

# LIFETIME WATERPROOFING AND PROTECTION FOR STRUCTURAL CONCRETE

**RADCON<sup>®</sup>**  
**FORMULA#7**



SHOPPING CENTRES  
SITE REFERENCES

# RECENT SITES OF INTEREST 2006

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**FIGURE 1.**

Top level of the Ferrara Plaza car park waterproofed with RADCON #7



### **RADCON Formula # 7 protecting the ground breaking shopping complex in Portugal – FERRARA PLAZA.**

The latest RADCON #7 application in Portugal was a car park area of the new "Commercial Theme Centre" – the Ferrara Plaza Shopping complex.

The project began in November 2006 and is the most significant construction in the Pacos de Ferreira region, from a communal perspective.

This entertainment and leisure centre will feature 130 stores, Carrefour hypermarket, 5 cinemas and a 1,400 space car park already waterproofed with RADCON Formula #7.

Thanks to the expertise of Exigencia e Estrategia, this mega complex is another entry on the high profile site reference list in Portugal.

#### **SITE DETAILS:**

COUNTRY	- Portugal
PROJECT NAME	- Ferrara Plaza
DEVELOPER	- Martifer Group
APPLICATOR	- Coala
SIZE	- 6,000 sq mtr

This 60 million Euro investment will feature a unique and ever changing display of furniture, design and decoration, representing the region's biggest industry. Its doors are due to open in August 2007.



# RECENT SITES OF INTEREST 2005

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**FIGURE 1.**  
The first Radcon Formula #7 waterproofed rooftop of a shopping centre in Saudi Arabia



### Radcon's debut in Saudi Arabia

Yet another remarkable introduction of Radcon waterproofing technology into a new territory - this time it is Saudi Arabia in the Ancient city of Jeddah.

This project, the first in this territory, was carried out by our Saudi colleagues, ISSAM KABBANI GROUP, covering a rooftop area of some 7,800 sq mtr, of a recently completed shopping centre.

#### SITE DETAILS:

COUNTRY	- Saudi Arabia
PROJECT NAME	- Shopping Centre Jeddah
OWNER	- Sheikh Saed Al Shoumaissy
CONTRACTOR	- Aziz Contracting Company
APPLICATOR	- Issam Kabbani Group
SIZE	- 7, 800 sq mtr

According to the Middle East Business and Finance News, Jeddah is a most important commercial and cultural gateway and is expected to increase the already booming shopping mall numbers in the upcoming years.

Well done to Issam Kabbani on winning such a strategic and important project!



**FIGURE 2.**  
Radcon Application



**FIGURE 3.**  
The new Jeddah shopping centre

## SHOPPING CURITIBA, BRAZIL

**Location:** Curitiba, Brazil  
**Builder:** Irmaud Construtora SA  
**Size:** 3,000 square metres  
**Applicator:** Lienge Netherland

As emerging markets like Brazil develop and stabilise, companies like Radcrete can make inroads in providing specifiers, builders and owners with new and reliable ways to waterproof concrete. A recent project was the Shopping Curitiba Centre in the city of Curitiba in the State of Parana approximately 400 kilometres South West of Sao Paolo.



FIGURE 8 - ROOFTOP

Curitiba is rapidly becoming a significant industrial centre in Brazil with several new greenfield car manufacturing plants and growing wealth.

Radcon #7 was applied to 3,000 square metres of flat concrete rooftop of which most was critical areas directly above the Food Hall. The roof has no fall lines and has

clusters of starter bars to allow for upward extensions in the future. These can be seen in Figure 8 encapsulated in the black pyramids. These starter bars created a detailing challenge to the applicator ~ Lienge Netherland. Being up to the task, Mr Luiz Hollanda successfully pond tested the site after application to the satisfaction of the client and builder.



FIGURE 9 - SHOPPING CURITIBA, BRAZIL

## NORWAY GAOL, NORWAY

**Location:** Ringerike Kretfengsel, Norway  
**Owner:** Statsbygg  
**Architect:** Torstein Ramberg AS  
**Engineer:** Berdal Stromme  
**Building Admin:** Kare Hagen AS  
**Main Contractor:** Veidekke ASA  
**Applicator:** Minihaller AS

This is a new prison outside the Norwegian city of Oslo. Radcon #7 was utilised to protect the top of the wall from the freeze/thaw damage. The Norwegian climate is very severe on concrete with freeze-thaw damage causing early deterioration. The prison wall is 1.1 kilometre long.

This is a very high security prison and is expected to house mainly international criminals, potentially people who commit crimes against humanity such as War Criminals.



FIGURE 10 - NORWAY GAOL



FIGURE 11 - RADCON #7 APPLICATION

## MAIA SHOPPING CENTRE, PORTUGAL

**Owner:** Sonae SA  
**Project Manager:** Cinclus SA  
**Builder:** Contacto SA  
**Architects:** Nuclarq SA  
Hellmuth Obata & Kassa Baum Inc, USA  
**Pre-cast Engineer:** Forjadus Castello (Spain)  
**Application:** Coala SA  
**Size:** 12,500 square metres

Portugal is going through a building boom centred around 'Expo 98' in Lisbon. Infrastructure works such as freeways, the large Vasco de Gama bridge, water treatment and supply projects (which are mainly EU financed) and private Shopping Centre developments are under construction.

The Sonae SA group, which is one of Portugal's largest enterprises, has built and owns a substantial portfolio of centres in Oporto, Lisbon and other major cities. Portugal seems to be one of the few countries in Europe that has really embraced the large US and Australian style of shopping centre.

The Maia shopping car-park is approximately 320m long and 40m wide. It is a pre-cast structure using Spanish pre-cast technology.

The 12,500 square metres is broken into 8 areas by approximately 500m of movement joints where **Texsa**<sup>®</sup> joint sealants were used.

The panels are pre-stressed approximately 250mm in thickness, overlaid by a 60-80mm thick topping, with crack control reinforcement. There was a significant amount of cold joints, some of which were of sufficient quality to seal with Radcon #7 alone, the remainder were hacked out and grouted.

The construction of this project was fast-tracked. This meant some of the site conditions were tough for the applicators,



FIGURE 12 - RADCON #7 APPLICATION

however that didn't inhibit the quality of the work. With a busy shopping centre development like this, the fact that other trades could use the car-park shortly after application was a point greatly appreciated by the Main Building Contractor, Contacto.



FIGURE 13 - MAIA SHOPPING CENTRE, PORTUGAL

## LAKE GARDA CAR PARK, ITALY

**Location:** Malcesine on Lake Garda, Trento District of Northern Italy  
**Applicator:** Tecnocoat Trento  
**Area treated:** 3 levels of car park  
**Size:** 6,000 square metres

The multi-storey car-park is located in the town on Malcesine on the shores of the famous Lake Garda in Northern Italy. It is a popular holiday area and is a great area for lake sailing and other boating activities. The car park is 3 levels, all of which was treated with Radcon Formula #7.

The reason the lower levels are treated is that in the northern part of Italy during winter there is snow and heavy use of de-icing salts. The cars carry this into the car-park and it melts leaving pools of salty water.

The ability of Radcon #7 to waterproof and resist chloride penetration helps to protect the decks from pre-mature deterioration from reinforcement corrosion.



FIGURE 14 - TOP DECK OF CAR PARK

# LIPPO KARAWACI SHOPPING CENTRE, JAKARTA

Developer:	LippoLand Development
Engineers:	PT Davy Sukamta & Partners - S PT Citra Serio Mandiri - M&E
Architects:	The Jerde Partnership, USA PT Airmas Asri
Builder:	PT Tatamulia Nusantara Indah
Rooftop:	65,000 sqm 46,000 sqm waterproofed with Radcon #7
Retail area:	100,000 sqm
Gross area:	14 Ha of land
Construction Cost:	US\$50-55 million

Faced with the challenge of waterproofing a 65,000 square metre rooftop, of which 46,000 square metres is concrete - as a consultant what do you do? The rooftop of Lippo Karawaci Shopping Centre is basically 4 department stores interlinked by one rooftop as best seen in Figure 21.

The situation. The shopping centre is to be built 2 levels high with the potential of any of the 4 anchor tenants adding another floor upon request. This dictates that the roof has to remain basically flat from one side to the other, and allow for easy addition of future levels. Traditional membrane with screeds were not appropriate as they would have to be removed before adding new floors. A trafficable membrane left exposed is a contradiction in terms over the long term and it too would require lifting before future levels were built.

Which is the 'right horse for this course'?

Due to the size and cost of the project, LippoLand played an active role in product selection. Finally Radcon Formula #7 was chosen after extensive meetings and presentations with the architects, engineers, builders and LippoLand. The reasons for selection of Radcon #7 for the largest flat concrete roof in Indonesia were: significant cost saving, relatively simple system reducing long term maintenance, able to withstand ponding water, completely trafficable, UV stable and construction of future floors to just go straight over the treatment with no pulling up of screeds or membranes.

The roof top was built with only a 120mm thick slab using 350kg of Ordinary Portland Cement per cubic metre. Naturally there were many construction joints which we requested were formed vertically and left exposed at the surface for easy treatment.

After the slabs had cured, Radcon #7 was applied directly onto the structural concrete with no topping or screed required. Radcon #7's ability to withstand large hydrostatic pressure was important considering the rooftop had no basic fall lines. To shed water from the rooftop, block out drains were installed at set intervals. Once the planned drain was jack hammered out, both the construction joint formed and the circumference of the fulgo inlet received a RX Waterstop from American Colloid as detailed in Figure 22 & finished in Figure 23.



FIGURE 22 - BLOCK-OUT DRAIN USING VOICLAY BX WATERSTOP AT JOINTS



FIGURE 23 - FINISHED BLOCK-OUT DRAIN

For Quality Control on site, areas were waterproofed in approximately 3,000 square metre sections. At the end of each application the area was bricked up and pond tested for a minimum of 24 hours. Mr A.J. Charles of PT Argacipta Cemerlang, our exclusive representative for Indonesia, can be seen here in Figure 24 inspecting one of the many pond tests.

Another significant benefit for TATA, the contractor, is that on such a large rooftop the down time on one area is less than a full day when using Radcon Formula #7. Basically an area is cleaned and treated with Radcon #7. Once the treatment has become touch dry (2-6 hours), it receives its first watering, a liberal hosing. When this watering is dry the area can be



FIGURE 24 - POND TEST



FIGURE 21 - LIPPO KARAWACI SHOPPING CENTRE, LIPPO VILLAGE, JAKARTA

## SUPA CENTRE, SYDNEY

**Engineer:** Hyder Consulting  
**Architect:** Mark Newton Architects  
**Main contractor:** Southern Cross Construction  
**Area treated:** podium deck  
**Size:** 4,500 square metres

Hyder Consulting Engineers recently specified Radcon #7 for the waterproofing of this podium deck at the Supa Centre in Homebush, Sydney.

After the Radcon #7 waterproofing treatment to the concrete was complete, the deck received a coloured trafficable coating. The area is now being utilised to display outdoor furniture.



FIGURE 37 - RADCON #7 APPLICATION

The product was applied with a team of applicators using back-pack spray units. Each spray unit can achieve an application rate of up to 150 square metres per hour enabling the waterproofing to be completed very quickly compared with



FIGURE 38 - SUPA CENTRE, HOMEBUSH

traditional membrane waterproofing systems. By specifying Radcon #7 for this project, no protective screeds or toppings were required to protect the treated concrete. The coloured trafficable finish was simply applied over the Radcon #7 for a durable surface.

## MELBOURNE CITY LINK - 'WESTERN LINK'

**D&C Contractors:** Transfield-Obayashi Joint Venture  
**D&C Sub-Contractor:** Boulderstone Hornibrook  
**D&C of all Foundations for Elevated Sections**  
**- Sub-contractor:** Wagstaff Piling

The 'Western Link' is part of the Melbourne City Link project. It forms a road connection between the 2 major arterial roads of Tullamarine Freeway and West Gate Freeway.

Part of the Western Link section involves the construction of 4.2 kilometres of elevated dual carriageway, which follows the Moonee Ponds Creek. To support the elevated road section of the project, Wagstaff Piling were responsible for some 4,500 concrete piles, a majority of which were pre-cast driven piles.

Radcon Formula #7 was chosen to increase the durability of the concrete piles. This was undertaken in order to fulfil the specific project design specifications in accordance with Austroads.

The product was applied to 268 pre-cast concrete piles which were driven into 16 locations in Area No. 5 - Moonee Ponds Creek, shown here in Figure 39.

Each pile was 400mm by 400mm with the upper 6 metres being treated with Radcon #7 at the manufacturing plant as shown here in Figure 40. The application was undertaken by Wagstaff Piling.

The Moonee Ponds Creek is a tidal stream with approximately one third the salinity of sea water. The piles in this area will be constantly exposed to 1-2 metres of flowing water. At the lowest tide this will be reduced to 200mm of water.

Radcon #7 was selected as an impregnation waterproofing product, being cost effective compared to a paint coating system, or a grouted sleeve application.



FIGURE 39 - PILES DRIVEN INTO MOONEE PONDS CREEK



FIGURE 40 - RADCON #7 APPLICATION

This additional assurance by treating the piles with Radcon #7 was undertaken to reduce corrosion as micro-cracking often occurs due to the impact of the pile driver.

# 1 UTAMA SHOPPING CENTRE, MALAYSIA ~ 46,000 SQM

Owner: See Hoy Chan Holdings Group  
Retail Planner: Semba Corp. Tokyo  
Architect: C.T. Architects  
Engineers: Perunding Talico  
Main Contractor: FNE OC Consortium  
Area treated: Rooftop car park  
Size: 46,000 sqm



As Malaysia's economy continues to record high growth figures under the leadership of Datuk Seri Dr. Mahatir with his 'Vision 2020', another massive shopping centre is completed. 1 Utama Shopping Centre seen here is Figure 12 is located in Bandar Utama Town Centre and poised to become the major commercial centre for Petaling Jaya.

Radcon Formula #7 was specified by project architect, CT Architect and the main contractor was made up of a joint venture between First Nationwide Engineering (FNE) and the Japanese contractor, Obayashi. The product was applied to 46,000 square metres of car park rooftop which made up part of the 2,600 car spaces distributed over three levels.

The original construction of this shopping centre involved massive amounts of poured in-situ concrete. To fast track the project, the design was altered to incorporate the use of precast panels.

With precast panels in place, a full structural topping was cast providing a stable concrete base. There were concerns during design and construction that vehicular traffic over precast panels had a high tendency to develop working cracks exceeding the abilities of Radcon #7. As the contractor was fully aware of this problem, tight design and control procedures were implemented during precast construction and installation.

Due to the size and importance of this project Radcrete provided full technical support and supervision of the major product applications to the rooftop car park. Figure 11 shows Radcon #7 being applied to the first stages of the shopping



FIGURE 10 - ONE OF THE CAR PARK SECTIONS



FIGURE 11 - RADCON #7 APPLICATION

centre. With the correct site preparation and large unobstructed areas of rooftop, application rates up to 4,000 square metres per day were achieved with one motorised spray unit.

The benefits of using Radcon #7 in this application are that the product waterproofs the structural topping leaving it completely trafficable, and increases the surface hardness meaning no requirement for a floor hardener.



FIGURE 12 - 1 UTAMA SHOPPING CENTRE, BANDAR UTAMA TOWN CENTRE, KUALA LUMPUR

## N3 SUPERBLOCK CAR PARK, INDONESIA

Owner: PT LippoLand Development  
Architect: Crone & Associates  
Engineer: PT Bitu Enercon Engineering, Bandung  
Main Contractor: Inti Surya - Wijaya Kusuma Contractors (JV)  
Applicator: PT Argacipta Cemerlang  
Area treated: Car park  
Size: 5,000 sqm

After the successful waterproofing of Lippo Karawaci Shopping Centre which included 65,000 square metres of Radcon Formula #7, the product was recently specified and applied to the nearby N3 Superblock Car Park.



N3 Superblock is a development comprising of 4 Towers of mixed commercial and residential components with a cross shaped car park/podium best shown in Figures 2. The towers to be located in the empty corners of the site will range from 28 to 33 levels. As these Towers are built, the car park will be raised by an additional 3 Levels to accommodate a total of 1,500 car spaces. Sydney based Crone & Associates are the architects for this project.

Radcon #7 was treated to the entire top deck of the car park which had developed a number of typical shrinkage cracks as seen in the insert of Figure 3. The cracks pass directly through the concrete slab and during application this caused Radcon #7 to leak through to the underside. To pond Radcon #7 inside the cracks, PT Argacipta Cemerlang wiped Ordinary Portland Cement along the soffit where the product was dripping through. Radcon #7 flash sets with the abundant Calcium ions in cement which creates a plug at the bottom of the crack.

Interestingly on this site the contractor had located the site sheds on the Ground Floor of the car park. When wind driven rain was blown into Level 1 which was untreated, leaks developed into the site sheds. Level 1 had only been treated with a floor hardener which has no crack bridging or waterproofing capabilities. PT Argacipta Cemerlang, were then called back to treat these areas with Radcon #7 to keep



FIGURE 2 - N3 SUPERBLOCK CAR PARK, STAGE 1 COMPLETED



FIGURE 3 - CAR PARK DECK WITH CRACK INSERT

the contractor dry. As this was the first time Inti Surya - Wijaya Kusuma (J.V.) Contractors had used Radcon #7, this problem gave them a good understanding of the products performance.

Due to limited use of the car park at this early stage of the project, the nearby University has now turned this car park into fully enclosed temporary class rooms. Whilst Radcon #7 was applied to the top deck of the car park, in what would be classified as fairly low risk, it is now demonstrating real waterproofing performance directly over critical habitable areas.

## UNIVERSITY OF BOLOGNA, ITALY - CRACK RE-SEALING TEST

Radcrete Pacific has always had ample proof of crack bridging performance on-site for Radcon #7, coupled with the University of NSW "Condition Survey of Applications using Radcon #7" where all sites surveyed had cracks going right through the slabs.

To substantiate our claims in Europe and more specifically Italy - we had to prove the products performance again in their home country. The University of Bologna was chosen to develop and perform laboratory testing to demonstrate the products crack re-sealing and permeability reduction capability. In order to simulate on-site cracking and push the performance of the product to the limits, a special rig was built to create, control and measure cracks in concrete elements as seen in Figure 4.

The slabs were cast 60mm thick with an indent for inducing of a crack, which meant the actual depth of the cracked slab was only 30mm. Once cured, the slabs were treated with Radcon #7 then put under tensile stress to induce a crack. The cracks were closed to 0 microns as a starting point. The

slab was then ponded with water and the crack was progressively opened to simulate conditions similar to a new crack. Radcon #7 maintained a watertight seal from 0 microns to 300 microns (0.3mm) which is a typical hairline crack width.

The testing was continued with a ponded Calcium solution to simulate a richer calcium supply normally experienced in the depth of a structural slab. Without re-applying the product, the cracks were able to re-seal up to 1.3mm.



FIGURE 4 - TEST RIG TO SIMULATE CRACKING

Copies of this test and other testing is available on request by faxing your name and address details on your company letterhead.

## THE GLEN SHOPPING CENTRE, MELBOURNE

**Architect:** Hames Sharley Architects  
**Engineer:** Connell Wagner Engineers  
**Construction Managers:** Bovis McLachlan  
**Main Contractor:** Baulderstone Hornibrook  
**Approved Applicator:** Higgins Coating  
**Area treated:** Suspended car park deck  
**Size:** 7,000 sqm  
**Completed:** May 1996

The Glen Shopping Centre is located in the Melbourne suburb of Glen Waverly. The construction work seen here is part of a major upgrade and extension to the existing shopping centre.



FIGURE 5 - THE GLEN

Radcon Formula #7 was applied to two main areas: the exposed car-park area on the upper level seen in Figures 6 & 7, and the exposed loading dock and car park on the lower levels. While both slabs were stressed there was some degree of cracking which showed leakage.

Radcon #7 was chosen as the material to waterproof this structure due to

the products simplicity, speed of application and the proven reliability when exposed to high traffic and thermal stress.

The application of Radcon #7 can be seen here in Figure 7 being applied to the top deck of the car park. Radcon #7 absorbs into the concrete over a 3 day watering procedure. The product reacts with the free Calcium ions that are liberated during the primary hydration of the concrete, forming a non-water soluble calcium silicate hydrate gel complex. This dense gel material reduces the permeability of the concrete matrix, and seals the shrinkage cracks, even when exposed to high thermal stresses.



FIGURE 6 - SECTION OF CAR PARK

The motorised spray unit will enable application speeds up to 800 square metres per hour. The fast application rate of Radcon #7 proved to be beneficial to Baulderstone Hornibrook who were nearing completion of the project at the time of waterproofing.



FIGURE 7 - RADCON #7 APPLICATION

## YOSENJI TEMPLE, JAPAN

This interesting Temple located in Tokyo was designed to have an exposed concrete finish as seen in Figure 8. For the waterproofing of this site, Radcon #7 was ideal due to its ability to waterproof both, the matrix of the concrete, and seal existing cracks up to 2.00mm.

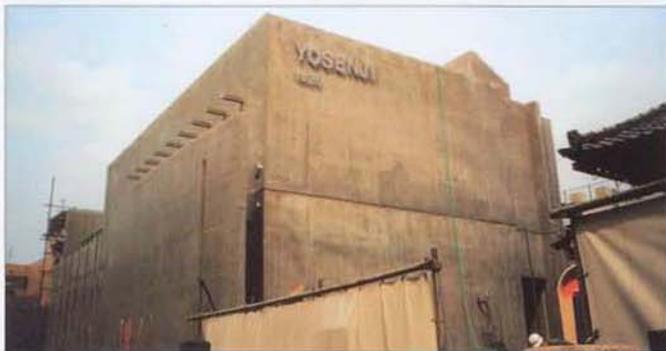


FIGURE 8 - YOSENJI TEMPLE, TOKYO

Regarding the aesthetics, Radcon #7 is a clear colourless treatment leaving the concrete colour unchanged so that the architect could maintain the dramatic effect of exposed concrete and still being able to achieve a waterproof result. This photo (Figure 8) was taken after the product had been applied.

Radcon Japan our exclusive representatives for Japan, applied Radcon #7 to a total of 2,000 square metres made up of rooftop, balconies and the concrete facades. Figure 9 shows the top of the cylindrical tower in the Temple where



FIGURE 9 - GLASS BLOCKS TO BE USED FOR LIGHTING

glass blocks are to be set into the cast concrete to enable a natural light source.

The Temple is located next to the American Embassy and the project was completed in June 1996.

# SITES OF INTEREST 2010

Radcrete Pacific presents: **Trafficable Areas**

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SITE DETAILS:	
COUNTRY	- Brazil
SITE	- Iguatemi Shopping Salvador
CLIENT	- Iguatemi Shopping Centres
CONSULTANT	- Netherland Engenharia Ltda
APPLICATOR	- Aterel Ltd
TREATED AREA	- Rooftop car park
SIZE	- 3,850 sq metres

**FIGURE 1-2.**  
Radcon #7 spray-application on the rooftop car park.

## **RADCON #7's faultless performance on a rooftop car park in Brazil.**

Radcon Formula #7 treatment for the rooftop and exposed car park of the Iguatemi Shopping Centre in Salvador was concluded in January 2007.

The area was required for the centre's grand opening and therefore left the authorised applicator – Aterel Ltd, with *only 3 days to waterproof an area of 3,850 sq metres!*

As there are department stores and other parking spaces located below the treated area, it was crucial to guarantee a 100% watertight result.

Radcon Formula #7 has been *performing without any leakage* since the completion of the works and *under severe traffic and weather conditions* (heat and torrential rains).



EXCLUSIVE GLOBAL DISTRIBUTOR FOR **RADCON FORMULA #7** WATERPROOFING CONCRETE FOR LIFE

## RADCON #7 FOR JUNCTION 8, SINGAPORE

Scott Vickers (FE) Pte. Ltd., an approved applicator for Singapore, recently completed the waterproofing of the food court, open plaza and floor slab on the ground level of Junction 8. Junction 8 is a new shopping complex located in the outer districts of Singapore.

In total, an area of 5,600 square metres was treated with Radcon Formula #7. Shown in the photo is one of the applicators using a low pressure backpack spray to complete the application.

Construction & Development Company were quick to realise the advantages over using a membrane in this application.

Over such large podium areas it is difficult to protect the integrity of a membrane during the construction timetable. Once Radcon #7 is applied, the area becomes trafficable within a matter of hours, after the first watering procedure is concluded.



## BLENHEIM STREET, WAVERLY

Commercial Industrial Contractors chose to use Radcon Formula #7 over conventional methods to waterproof this site.

The areas treated include 1,805 square metres of podium and balcony areas.

The approved applicator for this site was Kratrim Pty. Ltd.

Kratrim have been an approved applicator of Radcon Formula #7 for 6 years achieving an enviable track record on many prestigious projects.



## SITE REFERENCE:

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### SHOPPING CENTRES

**The Bay Shopping Complex**

Sydney, Australia

Architect: J Rihs Architects  
Builders: Stuart Bros.  
Treatment Date: March 1990  
Treatment Area: 1 000sqm – Roof, balcony, and façade

**Skygarden**

Castlereagh St, Australia

Architect: Multiplex  
Builder: Multiplex  
Treatment Date: December 1989/ May 1990  
Treatment Area: 650 sqm – toilet, restaurant, staircase, storage areas

**Westfield Shopping Centre**

Miranda, Australia

Architect: Westfield Projects  
Builder: Westfield Projects  
Treatment Date: May 1992  
Treatment Area: 2 000sqm – top deck carpark and rampways.

**Dandenong Shopping Complex**

Dandenong, Australia

Engineer: Elden Smith  
Project Manager: Construction Engineering  
Developer: Thompson Land Receivership  
Treatment Date: September 1989  
Treatment Area: 12 000sqm – roof deck, and carpark top deck over high risk areas.

**Australia Fair**

Southport, Australia

Builder: Watpac  
Architect: McKerral Lynch  
Treatment Date: March 1990  
Treatment Area: 9 100sqm- top deck car park and roof deck

**Phoenix Shopping Centre**

Perth, Australia

Architect: Armstrong Jones  
Treatment Date: May 1992  
Treatment Area: 9 369 sqm – top deck car park

**Garden City Shopping Centre**

Newcastle, Australia

Client: AMP Properties  
Builder: Civil & Civic  
Developer: AMP Properties  
Treatment Date: November 1991  
Treatment Area: 6 500sqm – roof top car park over high risk retail areas.

**Garden City Shopping Centre**

Newcastle, Australia

Client: AMP Properties  
Architect: Thrum  
Engineer: Hyder Consulting  
Treatment Date: November 1998  
Treatment Area: 9 700sqm – top deck car park, over high risk retail

**Seven Hills Shopping Centre**

Seven Hills, Australia

Engineers: Taywood Engineering  
Treatment Date: February 1987  
Treatment Area: 2 000sqm – top deck car park

**Caloundra City Centre**

Caloundra, Australia

Architect: Brian Simpson & Assoc  
Builder: Caloundra Construction  
Treatment Date: January 1991  
Treatment Area: 1 120sqm - roof, floor, and awnings

**Curitiba Shopping Centre**

Brazil

Location: Curitiba  
Builder: Irmaud Construtora  
Treatment Date: 1997  
Treatment Area: 3 000sqm – roof top car park, above food hall.

**Maia Shopping Centre**

Portugal

Owner: Sonae  
Builder: Contacto SA  
Architects: Nuclarq, Hellmuth Obata & Kasa Baum Inc USA  
Treatment Date: Mid 1997  
Treatment Area: 12 500sqm – carpark desk and ramp ways

**Supa Centre**

Sydney Australia

Engineer: Hyder Consulting  
Architect: Mark Newtown  
Main Contractor: Southern Cross Constructions  
Treatment Date: mid 1997  
Treatment Area: 4 500sqm – Podium Deck

**Maa On Shaan Shopping Centre**

Hong Kong

Client: Hong Kong Housing Authority  
Architect: Wong Tung & Partners  
Engineer: Robert Chiang  
Main Contractor: Shui On Building  
Treatment Date: February 1997  
Treatment Area: 8 000sqm – car park deck over high risk retail.

**N3 Superblock carpark**

Indonesia

Owner: Lippo land Development  
Architect: Crone & Assoc  
Engineer: Bitu Enercon  
Contractor: Inti Surya – Wijaya Kusuma  
Treatment Date: Mid 1996  
Treatment Area: 5 000sqm – carpark deck and ramp ways

**The Glen Shopping Centre**

Melbourne, Australia

Architect: Hames Sharley  
Engineer: Connell Wagner  
Construction: Bovis  
Contractor: Baulderstone & Hornibrook  
Treatment Date: May 1996  
Treatment Area: 7 000sqm – car park deck over critical retail

**1 Utama Shopping Centre**

Malaysia

Owner: See Hoy Holdings Group  
Planner: Semba Corp  
Architect: CT Architects  
Engineers: Perunding Talico  
Contractor: FNE OC Consortium  
Treatment Date: January 1996  
Treatment Area: 46 000sqm – carpark ramp ways, roof top over critical retail areas.

**Plaza Senayan Shopping Centre**

Jakarta, Indonesia

Developer: PT Senayan Trijarya  
Architect: RTKL, (USA)  
Contractor: Kajima Overseas Asia – Japan  
Treatment Date: 1995  
Treatment Area: 6 000sqm – carpark deck over critical areas

**Westfield Mt Druitt, Marketown**

Mt Druitt, Australia

Client: Westfield Design & Construction  
Engineer: MPN Group  
Treatment Date: 1995  
Treatment Area: 8 770sqm – carpark deck over critical retail

**Lippo Karawaci Shopping Centre**

Jakarta, Indonesia

Developer: Lippoland Development  
Engineers: PT Davy Sukamata  
Architects: The Jerde Partnership, USA  
Builder: PT Tatamulia Nusantara Indah  
Rooftop: 65 000sqm – over high risk retail

**Seacon Square**

Bangkok, Thailand

Developer: Seacon Development  
Architects: CASA/ Construction: PMI  
Project Managers: PRO 8  
Main Contractor: Italian Thai Dev Corp  
Treatment Date: 1994  
Treatment Area: 50 000sqm - High risk rooftop

**Whitford Shopping Centre - Westfield**

Perth, Australia

Client: Westfield  
Construction: Westfield Design & Construct  
Treatment Date: 1994  
Treatment Area: 1 600sqm – carpark deck and high risk roof top

**Junction 8 Shopping Centre**

Singapore

Architect: Construction & Develop Co.  
Contractor: Scott Vickers  
Treatment Date: 1994  
Treatment Area: 5 600sqm – roof top over high risk retail

**Kowloon City Plaza**

Kowloon, Hong Kong

Engineers: Chatwin Engineers  
Treatment Date: 1993  
Treatment Area: 10 000sqm – carpark deck over high risk retail

**Central Rama II Shopping Centre**

Bangkok, Thailand

Specified: 1999/2000

Area: 15 000sqm

**Macquarie Shopping Centre**

North Ryde, Australia

Builder: Concrete Constructions  
Client: AMP Properties  
Applicator: Kratrim Pty Ltd  
Area Treated: 5 000sqm - Car park over Franklins  
Date Completed: December 1992