

River Rock Home NSW

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This case study was written at the time when InfraBuild (formerly Liberty OneSteel) was part of OneSteel. In that context, in some instances within this case study reference may be made to OneSteel.

TOUGH SITE MADE EASY

RESIDENTIAL



DEVELOPMENT

Construction of Residential Home

ARCHITECT

Ashley Talbot Architects

ENGINEER

Northrop Holmes

BUILDER

Eddie Bryant & Sons

STEEL FABRICATION & ERECTION

Austfab Pty Ltd

RIVER ROCK HOME:

In this example, a wide range of DuraGal® sections and shapes featured significantly, and provided for an efficient and aesthetic design option for the construction of a residential home on a difficult and challenging site at Brooklyn, NSW.

As a result of the efficiencies in design, construction and materials, land once thought unsuitable, or uneconomic for residential home construction, can be made available for development.

“DuraGal steel sections contributed towards a significant reduction in the overall construction cost and the time frame for the works. This was made possible through the use of efficient steel sections with a smooth ready to paint surface finish, close tolerances, and easy lightweight site assembly”
ASHLEY TALBOT, ARCHITECT



MAJOR BENEFITS OF USING

DURAGAL INCLUDED:

- All major steel components could be fabricated with DuraGal Sections.
- Termite resistance among the bush surroundings.
- Lightweight construction.
- Easily fabricated.
- Smooth in-line galvanized surface finish to provide corrosion resistance, and providing an excellent prepared surface for painting.
- Cost effective.
- Readily available.

INTRODUCTION:

“River Rock” is a state of the art architect designed home perched high among the treetops with panoramic water views over a tranquil inlet on the Central Coast of NSW. The innovative, split level home provides a tranquil escape from city living for its owners.

The predominant visual and physical feature of the site, is its irregular composition of descending terraces formed by massive sandstone shelves and random boulders that end as a broad, steep cliff face along the road boundary.

The construction challenges faced in this project are being increasingly faced as remaining building blocks in some areas pose more difficult design challenges and on-site logistics.

DESIGN BRIEF:

During the design stage, maintenance of the natural features of the site needed to be considered to meet Council’s planning requirements:-

- The rock shelves and boulders were to be retained, undisturbed, throughout the site.
- A ‘restriction zone’ prohibited construction within 7.5 metres of the road boundary.
- A “green corridor” to protect existing flora and fauna species restricted construction from the western half of the site. In general, trees were to be retained throughout the site.
- Bushfire mitigation considerations were to be incorporated in the design of the house.

These controls became the formative aspects of the design brief, and resulted in a situation where only half the actual property was available for building.

In addition, the clients design brief also required:-

- Cost effective construction.
- Lifestyle compatibility.
- Spatial efficiency.
- Climatic control.

Given the narrow constricted segment of land, the building form chosen was a series of regular, off set room modules enabling the house to step around and bridge over the natural rock formations. This provided the low environmental impact required on the site while delivering all of the key features of the design brief.

STRUCTURAL DESIGN:

Due to the Council's conditions of minimising disturbance to the site, a strong lightweight steel frame building was seen as the best solution.

"We have specified DuraGal Sections in a wide range of residential and commercial designs. The inherent features of DuraGal, together with its ease of integration with other building materials, means we are able to design cost effective solutions"
 Jamie Shelton, Structural Engineer, Northrop Holmes.



DuraGal Hollow Section grade C450L0, 90 x 90 x 2.5 SHS for both the full height and up to floor level columns (standard bottom footing plates and bracing sets from the DuraGal Flooring System were used).



DuraGal Channel grade C450L0, 150 x 75 x 5.0 & 200 x 75 x 5.0 / 6.0 were used for the main floor and roof support members, with DuraGal SHS grade C450L0 65 x 65 x 5.0 for the stub columns.



DuraGal CHS sections were used for the roof and floor bracing struts.

DuraGal Angle grade C450L0, 75 x 75 x 5.0 was used for bracing the taller building columns.



DuraGal Rail (a flat sided oval) is available in several sizes, the 120 x 48 x 2.0 Rail section was used for the upper handrail on the decks and entrance area.

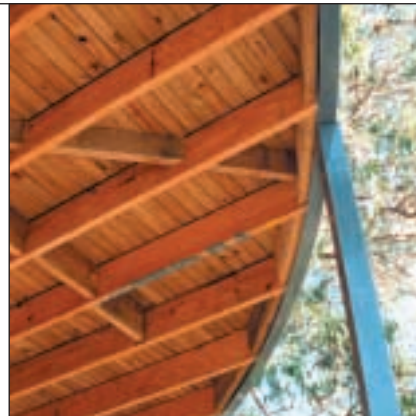
This was rolled through the same 12 metre radius as the 200 x 75 x 5.0 Channels used for the three decks.

DuraGal Angle grade C350L0, 30 x 30 x 2.5 was used for the balustrade bottom rails and used back to back for the vertical posts.

DuraGal Flats grade C400L0, 5 & 6 mm thick were used to prepare cleats, closure plates and channel connection plates.

Attaching the timber deck joists was achieved by notching the ends of the 200 x 45 joists, and locating them between the curved and inward facing DuraGal Channel flanges.

(Timber blocking was placed between the ends of the joists).



A waterproof membrane was then placed over the timber joists prior to attaching the decking.

At the house bearers, the deck joists were attached using standard joist hangers screwed to a timber beam bolted to the DuraGal Channel.

FABRICATION:

Brookvale based steel construction company, Austfab supplied and erected the fabricated steel components.

The shop fabrication involved roll forming, welding, drilling and flattening operations. These are all common processes used throughout the steel fabrication industry.

The majority of the DuraGal sections used on this project are manufactured to the higher tensile steel grade of C450L0. Austfab Managing Director, Geoff Blackburn, advised that DuraGal was as easily fabricated as the traditional hot rolled sections.

SITE ERECTION:

Ease of handling was imperative. The rugged inaccessible terrain with extensive tree canopy prevented the use of cranes. The building also required connection integration with some timber members and the prefabricated wall and glazing panels.

The lightweight, thinner DuraGal sections provided easy handling and positioning on site. The thinner sections meant that drilling on site was possible for the bolted connections.

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“Using DuraGal sections resulted in an easy to assemble construction project”.
EDDIE BRYANT, BUILDER.



Other connections involved standard Tek screws. This enabled the secondary wall and floor framing to be fixed on site, without the need for complex co-ordination of holes on the shop drawings.

Many of the columns bolted directly onto prepared existing rock surfaces, and underpinned where required, or bolted to small pad footings. The design used modular construction to minimise the number of on-site construction activities as well as the amount of building materials delivered to site.



The dimensional accuracy of the steel frame enabled pre-fabricated wall and glazing panels up to 4 metres in width to fit easily and accurately within the steel members, and provided an inherently stiff and

structurally efficient main frame structure for the floor, wall and roof structures.

Builder, Eddie Bryant, found the ease and speed with which the DuraGal steel frame came together, has convinced him that this was one of the most economical options available for irregular and elevated sites.

COATINGS:

The smooth in-line galvanized surface finish provided an ideal surface for the subsequent paint finishes applied to the exposed steelwork on both the external and internal surfaces.

1.0 Weld repair preparation and application:

Power tool clean the new welds to AS 1627.2^[1]

GALMET™ Cold Galvanizing, Zinc rich (92% Zn in dry film) Polystyrene coating^[2] applied to finish at 50 - 75 µm DFT. (Dry Film Thickness).

2.0 Primer & top coat preparation and application:

All surfaces were thoroughly cleaned prior to applying the primer and topcoats.

Primer - GALMET™ Keytite Primer^[3] one pack epoxy primer applied 10 - 15µm DFT over weld repair primer and DuraGal surface.

Top coat - GALMET™ Rustpaint^[4] one pack epoxy modified high gloss enamel. Two coats, each of 40µm DFT were applied to the DuraGal surfaces on both the inside and outside of the home.

1.0 Notes on painting and corrosion topics:

1.1 Reference should be made to the coatings manufacturers prior to the specification and application of these coatings.

1.2 Refer also to the DuraGal Easy Painting and Corrosion Protection Guide.

REFERENCES:

[1] AS1627.2 Metal finishing - Preparation and pretreatment of surfaces Part 2: Power tool cleaning of metal surfaces.

[2],[3],[4] ITW Polymers & Fluids Pty Ltd. Sydney, 02 9757 8800



ACKNOWLEDGMENTS:

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FURTHER INFORMATION:

DuraGal literature for residential construction:

DuraGal Flooring System
DuraGal Post
DuraGal Easy Painting and Corrosion Guide
DuraGal Plus for Lintels

To receive copies of these publications contact:

OneSteel Direct
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