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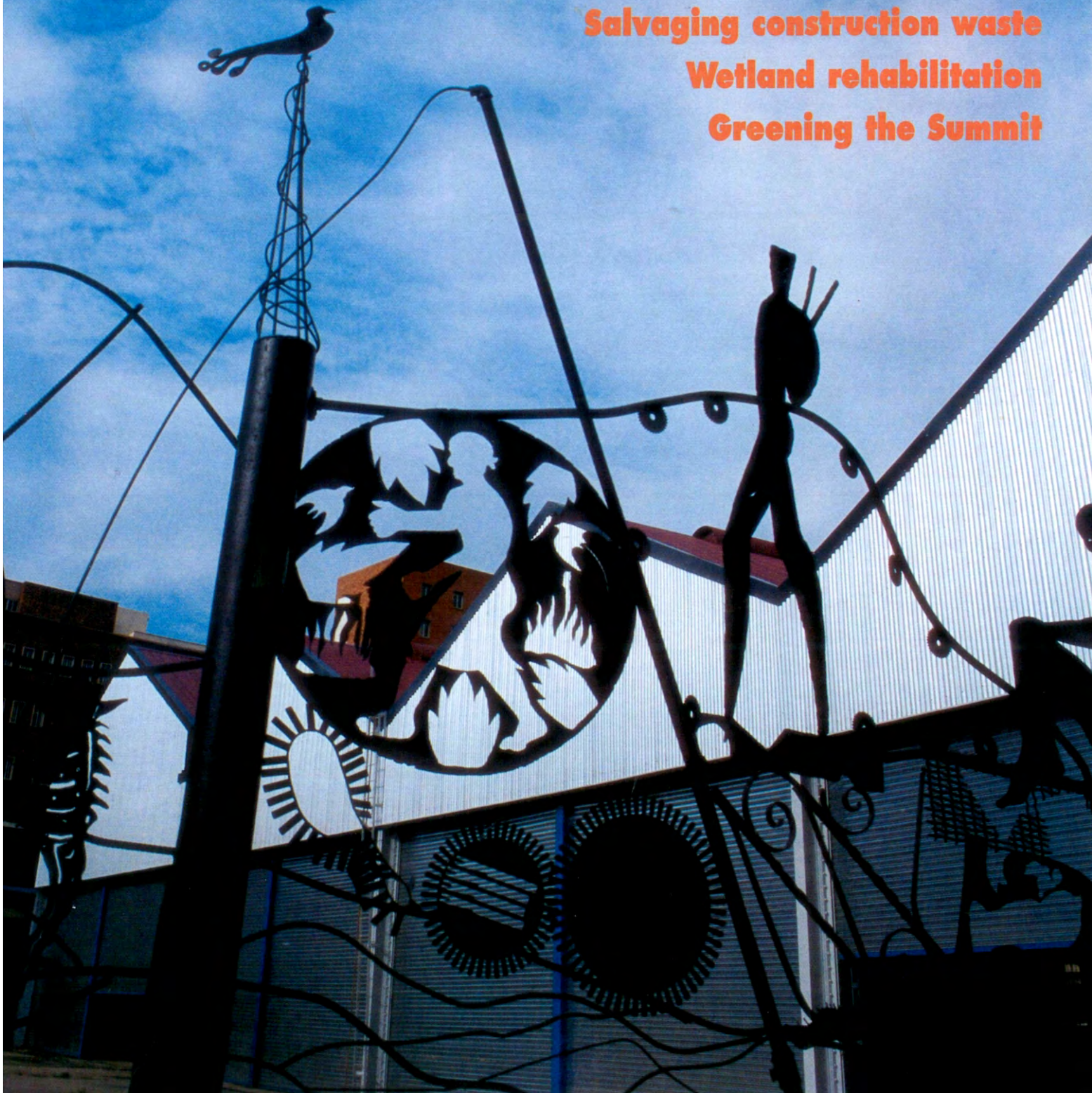

Studio Equilibrium

– from discard construction materials

Above: The studio is built from steel frames that had been used to provide temporary support in another construction project and were to be scrapped.

Left: Half of the fixed wall panels are glass and with the large opening sections, which provide for generous ventilation, this transparency opens the studio space to the garden.

***Architects Sue Clark and Jens Jüterbock of the practice Equilibrium, designed and built their suburban studio in Pretoria largely using materials that were to be discarded from other construction sites – either to be scrapped and recycled or dumped as waste. This project points to an opportunity for systematising the collection of such cast-offs for use in other buildings. Sue Clark described the project for* Urban Green File.**

Often two problems can resolve themselves in a mutual solution. This is how it happened for Equilibrium. The first problem was a mass of steel sub-frames which had been used to support the window openings in a large office building during its construction and, with the project completed, they were due to be dispatched to a scarp yard. Although this provides for the steel to be recycled, only a fraction of the expense of the steel, the labour, and the energy spent in manufacturing the sub-frames is recovered. The second problem was that with a small home, a six-month old son and a range of hobbies, in addition to our architectural work, we were running out of space. A separate studio could accommodate the wood and steelwork, pottery, painting and sculpture, and take the noise, heat and mess that these activities generate away from the dwelling area.

The studio was designed as a simple, uniform space to suit the module determined by the steel subframes, which measure 1,2m by 1,39m. The frames are fabricated from 75 by 25mm rectangular tube, with diagonal bracing of 25 by 25mm square tube. Of the 87 frames collected from the construction site, 83 were used, welded edge to edge to form the wall- roof- and door-frames of the studio. Additional steel had to be bought for bracing, roof purlins and for the construction of frames for working surfaces, shelves and drawer units. Standard steel window sections (F7 and T13) were also bought, to provide closed and opening sections in the wall frames.

Glass had previously been rescued from a reconstruction site, before being consigned to the dump, and had been kept in storage with the prospect of a studio on the horizon.

Construction began with the casting of the reinforced concrete base slab, 4,5 by 12,72m. The wall frames were then erected: the bottom row of sub-frames was secured to the slab edge with anchor bolts and the second row welded to the base frames to create a wall height of 2,4m. Thus a long rectangular 'box' of frames was constructed, with gaps left where doors were to be fitted.

The roof structure was fabricated on the ground. Each arched truss comprises five of the 1,2 by 1,39m braced frames. These were held in

The framework is closed with glass (salvaged from another site, before being dumped) and fibre cement panels (also salvaged), reinforcing the rhythm of the steel frames with solid and void sections along the elevations.

Corrugated iron roof sheeting proved sufficiently flexible to follow the arch of the roof structure and generous overhangs shade the interior from direct sunlight.

position on a jig and welded together before being lifted manually onto the top of the walls and there welded into place. At this stage the studio resembled a jungle gym.

F7 steel sections were welded into the wall frames that were to be glazed or closed with fibre-cement panels. Some of the fibre-cement boards had also been retrieved as discard material from a different construction site. They suited the studio design in that they could be cut to size to sustain the rhythm of the steel frames and they offered a lightweight means of wall closure, providing, at the same time, a degree of thermal insulation.

For the ceiling, damaged stock and off-cuts of insulating board, that would otherwise have been discarded, were sourced from a supplier. The ceiling boards were cut to size and simply dropped into each subframe of the roof structure. Corrugated iron roof sheeting, which was bought new, was then fixed to the structure and once it had been secured to the purlins flexed perfectly to the roof form. The sheeting is sized to provide generous eaves on all four sides of the building, shading it from direct sunlight. The roof appears to float over the studio as the supports from the wall frames are recessed and the gap is closed with glass, creating a narrow clerestory ribbon window.

Opening windows are hinged at the top edge and fitted with long stay-rods that allow them to be opened to an almost horizontal position, so providing for generous ventilation. Half of the fixed wall panels are glass and, with the large opening windows, this promotes a sense of being in the garden while working in the studio.

In the interior, 18mm thick pine shutter-board, which is most economically priced, is used, varnished, for work surfaces, solid shelves and cupboard doors. Weld-mesh racks do not catch dust and in a storage structure allow for everything to be seen, even if it is stored above eye-level. Drawer units are fitted with discarded ammunition cases which were salvaged from a site adjacent to one of the working sites where they had simply been dumped. They are ideal for heavy items such as tools and equipment and were found in a range of sizes and materials.

Electrical cabling is channelled behind removable shutter-board panels at dado height, to provide convenient connections for power tools, pottery kilns and similar. From this level cabling is also carried up to the neon light fittings and to a central row of industrial lamps, which were found as rejects from yet another project.

Above: Weld-mesh racking provides for further storage where everything stored can be seen. Discarded ammunition cases are used in the drawer units.

Above right: Additional steel was purchased for the roof purlins and bracing, and to construct the frames for work surfaces, shelving and drawer units in the studio. The steel-float-screeded floor slab is finished with floor enamel.

Centre right: Varnished pine shutter-board is used for work surfaces, solid shelves and cupboard doors, and to close the cabling conduits that are channelled along the structure at dado height.

Bottom right: While the neon light fittings are new, the yellow industrial shades used in the central row of lighting were rescued as rejects from another project.

All steelwork is painted battleship grey and this latticework is brought into relief by the glass and the warmer grey and mauve colours of the fibre-cement panels.

Even in the garden, precast concrete fence panels, that were saved when the boundary wall of a nearby property was demounted, have been reused as paving slabs on the paths that surround the studio and provide access to it. Again this demonstrates use of a waste material that would otherwise have had to be removed, at a cost, and would have taken up landfill space.

The Equilibrium Studio was built on weekends over the course of a year. All materials were transported by bakkie and no heavy plant or equipment was required in construction, all of which was done manually.

Reported by Sue Clark, with an introduction and comment by Leigh Darroll

Photographs by Gideon Verwas and Richard Clark

A construction waste salvaging system?

Clark points out that the kind of discard materials salvaged for this project are typically incorporated into the costs of larger building projects and, where they are required for temporary use, or judged unfit for purpose, they are often simply scrapped or dumped. This in itself incurs costs of on-site storage, transport and waste, amongst others. For this reason, as well as for considerations of sustainability and the environment, it makes sense to retrieve and reuse such materials wherever possible. Could a practical system be established whereby building materials designated for the dump or the scrap yard could be pooled at a central site (or series of sites) and from there sold on to wherever they might best be put to use? Surely this is a resource that could be used more efficiently?