

FREQUENTLY ASKED QUESTIONS

May 2019

Non-compliant Transfer Slabs in Darwin buildings

What happened?

The Department acted on a complaint against a registered Building Practitioner – Certifying Engineer (Structural) regarding an allegation of non-compliant transfer slabs in a five-storey residential building in Darwin.

The non-compliance that occurred was rectified and an independent structural engineer undertook an assessment of the design and developed the rectification works which took place.

Throughout investigations into the complaint, a further nine buildings of similar design, containing transfer slabs, designed by the same structural engineer were identified for independent third-party review.

Is it safe to be in the building? Should I move out?

No determination has been made to say the buildings are unsafe.

Given that there are significant factors applied to the working loads and to the material properties a theoretical non-compliance does not indicate imminent collapse. It is noted these buildings have now stood for years with no indications of distress or signs of failure having been reported by occupants to date, and hence appear to have performed adequately in the past. However, these have not been subject to a full and detailed inspection and assessment to date. As such, a process to have the buildings inspected by a suitably experienced structural engineer has been put into place and to ensure any non-compliance is rectified as soon as possible.

What actions has the Department taken?

The Department of Infrastructure, Planning and Logistics engaged a structural engineer to undertake a review of the buildings identified with a focus on compliance with the National Construction Code and associated Australian Standards.

The transfer slabs in question have been analysed using a 3D finite element analysis software package, with punching shear capacities at support locations being calculated and assessed for compliance.

Findings from the third party peer review

Reports for each of the nine buildings concluded that based on the results of the analysis and capacity check, it appears that the transfer slabs have not been adequately designed for punching shear and bending (in parts).

The analysis software used in the third party review uses finite element methods to analyse reinforced concrete buildings. The software was used to determine the gravity loads and to run a punching shear and bending design check on each of the transfer slabs present in the nine buildings.

The analysis and design checks were limited to an assessment of punching shear and bending at the transfer level based only on the gravity loads.

How many buildings are impacted?

The structural engineers determined that nine of the properties assessed in the investigation were non-compliant to the National Construction Code to varying degrees in punching shear capacity and eight of the buildings were non-compliant to the National Construction Code to varying degrees in bending capacity.

Who will cover the costs?

It is the owner's responsibility to undertake rectification works to ensure the building is compliant with the National Construction Code.

What rectification works would be suitable in this situation?

Remediation for punching shear could include:

- The installation of steel or concrete column capitals designed to increase the punching shearing perimeters.
- Increasing the column sizes to increase the punching shear perimeter.
- The installation of shear bars. These would be rods drilled and epoxied into the slab around the perimeter of the columns.

Remediation for bending could include:

- The addition of post fixed reinforcing to the slab. This could be in the form of steel plates or carbon fibre strips epoxy bonded to the slab surface or chased into the surface of the slab.
- The addition of extra support in the form of columns or steel beams if practical given the usage restrictions.

What is the next course of action by the Department of Infrastructure, Planning and Logistics?

The Director of Building Control has issued owners with a *Building Notice* under the Act to require the appointment of an independent registered structural engineer to undertake an assessment of the transfer slabs and provide recommended temporary and permanent remedial action where required to ensure compliance and safety for occupants.

Under the Act, a Building Notice is usually required to be issued prior to a Building Order being made. Building Notices provide an owner with the opportunity to express whether or not they agree with the Director's opinion that circumstances exist for the making of a Building Order. Owners can do this by providing a technical report, or an explanation regarding the status of the works (such as providing documentation or other contextual information).

If an owner does not comply with the Building Notice, a Building Order will be issued directing the building owner to comply with the direction specified in the Building Order.

Building orders can be issued irrespective of the age of a building and irrespective of when the matter comes to the attention of the Director. Note, however, that if a person contravenes a Building Order, it is an offence and the same time limitations for prosecutions under the Act apply (two years from the date the offence came to the attention of the Director).

Building orders remain in force until they are cancelled, complied with, or an appeal is finalised.

The Director of Building Control has done the necessary steps, to exercise powers under the *Building Act 1993* to refer the registered building practitioner to the Building Practitioners Board for an inquiry in alleged professional misconduct pertaining to a pattern of non-compliance with the National Construction Code in relation to the under design of transfer slabs, to varying degrees in punching shear capacity. If the practitioner is found guilty, the Board will decide the action to be taken under section 34T of the Act, which can include reprimand, suspension or cancellation of the practitioner's registration.

What is the National Construction Code?

The National Construction Code provides the minimum necessary requirements for safety and health; amenity and accessibility, and sustainability in the design, construction, performance and livability of new buildings (and new building work in existing buildings) throughout Australia. It is a uniform set of technical provisions for building work and plumbing and drainage installations throughout Australia whilst allowing for variations in climate and geological or geographic conditions.

What is a transfer slab?

A transfer slab is essentially a reinforced, suspended concrete slab used to transfer the floor loads from above the transfer slab level, to the supports below, typically concrete columns or walls. The transfer slabs are typically located on the lower floors of the buildings.

Structural issues that can occur where a transfer slab has been under designed and therefore non-compliant with the National Construction Code are 'punching shear failures' and 'bending failure'.

What is 'punching shear failure'?

Punching shear failure occurs where the load on the slab cannot be transferred and the column 'punches' up through the slab as a result.

What is a 'bending failure'?

A bending failure occurs where the slab does not have sufficient depth and/or reinforcement to over the clear distance between supporting columns. Bending failure may happen at the mid-span (approximately halfway between supports) at which signs of cracking may be evident on the underside of a slab, or can occur over a support, at which point signs of cracking may be evident on top of the slab.

What is being done to stop this happening again?

The Director of Building Control will also exercise powers under the Building Act by referring the registered building practitioner to the Building Practitioners Board for an inquiry into alleged professional misconduct pertaining to a pattern of non-compliance with the National Construction Code and Australian Standards in relation to the under design of transfer slabs, to varying degrees in punching shear capacity. If the practitioner is found guilty, the Board will decide the action to be taken under section 34T of the Act, which can include reprimand, suspension or cancellation of the practitioner's registration.

Are there other buildings that might be at risk and need to be investigated?

The Department has not received complaints of this nature against any other structural engineers and has been working in collaboration with the structural engineer to ensure that all works of a similar nature that he has designed have been included in the third party review instigated by the department.

What if I am concerned about issues with my building?

Building Advisory Services investigates complaints where there is evidence of non-compliant building works. If you are concerned about any building issues you may wish to engage an independent building practitioner or contact Building Advisory Services through email bas.compliance@nt.gov.au