LET'S GET YOU CHARTERED
STRUCTURAL ENGINEER GUIDANCE

If you're a structural engineer, use this additional guidance to complete your Chartered assessment.

You'll need to provide evidence specific to your structural engineering activities for the four competencies:

1. Engineering knowledge
2. Managing engineering work
3. Professional acumen
4. Developing technical solutions

ENGINEERING KNOWLEDGE

Show you understand and apply accepted principles underpinning widely-applied good practice for complex engineering. Summarise your specialised knowledge of the behaviour of structures.

Attach two Work Records and link two or three relevant evidence sample files to these records, such as free body diagrams, engineering sketches (with appropriate annotation) and design features reports.

Make sure your evidence shows you can apply fundamental structural engineering principles and include clear, logical, handwritten calculations another engineer can easily follow. If you're supplying solutions produced using software such as MathCAD, make sure they're supported by evidence of your understanding and application of the structural engineering models underpinning the software used.

In the Sample Evidence box, summarise how these Work Records show you can:

- assess structural actions in typical beam and column structures, bridge structures, wall structures or in slabs, and when these are subjected to gravity and lateral loads, with and without using a computer. This is an essential skill for structural checking and analytical modelling
- assess the structural strengths and deflections of members quickly without using a computer
- define load paths (both vertical and lateral) through the overall structure and through structural details (such as in sample calculations)
- demonstrate knowledge of the properties of common structural materials

- define ductility levels and the basic failure hierarchy of a structure
- demonstrate understanding of relative stiffness and displacement compatibility.

CPENG – NEW ZEALAND-SPECIFIC GOOD PRACTICE

For CPEng, you need to supply New Zealand-specific examples. Show you understand and apply accepted principles underpinning good practice for professional engineering that is specific to your practice area.

Explain how you take account of New Zealand's seismicity and associated geotechnical considerations.

Attach two Work Records and link two or three relevant sample evidence files to these records that show:

- how you apply design guides, such as the New Zealand Society of Earthquake Engineering (NZSEE) Engineering Assessment Guidelines
- how you comply with key legislation and standards, including:
    - Engineering New Zealand practice notes and guidelines
    - the Building Act and New Zealand Building Code, eg structural integrity during a fire.
    - loading Standards, for example AS/NZS 1170, or the NZ Transport Agency Bridge Manual
    - relevant structural materials standards, for example NZS 3101 for concrete structures, NZS 3603 for timber structures and NZS 3404 for structural steel
    - Resource Management Act, Health and Safety at Work Act 2015 and the Construction Contracts Act where relevant
- your knowledge of materials' technical specifications, such as steel, cement, epoxies etc.
- your knowledge of the skill base and capability of the New Zealand construction industry and its practices.
- your knowledge of material durability and an accredited supply chain.
- how you maintain currency
- your knowledge and understanding of your practice field and where it connects with other fields.

Summarise why your Work Records are relevant for New Zealand-specific good practice. Explain how your samples provide evidence of critical detailing for seismic actions and structural earthquake engineering as practised in New Zealand.

INVESTIGATION AND ANALYSIS

Describe how you have defined, designed, investigated, analysed and developed solutions for complex engineering problems in line with good practice for professional engineering.

Summarise how you investigate and assess options, and define and analyse complex structural problems with only limited assistance from more senior engineers.

Attach two supporting samples from your Work Records and link two or three relevant sample files that show how you:

- define constraints for the designer to work within, such as building architecture, available materials, site constraints, operational requirements and budget
- identify missing or required information, for example

    - site related problems, such as ground conditions – is the structure likely to be affected by settlement?
    - wind analysis – are wind tunnel tests required?
- develop briefs for external consultants to gather missing information
- define loads
- define acceptance criteria for key parameters
- research material properties, eg reinforced concrete – shrinkage, early age strength, etc.

Modelling and analysis

- Selecting an appropriate analytical process – static vs. dynamic.
- Defining models including boundary conditions, eg soil structure interaction, staged construction considerations, diaphragm flexibility etc.
- Conducting analysis and correctly interpreting results, eg choosing an appropriate building period, correctly determining diaphragm design actions, etc.
- Verifying the authenticity and conducting sensitivity analysis of results.

If you're a first-time applicant, the calculations you submit could include basic checks, eg to show you have checked the sum of reactions and the deflected shapes.

Designing and developing solutions

- How the structural form evolved to meet the constraints, eg constructability considerations, resources, etc.
- How load paths (vertical and lateral) are identified for gravity, seismic and wind loadings.
- How the materials used were suitable for the solution.
- How the subsystems were designed and how standardisation opportunities were considered.
- How size of members, reinforcing bars, length of welds, etc have been designed.
- How **constructability** has been considered.
- How an appropriate observation/monitoring schedule for critical parts of the construction process was developed.
- Recognition of the need for expert assistance and a proactive approach to peer review.

Summarise why the Work Records are relevant and how the files prove you analyse, define, investigate, design or develop solutions to complex engineering problems.

How we define low, medium and high-rise structural engineering

- Low rise construction: All buildings up to and including 3 stories
- Medium rise: All buildings from 4 to 20 stories
- High rise: All buildings 21 stories and over