MATERIAL NOTE 01

On the durability of GFRC

Almost every family asks the same question before they commission a memorial: *is it going to last?* It is the right question. This note answers it plainly — what the material is, how it behaves against ordinary concrete and against granite, and what it can be shaped into that stone cannot.

Formed, not cut.

CONTENTS

GLASS-FIBRE REINFORCED CONCRETE
CONKRETE STUDIO · DURBANVILLE · CAPE TOWN
CONKRETE.CO.ZA

THE MISUNDERSTANDING

It is not the concrete you are picturing

When people hear *concrete* they picture a driveway: grey, coarse, poured over steel bars, and cracked within a decade. That material and ours share one ingredient — cement — and almost nothing else.

What we cast is **glass-fibre reinforced concrete**, or GFRC. It was developed in the 1970s for architectural cladding, precisely because ordinary reinforced concrete was too heavy, too thick and too short-lived for the job. It is a mineral composite: a fine, dense cementitious matrix carrying millions of alkali-resistant glass filaments dispersed through every millimetre of the section.

The reinforcement is not a cage buried in the middle of the piece. It *is* the piece. That distinction is the whole answer to the durability question.

> There is no steel anywhere in it. That single fact accounts for most of the difference.

01 **Portland cement matrix**
Low water-to-cement ratio, cast dense. Far less porous than site-poured concrete, so far less water gets in.

02 **Graded silica sand**
Fine aggregate only. No stone, which is what gives the surface its close, honed texture rather than a rough cast face.

03 **Alkali-resistant glass fibre**
Zirconia-bearing AR glass, engineered to hold its strength in a high-pH cement environment across the material's service life. Ordinary E-glass would not.

04 **Acrylic polymer & admixtures**
Improves curing, toughness and long-term strength retention, and lowers permeability further.

05 **Mineral oxide pigment**
Colour is in the body of the material, not a coating on it. There is no paint layer to fail.

Why ordinary concrete fails

Reinforced concrete almost never fails because the concrete gives up. It fails because water and chloride reach the steel inside it. Rusting steel expands to several times its original volume and splits the concrete off from within — **spalling**. Once it starts, it does not stop.

Remove the steel and the mechanism cannot begin.

MEASURED AGAINST ORDINARY CONCRETE

Thinner, lighter, and several times stronger in bending

A memorial is not loaded in compression, which is the one thing plain concrete is good at. It is loaded in *bending* — wind on the cross arms, a knock from a mower, the ground shifting under one corner of the base. Bending is where the two materials separate.

5–8×

the typical flexural (bending) strength of unreinforced concrete, on the same section

30mm

wall thickness doing the work of a 100mm steel-reinforced section, because no cover to rebar is needed

0

corrodible metal in the casting — no rust staining, no spalling, no expansion cracking

TYPICAL PROPERTIES — CAST GFRC AGAINST CONVENTIONAL CAST CONCRETE

	GFRC — WHAT WE CAST	CONVENTIONAL CONCRETE
Flexural strength (MOR)	20–30 MPa	3–5 MPa unreinforced
Compressive strength	50–80 MPa	20–40 MPa
Reinforcement	AR glass fibre through the full section	Steel bar or mesh, locally placed
Dominant failure mode	None inherent; fibres bridge micro-cracks	Rebar corrosion → spalling
Behaviour on impact	Tough. Yields and holds together	Brittle. Cracks propagate freely
Water absorption	Low — dense, polymer-modified matrix	Moderate to high, porous
Minimum viable section	12–30 mm	75–100 mm (cover to steel)
Density	≈ 2 000 kg/m³, cast hollow	≈ 2 400 kg/m³, cast solid

What the fibres actually do

Cement is strong when squeezed and weak when bent — the tension face opens first. The AR glass filaments run in every direction, so a crack that wants to open has to break millions of individual fibres to travel anywhere. In practice it stops.

LIFESPAN

Designed for a hundred years, with fifty already on record

GFRC is not a new or experimental material. It has been used as structural cladding since the mid-1970s, and panels from that first generation are still in service on facades across Europe, the United Kingdom and the Middle East — through five decades of rain, UV, salt and thermal cycling, on buildings that are inspected and certified.

We specify our memorial work to a **100-year design life**. That figure is not a warranty period; it is the exposure standard the material is engineered and proportioned to, the same way a bridge or a facade panel is specified.

> Nothing in the material is on a clock. There is no paint film to fail and no metal to rust.

The Western Cape is a demanding place to put anything outdoors: salt-laden wind off the sea, hard summer UV, a hundred cycles a year of hot day into cold night. Those three things are exactly what destroys steel-reinforced concrete, and exactly what GFRC was developed to survive.

ON RECORD

1970s — Developed
Alkali-resistant glass fibre is developed for use in cement, and GFRC enters service as architectural cladding.

1980s — Standardised
Early unmodified mixes proved variable over time. PCI and the GRCA respond with design and testing standards mandating polymer modification and AR-glass content — the specification we cast to.

2020s — Still standing
First-generation panels remain in service after fifty years of weather, on buildings under periodic inspection.

Today — Our specification
Memorial work proportioned, cast and sealed to a 100-year design life.

What actually changes over time

Honestly: the surface, slightly and slowly. A cast mineral surface takes on a patina as limestone does — it settles into its setting rather than staying showroom-new. Through-body pigment means that patina is a softening of tone, not a coating peeling off a substrate. Lichen will find any stone in a damp, shaded cemetery; on a sealed GFRC surface it sits on top and washes off rather than rooting in.

What we ask of the family

Very little, and none of it urgent. Rinse with clean water and a soft brush when you visit. No acids, no chlorine-based cleaners, no pressure washer — the same rules that apply to natural stone.

We re-seal on request, roughly every eight to ten years: a half-hour job done in place, and the only maintenance the piece will need. Damage can be repaired *in situ* with the same matrix and pigment. Granite, once chipped, is chipped permanently.

MEASURED AGAINST GRANITE

Granite is cut away. This is formed.

Granite is an excellent material and we will say so plainly. But every granite memorial begins as a block and ends as whatever is left after material is removed — and that one constraint decides everything it can be.

CAST GFRC AGAINST QUARRIED GRANITE — MEMORIAL CONTEXT

	GFRC	GRANITE
Method	**Formed — cast to a mould, additive**	Cut — sawn and carved, subtractive
Flexural strength	**20–30 MPa, fibre-toughened — holds together at slender sections**	10–20 MPa, brittle — fractures along the grain
Hollow forms & chambers	**Standard — cast in**	Not practical
Undercuts, curves, negative space	**Free — a mould question**	Severely limited, and costly
Colour & texture	**Specified — any tone, honed to weathered**	Whatever the seam yields
Repair of damage	**Patched in situ, matrix and pigment matched**	Permanent — the block is gone
Origin	**Cast in Durbanville**	Quarried, often cut abroad

Shapes granite cannot hold

- Thin curved planes at a 30mm wall
- Hollow bodies with sealed chambers
- Lettering cut *through* the piece
- Planting recesses and vase voids
- Undercuts and cast-in bronze or glass

For us these are a mould drawing — which is why complexity costs far less here than the same complexity carved out of stone.

A TYPICAL CROSS — PART SCHEDULE

01	**Base slab**	700 × 550 × 140, solid
02	**Pedestal**	750 h, tapered **hollow, 30 min wall**
03	**Cross**	800 h · 500 span · 150 sq, on a concealed spigot
04	**Ash door**	150 × 200 stainless, lockable

Four parts, dry-assembled, about 1700mm overall. In granite that pedestal would be a solid block — the ash chamber could not exist. Every piece is drawn to the family's brief; these are representative sizes, not a fixed model.

IN SHORT

A memorial should outlast everyone who stands before it

That is the standard we hold the material to, and it is why we cast in GFRC rather than pour concrete or buy in cut stone.

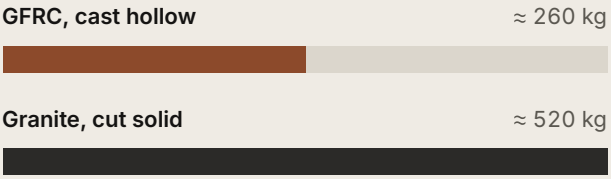
It is several times stronger in bending than the concrete it is confused with. It contains nothing that can rust, so the single failure mode that ruins concrete memorials cannot begin. It has fifty years of service record behind it and is specified to a hundred. It weighs about half what the equivalent granite would. And it can be given a form that no block of stone would survive being cut into.

What we will not claim

It is a hard mineral material, not an indestructible one. A deliberate strike with a steel tool will mark it, as it would mark granite. Fine surface crazing is possible on a cast face over many years and is cosmetic, not structural. It is cast, not quarried — it is honest about being made.

The difference is that every one of those things is **repairable in place**, by us, in the same material it was made from.

ASSEMBLED WEIGHT — A CROSS OF THAT SIZE



Half the weight of the equivalent cut stone — which means a lighter foundation, a gentler installation on the grave, and no crane on a cemetery lawn.

If there is any part of this you would like to go through in person, bring the question to the studio. We will put a test section in your hands and you can decide what you think of it.

STUDIO

Durbanville
Cape Town
By appointment

SPEAK TO US

+27 84 587 5536
info@conkrete.co.za

ONLINE

conkrete.co.za
/work · memorials
/care

NOTES ON THE FIGURES

Property ranges are typical published values for polymer-modified, premix and sprayed GFRC, and are drawn from PCI MNL-128 *Recommended Practice for Glass Fiber Reinforced Concrete Panels*, the International Glassfibre Reinforced Concrete Association (GRCA) specification, and BS EN 1169 / EN 1170. Granite values are typical ranges for dimension stone; individual seams vary. Comparative weights are calculated for a representative memorial cross of about 1700mm overall: a cast volume of roughly 0.120m³ at 2200kg/m³, against the same form cut solid from granite (0.195m³ at 2700kg/m³). Figures for any given piece are confirmed once its drawings are settled.