



**Sean Butler** draws on his past experience as a civil engineer to dispense tips on the correct placement of steel reinforcements

Before I was a landscaper, way back in the Eighties, I worked in civil engineering. One of my favourite jobs was being a steel fixer. It was very hard and dangerous work, but I liked the challenge of creating a perfect steel layout from a set of drawings that looked like a computer wiring programme. I was in charge of the largest section of the Limehouse Link tunnel. We built, in steel rebar, the most technical steel-reinforced roof construction ever created, and consequently formed the biggest single-poured concrete structure in the world at that time.

My knowledge of rebar construction has enabled me to overcome many problematic situations when constructing gardens – so here are a few tips on how to fix rebar.

Although steel fixers will place the reinforcing steels on larger projects, most contractors do carry out some reinforcement. Getting it in the right position and keeping it there during concrete placement is critical to the structure's performance. Reinforcement should be placed as shown in the drawings.

#### Cover

One important reason that the reinforcing steel must be placed properly is so that the right amount of concrete cover is achieved – concrete cover being the amount of concrete between the reinforcing steel and the surface of the concrete member. Cover is the single most important factor in protecting reinforcing steel from corrosion, and is also necessary to assure that the steel bonds to the concrete well enough to develop its strength. The requirements for minimum cover are usually listed in the project specifications, or shown on the drawings.

- Typically, for concrete cast against and permanently exposed to earth, such as footings, 75mm is the minimum.
- For concrete exposed to weather or earth when using 12mm bars and larger, 50mm is the minimum.
- For 6mm bars, 40mm.



# NERVES OF STEEL

#### Positioning

What's important to remember is that the design of the structure is based on the steel being in the right place. Incorrect placement can – and has – led to serious concrete structural failures. For example, lowering the top bars or raising the bottom bars by 12mm more than that specified in a 150mm deep slab could reduce its load-carrying capacity by 20%.

## “INCORRECT REINFORCING STEEL PLACEMENT CAN – AND HAS – LED TO SERIOUS CONCRETE STRUCTURAL FAILURES”

Placing reinforcement on top of a layer of fresh concrete and then pouring more on top is not an acceptable method for positioning – you must use reinforcing bar supports, which are made of steel wire, precast concrete, or plastic. Chairs and supports are available in various heights to hold specific reinforcing bar sizes and positions. In general, plastic accessories are less expensive than metal supports.

When tying bars, there is no need to tie every intersection – every fourth or fifth is normally sufficient. Remember that the tie contributes no strength to the structure, so more are necessary only when the steel might become displaced during concrete placement. Be sure to keep the ends of the tie wires away from the surface of the concrete, where they could rust.

When you are unsure of a garden's history and areas of paving may be at risk of subsidence, always consider using reinforced steel concrete as the base to lay paving onto. A simplified steel fixing solution can be achieved by using mesh, which comes preformed in varying grades:

- A393 10mm bars
- A252 8mm bars
- A193 7mm bars
- A142 6mm bars

A142 is commonly stocked by large builders' merchants. It can be used in two layers, separated by either a metal chair, if available, or a small piece of broken concrete 100mm thick. Old council paving slabs are ideal replacements for steel chairs when broken up into small pieces.

If paving over old ponds, swimming pools or any other voids, always use steel to create a reinforced concrete slab to work on. The slab should extend beyond the footprint of any voids by at least 500mm.

Always be confident in creating solutions to problems – now go and get fixing!

#### ABOUT SEAN BUTLER

Sean Butler is a landscape designer and director of Cube 1994. With a background in civil engineering, Sean has an in-depth understanding of the design, construction and maintenance of the physical and naturally built landscape.  
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