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INFORMATION SHEET 11

VERIFICATION OF SOIL BEARING CAPACITY

Requirements outlined in this pamphlet are intended to apply generally to buildings (up to 2 storeys high) such as domestic dwellings, and most residential and most commercial/industrial buildings.

The Requirements

Section 3 of NZS 3604:2011 Timber Framed Buildings sets out the criteria for ground conditions for buildings constructed to this standard (i.e. buildings not requiring specific design).

The main requirement is that the ultimate bearing pressure of the soil supporting the foundations is not less than 300kPa (i.e. an allowable pressure of 100kPa using a factor of safety of 3.0).

Where the ground bearing capacity does not meet the 300kPa requirement for NZS3604:2011 OR the ground consists of expansive soils (shrink-swell), soft soils (clays) or loose gravels, the foundations (not necessarily the remainder of the building) must be specifically engineer designed.

Past soil investigations have shown there are substantial areas of weak soils in the Wairoa district. The soils are variable and can differ substantially, even on neighbouring properties.

Recent Subdivisions

If you are intending to build on land which has recently been part of a subdivision, check to see if a **'Consent Notice'** is on the **Certificate of Title**. A 'Consent Notice' may dictate the level of subsurface investigations and instability remedial measures required at the building consent stage. Alternatively, 'advice notes' on the subdivision consent may give an indication of the level of testing required.

BUILDINGS REQUIRING SITE INVESTIGATIONS

Residential Buildings

- New habitable buildings over 30m² in floor area (including sleepouts)
- All new habitable buildings located in an area of **natural hazard** regardless of size and construction materials (including sleepouts)
- All relocated houses
- Substantial additions >50% of original area
- Small to medium additions to an existing building which shows signs of previous movement
- Large - generally over 110m² ancillary buildings (sheds, garages etc). See pole shed exemptions.
- Retaining walls with surcharges in areas of natural hazards.

Areas of natural hazard include (but are not limited to):

- On or at the base of sloping land or on ridge tops
- Fill material
- Coastal environment
- Adjacent to water courses, drains or rivers
- Areas of high or moderate liquefaction potential

Note: two storey buildings on sand soils will require liquefaction analysis.

Commercial/Industrial Buildings

- All building consents for commercial/industrial buildings greater than 110m² and all tilt slab buildings regardless of size, shall include liquefaction testing and if required, engineer designed foundation or mitigation measures to account for settlement or movements (lateral spreading).
- Commercial/industrial buildings (not including tilt slabs) less than 110m² shall be in accordance with the same requirements as residential buildings.

Note: Allowance for consolidation settlement of soils from building loading and floor loadings shall be considered in the foundation/ floor slab design for all commercial/industrial buildings.

Small to Medium Additions

If existing buildings show no signs of previous movement, it may be possible to construct the foundations to the same dimensions as the existing foundations or to that required by NZS3604:2011, whichever is the greater, without the need for subsurface investigations. Council will look at this on a case by case basis depending on location and proposed use.

Exemptions

- Pole sheds without concrete floor
- Poles sheds with concrete floor but not attached to foundation
- Portal frame tin sheds <401m² (this does not apply to any tilt slab buildings)

Testing Specifications

1. If your building platform is 200m² or less and generally rectangular in shape:
 - a. Five auger holes and five ground-bearing capacity test. One in each corner of the building platform and one in the centre.
2. To a minimum of:
 - a. 2m below the underside of the proposed strip or bored pile footings; or
 - b. 600mm beneath short driven timber piles or 2m in depth, whichever is the deeper; or
 - c. Until refusal (justification for refusal must be given).
Note: Where foundation depth may need to be deeper than the required testing depth, testing will need to be extended to allow for this.
3. A penetrometer must be used in sandy soils and a shear vane in cohesive, expansive or clay soils. Shear vane readings are to be taken every 200mm in depth in each bore.
4. If the building platform is greater than 200m² or an irregular shape additional test(s) will be required - 1 extra test site per additional 50m².

Engineer Design Solutions

Where the ground bearing capacity does not meet the requirements of NZS3604 i.e. allowable bearing of 100kPa, or if the ground consists of clays, expansive soils or loose gravels, highly liquefiable soils, or if slope stability remedial measures are required then the foundations and any remedial measures (e.g. a retaining wall) must be designed by a suitably qualified CPEng. The consulting engineer is also required to give a professional guarantee through a “Producer Statement” (PS1) which must also be supplied with the building consent application.

Associated Earthworks

Depending on the location of your proposed building site you may require earthworks (cut and fill) to form the building platform and associated areas. This may trigger a requirement for a building consent for “site works” or resource consent for land disturbance, particularly if you are on a hill slope.

Building Consent Requirements

The following is to be submitted with your building consent application if applicable:

- A “Geotechnical Bearing Capacity Report” from a suitably qualified CPEng. The report is to contain
 - A scaled site plan showing the position of the proposed building and accurate locations of the investigation sites
 - Auger profiles and ground bearing capacity test results (as per testing specifications)
 - A description of the landscape and an interpretation of the results, including recommendation for bearing capacity plus depth of good ground and reasoning how this was derived. Confirmation that the potential for differential (uneven) settlement and liquefaction is either low or high risk and mitigation measures must also be included.
 - Recommendations for any foundation design (engineered) requirements i.e. for clays, expansive soils or loose gravels or due to low bearing capacity
 - On or at the base of sloping land (including ridge tops)
 - In close vicinity to a watercourse, drains or rivers
 - On fill material
 - In an area of natural hazard

The report shall include the requirements of “flat sites” and include stability analysis and recommendations for appropriate foundation design and development options (stability measures).

Please refer to the Yellow Pages under Engineers-General, Engineers-Civil and Engineers-Consulting.

Please note: Wairoa District Council reserves the right to request further information for any building irrespective of the following requirements, depending on the nature of the site and building.