InfraBuild

Kennards Self Storage Adelaide

July 2002

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.

PROVEN PERFORMER

STORAGE

CLIENT
Kennards Self Storage

DEVELOPMENT
Building Conversion

BUILDER
Total Construction Pty Ltd

ENGINEER
Bryant Concepts

Kennards Self Storage is a major Australian company with many years experience in the building and developing of storage facilities throughout Australia. One of Kennards latest development projects was the conversion of an existing building in Adelaide, South Australia into a major self storage facility.

As with most mezzanine floor constructions, there are often specific client demands for site flexibility and ease and speed of installation at a competitive cost.

Based on the highly successful DuraGal Flooring System, DuraGal Sections featured significantly in the discrete design that won out against established competition.

"The simple nature of the connections and mechanical fasteners meant that the overall construction of the mezzanine floor was straightforward, and easily handled by the installation crew"

Steve Taylor,
Managing Director,
Total Construction Pty Ltd.

The In–ine hot dip galvanized surface of DuraGal, and the use of efficient section shapes, frequently results in a reduction of the overall mass and ultimately the cost in materials and coatings.

So successful was the application of DuraGal Sections in this application, Total Construction Pty Ltd have used them on other projects with good results.

MAJOR BENEFITS OF USING DURAGAL INCLUDED:

- Being cost effective.
- All major components were fabricated with DuraGal Sections.
- Modular System, able to fit in with specific site requirements for spans and predetermined storage compartments.
- Lightweight construction.
- Adjustable fittings to accommodate irregularities in slab height.
- Faster fabrication by eliminating the need for third party protective coatings.
- The elimination of dust collection surfaces and pathways for vermin that can occur with open sections in large storage systems.

INTRODUCTION:

The builder, Total Construction Pty Ltd, was established in Sydney in 1994, with offices in Victoria, South Australia and Western Australia. The company is involved with specialised design, construct and management service for major national companies.

The building being converted into a two storey self storage facility provided many challenges during the initial development proposal.

DESIGN BRIEF:

The plan involved two levels of storage. The first level was located on the existing concrete slab. Above, a new 1840 square metre mezzanine floor rated at 5 kPa live load was to be constructed.

The supporting columns were to be placed within the walls of the ground level storage compartments which differed in size throughout floor area.

Kennards Self Storage needed the total flexibility that would allow the size of the storage areas to be changed by removing or relocating the wall partitions at any time in the future.

The nature of the existing building meant that the floor materials needed to be transported in through the roller doors of the building and this limitation suited a lightweight system.

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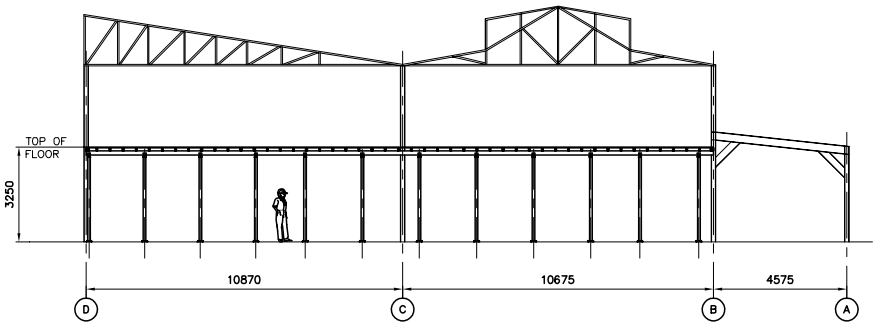


Plan and section elevation through building.

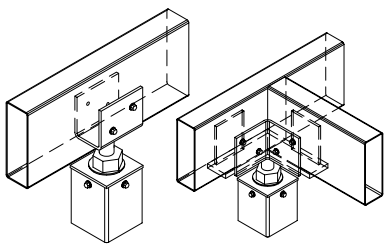
STRUCTURAL DESIGN:

Floor components:

DuraGal Hollow Section C450L0 SHS 90 x 90 x 2.0 was used for the columns, and most of the 390 columns used on this project were located within the walls of the individual storage modules.

DuraGal Hollow Sections C450L0 RHS, were used for the main floor members, 150 x 50 x 3.0 for the bearers, and 100 x 50 x 2.0 for the joists.

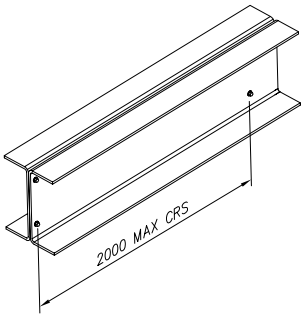
To allow ease of assembly and to assist levelling on the uneven slab, the DuraGal bearers were supported over the columns using standard adjustable top fittings from the DuraGal Flooring System.



In some areas back to back DuraGal Channels C450L0, ranging in size from 150 x 75 x 5.0 CC to 300 x 90 x 8.0 CC were used for the bearers for the larger spans over access areas.

OneSteel have developed and tested a new methodology for joining DuraGal Channels in a back to back configuration using high strength galvanized Tek screws.

This methodology was used for connecting the back to back DuraGal Channels.



DuraGal flats C400L0, 50 x 6 CF for spreader plates, and C350L0, 75 x 4.0 CF were used for part of the cross bracing arrangements.

The existing building structure was found to provide adequate earthquake bracing in the lateral direction. The structure was erected with portal frames attached to the main columns on one side of the building

to form a skillion just above the mezzanine floor. The portal rafters were joined to the columns with knee bracing as shown in the following photograph.

The longitudinal earthquake bracing for the mezzanine floor was achieved by incorporating double floor joists between the webs of the existing building columns, forming a compression strut.

Stairs and handrails:

DuraGal Channels grade C450L0, 230 x 75 x 6.0 CC were used for the stair stringers.

DuraGal Angle C450L0, 75 x 75 x 6.0 CA was used as the tred support brackets.

DuraGal Angle C450L0, 100 x 100 x 6.0 CA was used for the kickplate/handrail supports located around the voids for the stairwells.

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FABRICATION:

In this example, the need for welding on site was an exception to the rule. The use of simple connections means that in most cases the whole system can be assembled on–site without welding, using bolts and Tek screws.

The adjustable top fitting also provided ample allowance for variations on the slab height, making for the faster, more accurate levelling of the floor.

The lightweight, DuraGal Sections provided for easier handling and positioning on site. The thinner sections meant that drilling on site was possible, reducing the need for complex coordination of holes on shop drawings and the expense of beam line processing for bolt holes or welding of numerous cleats.

Using the standard galvanized internal joiners available for the DuraGal Hollow Sections enabled continuous spans over the full width of the floor.
These joiners also reduced any waste by utilising any useful offcuts.

The floor sheets were glued and screwed easily to the DuraGal joists. All the hollow sections were closed off with standard plastic caps to prevent entry by vermin.

COATINGS:

DuraGal sections are produced with a smooth hot–dip galvanized external surface that complies with AS/NZS 4791:1999[1] ILG100 and AS 4792:1999[2] ILG 100.

The zinc coating is applied in line at the time of manufacture, over a class 3 cleaned metal surface to AS 1627.4[3]. DuraGal Sections are ideally suited for use in non-aggressive environments such as this.

The external zinc coating is aesthetically pleasing, being smooth and spangle free. In this case, no additional coating was deemed to be necessary, apart from coating the fresh cut edges and weld areas with a suitable organic zinc rich paint[4].

As cold galvanizing paint dries to a matt grey, any repaired areas requiring an aesthetic finish were quickly restored to the original DuraGal finish by the spray pack application of Galmet DuraGal Silver[5] over the cold galvanizing paint.

REFERENCES:

[1] AS/NZS 4791:1999 Hot dip galvanized (zinc) coatings on ferrous open sections, applied by an in–line process.

[2] AS/NZS 4792:1999 Hot dip galvanized (zinc) coating on ferrous hollow sections, applied by a continuous or a specialised process.

[3] AS 1627.4:1989 Metal finishing–preparation and pre–treatment of surfaces.

[4] Dura Gal Easy Painting and Corrosion Guide.

[5] ITW Polymers and Fluids Pty Ltd Sydney.

ACKNOWLEDGEMENTS:

KENNARDS SELF STORAGE

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FURTHER INFORMATION:

The DuraGal Mezzanine Flooring System Guide is now available. Included are span tables for 3kPa and 5kPa live loads to cover applications such as mezzanine, commercial and storage.
To obtain your copy, contact: