Title	**Apply design principles in the design of scaffolding**		
Level	**5**	**Credits**	**12**

Purpose	This unit standard is for people who have intermediate scaffolding skills and who want to develop their scaffolding skills to an advanced level. People credited with this unit standard are able to: – determine load bearing capacity for scaffolding components; – calculate loads on a cantilever supporting structure on outboard, inboard and fulcrum points; – assess the capacity and design support mechanisms for scaffolds supported by an existing structure; – assess the capacity and design support mechanisms for scaffolding and scaffold attachments supported by or attached to another scaffold; and – apply regulatory requirements in the design of scaffolding.

Classification	Lifting Equipment > Advanced Scaffolding

Available grade	Achieved

Guidance Information

1 This unit standard has been developed for learning and assessment on-job or off-job in a simulated environment.

2 All tasks must be carried out in accordance with:
- a quality management systems;
- b designer's requirements and manufacturers' operating instructions; legislation, regulations, bylaws, Health and Safety at Work Act 2015, and Health and Safety in Employment Regulations 1995;
- c the most up to date version of the *Good Practice Guidelines – Scaffolding in New Zealand* (GPG) available from https://www.worksafe.govt.nz/topic-and-industry/working-at-height/scaffolding-in-new-zealand/; and all subsequent amendments and replacements.

3 Definitions
Cantilevers refer to scaffolding structures that project outward at height from an existing structure or scaffold.
Scaffold attachments refer to items added to a scaffold for specific functions and which materially impact on the forces bearing on it and in particular its loading. Attachments include winches, hoists, gin wheels, catch fans, and barrow ramps.

Scaffold plans refer to key design document prepared by the candidate and used as a basis for the erection of a particular scaffold.
Scaffolding is as defined in the GPG and in the Health and Safety in Employment Regulations 1995.
Support mechanisms refer to a series of ties, beams, bracing, or other arrangements or methods used to support or stabilise an entire scaffold structure.
Types of scaffold refer to different scaffolds or scaffolding types such as birdcage scaffolds, vessel scaffolds, cantilevers, loading platforms, hanging scaffolds, mobile scaffolds etc.

4 Recommended skills and knowledge
New Zealand Certificate in Scaffolding (Level 4) [Ref: 2362], or demonstrate equivalent knowledge and skills.

Outcomes and performance criteria

Outcome 1

Determine load bearing capacity for scaffolding components.

Performance criteria

1.1 Determine loads and forces that can be applied to different scaffolding components.

Range includes – tube, fittings, and bracing;
may include but is not limited to – base jacks, base plates, planks, ties.

1.2 Determine ground capacity to take load based on the type of scaffolding and the nature of the ground conditions.

1.3 Determine individual leg loads for different scaffolding structures.

Range at least three scaffolds of different types.

1.4 Determine slip fitting parameters based on fitting types.

Range steel and aluminium for at least three types of fittings across a range of loadings.

Outcome 2

Calculate loads on a cantilever supporting structure on outboard, inboard and fulcrum points.

Range two calculations of outboard and inboard lengths.

Performance criteria

2.1 Determine the live and dead loads on the outboard portion of the cantilever.

2.2 Determine the factor of safety and the load required on the inboard portion of the cantilever.

2.3 Determine the load on the fulcrum point and do the calculation.

Outcome 3

Assess the capacity and design support mechanisms for scaffolds supported by an existing structure.

Range at least three different types of scaffold.

Performance criteria

3.1 Assess the capacity of the supporting structures to support scaffolding.

Range includes but is not limited to – assessment of strength, stability, and rigidity.

3.2 Assess the capacity of the supporting structures to support different types of scaffold.

Range includes but is not limited to – suitable tie types and attachment points.

3.3 Design ties and bracing.

3.4 Design attachment methods and designate attachment points.

Outcome 4

Assess the capacity and design support mechanisms for scaffolding and scaffold attachments supported by or attached to another scaffold.

Range at least one cantilever and one other type of scaffold, two different scaffolding attachments.

Performance criteria

4.1 Assess the capacity of the existing scaffolding and the structures it is dependent on, to support additional scaffolding or scaffold attachments.

Range includes but is not limited to assessment of – strength, stability, rigidity of the structure relied upon, and suitable tie types, bracing methods, attachment points.

4.2 Assess the impact of particular attachments and their operation on the existing scaffolding.

Range includes but is not limited to impact on – loadings, magnitude and direction of forces, attachment bracing requirements.

4.3 Incorporate associated strengthening of the existing scaffolding and/or appropriate stabilising structures into the design.

Range may include but is not limited to – counterweights, raker tubes, raker bays, doubling standards.

4.4 Design ties and bracing.

4.5 Design attachment methods and designate attachment points.

Outcome 5

Apply regulatory requirements in the design of scaffolding.

Performance criteria

5.1 Determine the duty loading of different types of scaffold and scaffolding structures.

Range at least three different types.

5.2 Identify the requirements of special duty scaffolds.

Range includes but is not limited to – proprietary scaffolds outside the manufacturer's specifications, scaffold structures exceeding 33 metres, scaffolds susceptible to exceptional environmental loading, any scaffold that falls outside of the general requirements of the GPG in terms of bay specifications, width, length, and duty loadings.

5.3 Determine the need for consultation with a chartered professional engineer

5.4 Identify and apply the requirements of supervisory scaffolders in relation to engineer-designed scaffolds.

5.5 Consult and utilise the GPG, Australian/New Zealand's Standards, or other international standards appropriately in drawing up scaffold plans and technical specifications for different scaffold types in a variety of applications.

Range at least three different types.

Replacement information	This unit standard and unit standard 26597 replaced unit standard 4208 and unit standard 4210.

Planned review date	31 December 2026

Status information and last date for assessment for superseded versions

Process	Version	Date	Last Date for Assessment
Registration	1	21 July 2011	31 December 2016
Review	2	16 July 2015	31 December 2025
Review	3	24 February 2022	N/A
Revision	4	24 August 2023	N/A

Consent and Moderation Requirements (CMR) reference	0003

This CMR can be accessed at http://www.nzqa.govt.nz/framework/search/index.do.

Comments on this unit standard

Please contact the Waihanga Ara Rau Construction and Infrastructure Workforce Development Council qualifications@waihangaararau.nz if you wish to suggest changes to the content of this unit standard.