DESIGN RIGHT

Level threshold access

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Level threshold access to a home can provide an appealing indoor/outdoor flow and accessibility for all, but how do you achieve this while ensuring weathertightness?

FRONT DOOR access into New Zealand residential dwellings was traditionally via steps up from the external ground level to the internal finished floor level. Our homes had suspended timber floors native floorboards on timber joists and bearers and generous crawl spaces beneath to enable access and maintenance, plenty of subfloor ventilation and the inevitable storage of domestic detritus.

Level entry from free-draining decks

Later, when external timber decks became part of the Kiwi architectural vernacular, the lure of seamless indoor/outdoor flow and unfettered level entry access became attractive. It suited our evolving outdoor living lifestyle and was especially helpful for elderly or disabled users.

Level entry from free-draining timber decks was possible with minimal risk of water ingress into the interior, and the principles remain to this day. NZS 3604:2011 *Timber-framed buildings,* and later E2/AS1 paragraph 7.1.1, indicated how we could safely design and build this junction.

As residential dwellings transitioned to reinforced concrete slab-on-ground construction, the difference between external ground level and internal finished floor level decreased markedly. Currently, the general NZS 3604:2011-stipulated minima are 150 mm above permanent paving or 225 mm above unpaved ground. Many of the adjacent outdoor living spaces became concrete patios, sometimes tiled, instead of suspended timber decks.

> As always, junctions remain one of the most important areas that we must take care with during both design and construction.

Weathertightness with level access

When level threshold access is required between interior rooms and external patios, weathertightness must still be maintained. This can be achieved by creating a physical gap between the two structures, but currently the most common solution is installing a channel drain across the face of the door unit.

There are several proprietary drainage systems available in the market that provide compliant drainage solutions for this situation and are accessible and safe for all users, including disabled or elderly. Most are designed to be compliant with Building Code Acceptable Solution E2/AS1.

E2/AS1 7.3.2 lays out a comprehensive solution for level access between a reinforced concrete floor slab and an adjacent exterior patio or paved surface. It includes a drained channel – maximum length of 3,700 mm – across the door opening, with a minimum width of 200 mm and minimum depth of 150 mm with 1:200 minimum fall discharging to the surface water drainage system via a sump.

Removable grating should have gaps sized to prevent the wheels of wheelchairs or mobility aids being trapped and be supported independently of the door frame. The exterior patio/paving shall have a minimum fall of 1:40 away from the channel, and be in accordance with Building Code clause E1 *Surface water*. This is clearly illustrated in cross-section Figure 17B of E2/AS1.

Achieving minimum clearances

So far, so good, but the next issues to address are the minimum clearances prescribed for the external cladding system relative to the internal floor slab level and to the adjacent external ground level – in this case, the patio or paved surface.

The base of the external cladding system must extend 50 mm below the internal finished floor level/bottom plate of the timber wall framing. At the same time, the cladding must finish a minimum of 100 mm above the external paved surface.

Nib wall around perimeter of floor slab

In the past when I struck this situation, I designed a 150 mm high concrete nib wall to the external perimeter of the concrete floor slab of the house (Figure 1). This allowed the internal floor to remain at approximately the same level as the adjacent patio but enabled the adjacent wall framing bottom plate and external cladding to be lifted higher to comply with the clearance criteria.

(Note: this is an Alternative Solution and subject to acceptance by the BCA.)

In recent conversations with other architect colleagues, I found they are still using the same or a similar solution to this quandary – albeit with institutional buildings.

We agreed that it is technically possible to box up and pour the nib wall concurrently with the main slab. We also agreed it remained difficult to get a tidy internal nib/slab junction and to obtain a high-quality float finish up to the nib and that no contractor would thank us for detailing it this way!

Nib wall in separate pour

To pour the nib wall separately, the greatest risk remains the ongoing weathertightness of the nib/slab junction. When I undertook this exercise many years ago, I researched what options were available, and there were many. I settled on a proprietary product used for slab bonding.

The foundation and slab were poured initially, then the perimeter edge was scabbled to form a strong key. We applied an epoxy grout and bonding agent, then boxed and cast the nib wall on top.

The project was a new-build Hawke's Bay country homestead, and I phoned the owners to see how it had fared. They kindly undertook a thorough inspection and reported back that, after 12 years, it was still like new, with no sign of deterioration or water ingress at all – phew!

Other options

My architect colleagues also discussed the various systems they had used over the years with their institutional projects, but the fundamental issues and solutions remained much the same.

They always use 140 mm timber wall framing now to enable the nib wall to be wider and more stable and so the framing can overhang slightly. They also often utilise a PVC water bar in conjunction with the chemical waterproofing/bonding agent. We all seem to have our favourite, tried and true brands that we trust and use, but they all claim to do the same job.

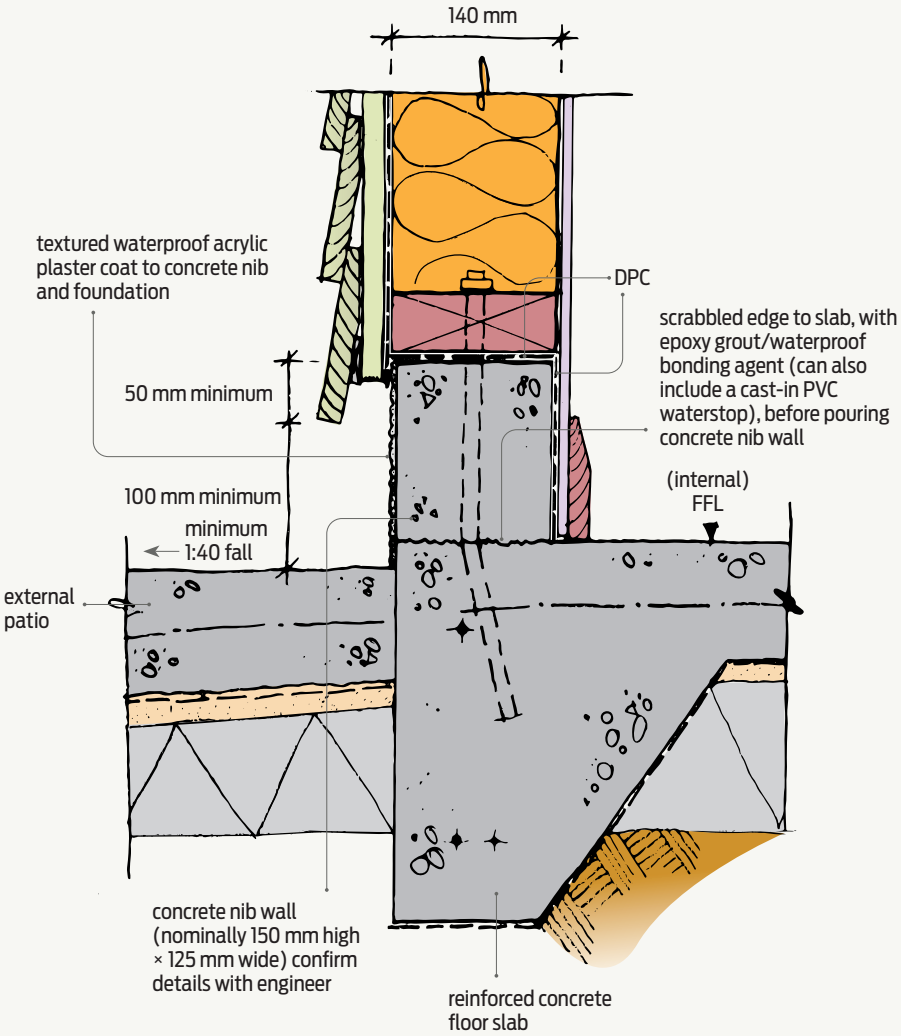

Figure 1 **Concrete nib wall cross-section.**

Detail that needs robust design

While it is beneficial to have level threshold access, we are fighting with the physics of nature. External water will always be trying to penetrate the building, and it will not always be obvious or visible, so the barriers we design and provide must be robust.

What do you do? Let us know

This is a topical subject with many practitioners cautiously refining these details so they can have confidence that their buildings remain weathertight. We are interested in any comments or feedback on how other architects, designers or builders may have dealt with this specific issue.

As always, junctions remain one of the most important areas that we must take care with during both design and construction.

Note **Please send comments or feedback to Bruce.Sedcole@branz.co.nz.**