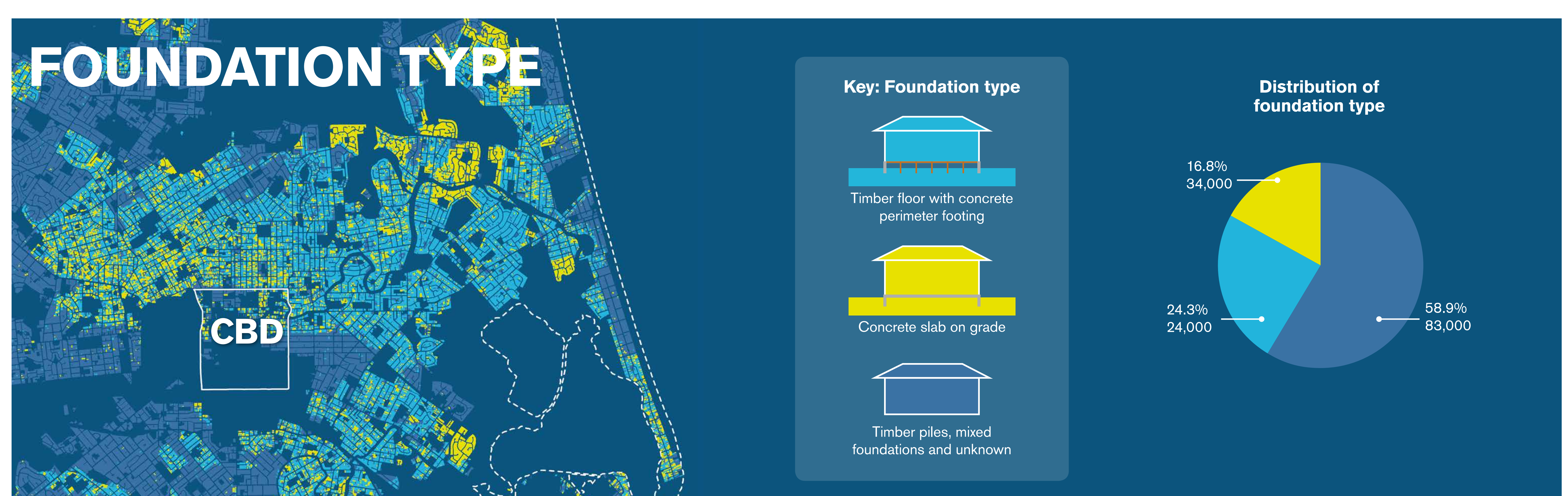
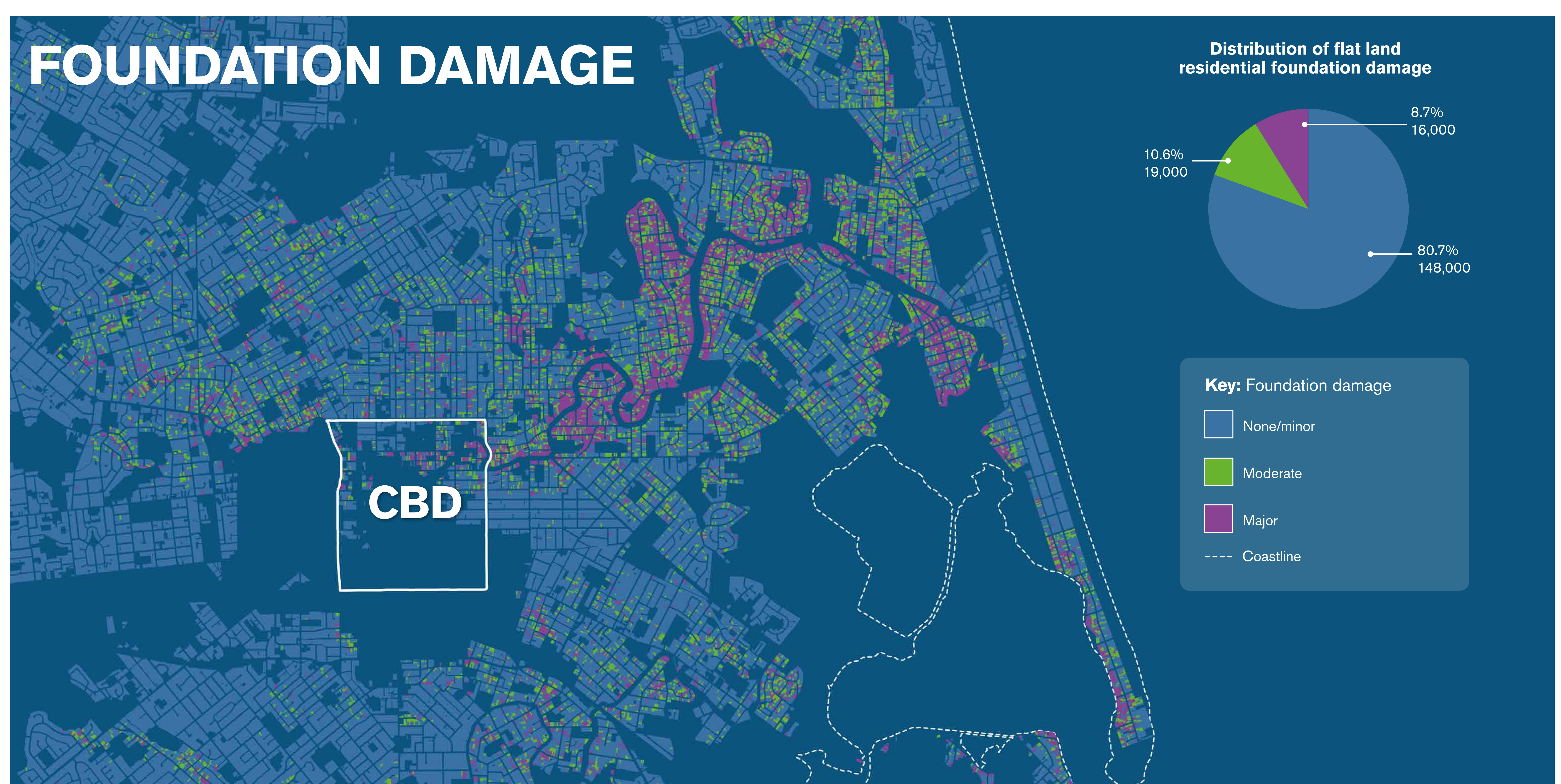
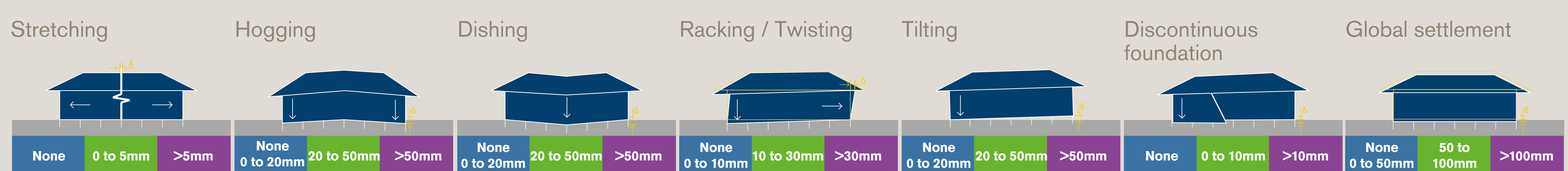


FOUNDATION DAMAGE

Geotechnical engineers have inspected more than 60,000 residential properties for possible liquefaction-induced land damage after the 2010-2011 Canterbury Earthquake Sequence. Visually observed liquefaction-induced damage to house foundations was recorded based on criteria reflecting the type of damage and its severity. Historical and modern construction practices were put to the test with some building foundations performing better than others. This foundation damage has been compiled into a database and the severity from seven modes of damage has been plotted.

Seven modes of damage



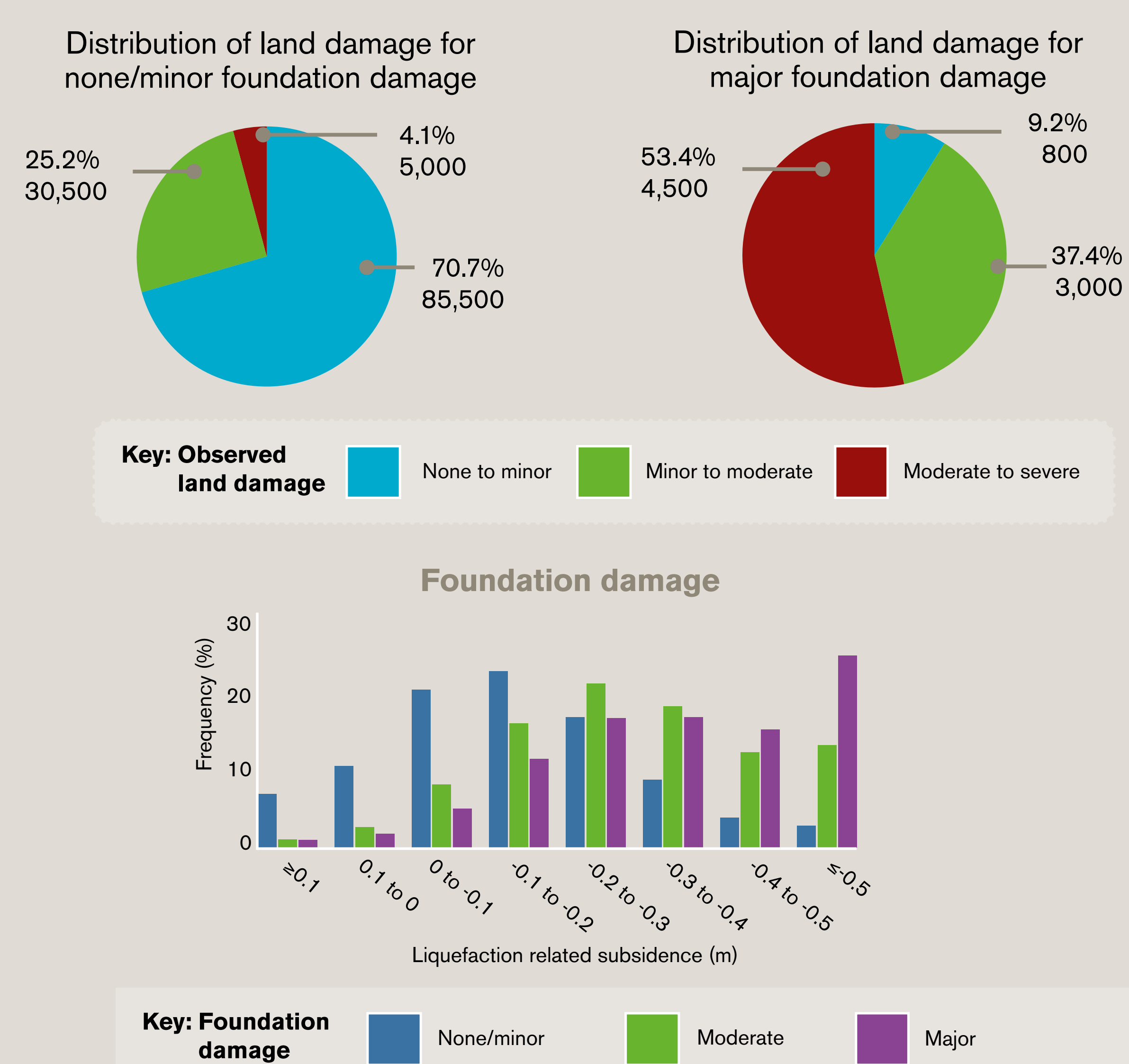
Concrete slab on grade is a more modern foundation system, but early versions of this design were not sufficiently reinforced or robust and lacked stiffness to withstand the differential ground surface deformation caused by liquefaction. This resulted in greater foundation and structural damage in areas where liquefaction-induced ground surface deformation occurred. Older foundation systems of timber floors, supported by a concrete perimeter footing and internal shallow timber piles, performed better.

LIQUEFACTION-INDUCED DAMAGE TO PROPERTIES

Major foundation damage generally coincided with areas of moderate to severe observed liquefaction land damage where large quantities of sand was ejected, there was differential settlement or severe lateral spreading occurred. By contrast, areas with a low concentration of foundation damage generally coincide in areas of none to minor observed land damage.

There is a strong correlation between land damage resulting from liquefaction and residential foundation damage which also extends to measured liquefaction-related subsidence.

Major foundation damage occurred in areas with more liquefaction related subsidence.



APPROXIMATELY
60,000
PROPERTY INSPECTIONS

APPROXIMATELY
16,000
PROPERTIES WITH MAJOR FOUNDATION DAMAGE



MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT
HĪKINA WHAKATUTUKI

EQC
EARTHQUAKE COMMISSION
Kōmihana Rūwhenua