

# A code based on scientific data

New Zealand's Building Code can trace part of its history back to the US small dwelling code published in 1922. This was the first nationally developed US building code and probably the first anywhere to explore going beyond minimum standards.

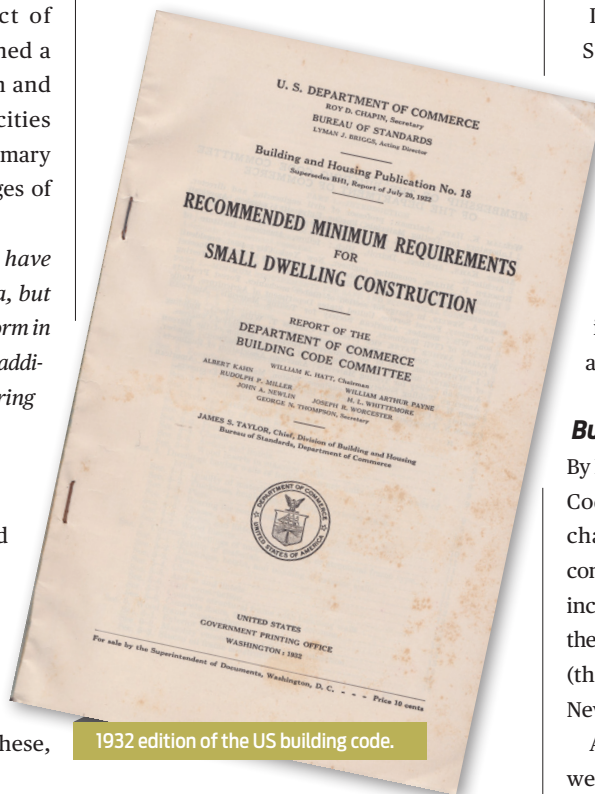
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**IN APRIL 1920**, following the impact of World War I, the US Senate established a Select Committee on Reconstruction and Production. It held hearings in 13 cities over 37 days, presenting a 61-page summary report in March 1921 (with 2,360 pages of appendices) and concluding:

*'The building codes of the country have not been developed upon scientific data, but rather on compromises; they are not uniform in principle and in many instances involve an additional cost of construction without assuring more useful or more durable buildings.'*

## Demand for building code

Soon after, a Division of Building and Housing was established in the National Bureau of Standards with its first task to create such a code. The demand was impressive - of all the US cities with populations over 5,000, 25% lacked a building code or inspector, and of these, half had populations over 10,000.



1922 edition of the US building code.

In 1920, Herbert Hoover was appointed Secretary of Commerce. A focus of his tenure was on improving productivity through fair competition. This included developing the legislative framework leading to the modern Federal Communications Commission, the Federal Aviation Authority and standardisation of a range of products, including building materials, like brick and timber sizes.

## Building Code Committee established

By May 1921, Hoover had established a Building Code Committee (BCC) and appointed the chair and six members. The chair was a consulting fire engineer, while the committee included three engineers, two architects and the New York City Superintendent of Buildings (the person in charge of administering the New York City building code).

Averaging 54 years of age, the members were well experienced. However, as they

all came from the east or the mid-west, regions known for very cold winters and hot summers, their knowledge of construction in milder climates may have been limited.

They set to work with vigour, travelling regularly from their home cities by train to Washington DC for meetings. In February 1922, they sent out over 1,000 copies of the draft code, receiving back 150 letters of comment mostly from groups or organisations. These were debated and incorporated along with a range of illustrations provided by industry associations and companies.

### **First US building code in 1922**

In July 1922, *Recommended minimum requirements for small dwelling construction* was published, complete with a letter of approval from Hoover.

It covered brick, concrete block, monolithic concrete and timber-framed buildings up to 30 feet (9.1 m) high accommodating one or two families.

This was the first nationally developed US building code. It brought together the experiences of not only the wider nationwide code community but also the work of researchers at organisations such as the National Bureau of Standards and the Forest Products Laboratory. The final code received wide support from the building industry and was widely distributed.

### **Code small and prescriptive**

The code was divided into nine articles, each with a number of clauses (see Table 1). To those used to working with modern building codes, a surprise is the small number of clauses and pages. ➤

**Table 1**

## **1922 US building code clauses and coverage**

### **ARTICLE I GENERAL (2 CLAUSES, 2 PAGES)**

- Limitations, heights and areas

### **ARTICLE II DWELLINGS WITH SOLID BRICK WALLS (5 CLAUSES, 1 PAGE)**

- Thickness, height and bonding of exterior walls
- Piers, chases, arches and lintels
- Material quality

### **ARTICLE III HOLLOW: BUILDING TILE, CONCRETE BLOCK, BRICK (5 CLAUSES, 3 PAGES)**

- Thickness, height and bonding of exterior walls
- Piers, chases, bearing for concentrated loads
- Material quality

### **ARTICLE IV CONCRETE MONOLITHIC, UNIT OR STRUCTURAL FRAME (5 CLAUSES, 2 PAGES)**

- Monolithic concrete, unit construction
- Concrete structural frame with enclosing walls
- Height of concrete exterior walls
- Floors, floor beams and columns

### **ARTICLE V FRAME CONSTRUCTION (4 CLAUSES, 2 PAGES)**

- Definition, exterior walls
- Masonry veneer and stucco on frame construction

### **ARTICLE VI WOOD FRAMING (6 CLAUSES, 3 PAGES)**

- General requirements, strength of members
- Beams, joists, girders and rafters, basement columns
- Bearing partitions, non-bearing partitions

### **ARTICLE VII PARTY AND DIVISION WALLS AND PARTITIONS (3 CLAUSES, 4 PAGES)**

- Party and division walls, parapet walls, interior partitions

### **ARTICLE VIII FOUNDATIONS (3 CLAUSES, 2 PAGES)**

- Foundation walls, footings, ventilation

### **ARTICLE IX MISCELLANEOUS REQUIREMENTS (10 CLAUSES, 2 PAGES)**

- Loads, weight of materials, floor loads, roof loads
- Plastering, timber in walls
- Chimneys and surround woodwork, fire-stopping
- Private garages

Although the code provides some details, for example, a table of allowable stresses permissible for structural timbers by timber species, it is mostly prescriptive. One example is, *Wood studding shall be not less than 2 by 4 inches and spaced not to exceed 16 inches on centers.*

It is likely the BCC expected those likely to use the code would be well trained, experienced and likely to know their construction materials. These expectations would be buttressed with a good dose of inspection and the potential for legal consequences.

The 1922 code was possibly the first code anywhere that included exploration of going beyond the minimum. It used the research to identify the need for a range of requirements in response to local conditions including wind, snow, earthquakes, moisture, sound, vermin, insects and the correct use of thermal insulation.

### **Base for other codes, including NZ's**

The BCC code found a major use in the development of the 1927 Uniform Building Code prepared by building officials on the temperate west coast. This, along with other BCC publications, supported the development of the 1945 Standard Building Code widely used in the southern states and the 1950 Basic Building Code used mainly in the north central and eastern states.

In 1997, these three codes merged into the International Building Code, making the 1922 code the grandparent of the modern US building code.

This 1922 US building code also travelled to New Zealand, where it was used to create the first New Zealand national Building Code in 1924 - but that is another story. ◀

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# Building Code turns 25

This year marks 25 years since the New Zealand Building Code came into effect.

**BEFORE THE** early 1930s, many New Zealand councils had their own building bylaws, although some had no requirements at all. Often adjacent councils had different rules, causing difficulties for architects, builders and material suppliers. While some local issues were considered, the bylaws were often based on overseas experience - notably Britain.

### **Changes after Napier earthquake**

The 1931 Napier earthquake changed everything. Overnight, it became evident that construction methods that worked well half a world away and had locally for some years were unsuitable for use in the Shaky Isles. The poor performance of heavy unreinforced masonry that was widespread around the country but had caused significant loss of life in Napier was cause for particular concern.

The country clearly required some form of building standard. In 1935, NZSS 95 *Standard Model Building Bylaw* provided a uniform but prescriptive basis for local bylaws. It was followed in 1964 by NZSS 1900, but local changes still led to unnecessary difficulties.

It was an easily enforced cookbook-style of building control, but many believed it stifled innovation and the use of new materials. Nevertheless, the system remained in place until the early 1990s.

### **1992 saw performance-based building controls introduced**

The Building Act 1991 was a remarkable departure from the old way of doing things. Not only did it merge many of

the existing Acts and regulations, it introduced the concept of performance-based building controls. At the centre of this sea change were the Building Regulations 1992, in particular, Schedule 1 - the New Zealand Building Code.

The Building Code marked the beginning of a new way of thinking about quality for the building industry. The old, prescriptive guidance was gone. In its place was a new set of minimum performance requirements that all new buildings had to meet.

Local authorities became the day-to-day administrators of the new system, taking responsibility for ensuring that all building work in their jurisdiction met or exceeded the new performance requirements. For a period, the owner could choose to use a private building certifier to check technical proposals and perform inspections.

### **Guides helped to overcome confusion**

In the absence of practical guidance explaining how to build, the change caused some confusion. A series of guides explaining performance-based building controls and how to implement the Building Code went some way towards helping the industry embrace the new system.

Over the last two and a half decades, the Building Act and the New Zealand Building Code Acceptable Solutions and Verification Methods have been changed and updated many times. However, the Building Code, with its forward-thinking performance-based requirements and focus on occupant health and safety, remains in place to this day. ◀