – completing civil engineering laboratories bituminous binder sampling which may include prepared materials and test materials such as standards and reagents.
|   |   | – an understanding of test methods, and the reporting requirements and meaning and applicability of test results
|   |   | – performing tests and calculating and reporting test results which must include:
|   |   | For bitumen/modified bitumen tests:
|   |   | Bitumen or modified bitumen tests – penetration, softening point, kinematic viscosity.
|   |   | A minimum of two additional bitumen or modified bitumen tests, such as – dynamic viscosity, solubility, flash point (Cleveland open cup), rolling thin film, rheology (dynamic shear), flexural creep (bending beam rheometer), pressure ageing, ductility.
|   |   | For bitumen emulsion tests:
|   |   | Three bitumen emulsion tests, such as – viscosity, sieve, binder content.

**Concrete Strand**

| 8 | Complete concrete sampling and perform concrete tests. | Programmes must include:
|   | Credits 30 | – completing civil engineering laboratories concrete sampling for either fresh or hardened concrete. Samples must include:
|   |   | For fresh concrete: snatch or representative samples taken randomly or selected from the following scenarios; placed concrete, agitator, paving mixer, open top container, pump outlet.
|   |   | For hardened concrete: cylindrical drilled cores, sawed beams, sawed cubes.
|   |   | – an understanding of test methods, and the reporting requirements and meaning and applicability of test results
|   |   | – performing tests and calculating and reporting test results which must include:
|   |   | For fresh concrete
|   |   | A minimum of two: Yield, Air Content, Slump, Spread, Unit Mass for fresh concrete.
|   |   | For hardened concrete
Field Investigations Strand

| 9 | Perform field investigation tests. | Programmes must include: |
|   | Credits 30 | – an understanding of test methods, and the reporting requirements and meaning and applicability of test results |
|   |   | – performing tests and calculating and reporting test results which must include: |
|   |   | A minimum of five field investigation tests, such as – Nuclear Density Meter, Benkelman beam, shear vane, Scala penetrometer, cone penetrometer test, static penetrometer test, falling weight deflectometer, lightweight deflectometer, impact soil tester (clegg), sand circle, British pendulum, National Association of Australian State Road Authority (NAASRA), grip tester, sand replacement, balloon densometer, core cutters, in situ California Bearing Ratio, plate bearing, soil and rock logging. |

Soil Strand: Candidates must choose at least one of the following tests: soil classification, soil density and compaction, soil strength.

| 10 | Complete soil sampling and perform soil classification, soil density and compaction, or soil strength tests. | Programmes must include: |
|    | Credits 30 | – completing civil engineering laboratories soil sampling which may include prepared materials and test materials such as standards and reagents. |
|    |   | – an understanding of test methods, and the reporting requirements and meaning and applicability of test results |
|    |   | – performing tests and calculating and reporting test results which must include: |
|    |   | For soil classification tests: |
|    |   | A minimum of four soil classification tests, such as – wet sieve (particle size), dry sieve (particle size), liquid limit cone, liquid limit casagrande, plastic limit, linear shrinkage, moisture content, pinhole dispersion, Allophane, pH, Emerson crumb test, hydrometer (particle size), pipette (particle size), shrink/swell, jar slake. |
|    |   | For soil density and compaction tests: |
|    |   | A minimum of two civil engineering laboratory soil density and compaction tests, which may include but are not limited to – NZ standard, NZ heavy, NZ vibrating hammer, solid density (fine), solid density (coarse), maximum density, minimum density. |
|    |   | For soil strength tests: |
|    |   | A minimum of two civil engineering laboratory soil strength tests, which may include but are not limited to – California Bearing Ratio - remoulded, California Bearing Ratio - undisturbed, unconfined compressive strength - standard, unconfined |
Transition information

<table>
<thead>
<tr>
<th>Replacement information</th>
<th>This qualification replaced:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• National Certificate in Infrastructure Civil Engineering (Laboratory Technician) (Level 4) with strands in Aggregate, Soil, Bitumen, Concrete, Asphalt, and Field Investigation [Ref: 1643].</td>
</tr>
</tbody>
</table>

People currently working towards the replaced qualification may either complete the requirements for that qualification by 31 December 2018 or transfer to this qualification.

The last date for entry into programmes leading to the replaced qualification is 31 December 2016.

It is the intention of the Infrastructure ITO that no existing trainee should be disadvantaged by these transition arrangements. Any person who considers they have been disadvantaged may appeal to the Infrastructure ITO at: Infrastructure ITO, PO Box 2759, Wellington 6140.