Case History

CLIENT: BLENHEIM NORWEST
ENGINEER: SKM ANTHONY HUNT & PARTNERS
CONTRACTOR: NORWEST HOLST / LANCSVILLE

Waterproofing
Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions — The Secure Option

BLENHEIM CENTRE, HOUNSLOW, UK

In December 2004 work began on the Blenheim Centre, a new £220 million development project in Hounslow. The site will encompass circa 17 acres of land and will provide a range of facilities to the public. Around 236,000 square feet of the centre will provide space for commercial and leisure regeneration including retail establishments, restaurants and cafes, a multiplex cinema, a community health centre and a day nursery. In addition to these proposed facilities, there will be a new residential space created with over 300 flats of which 117 are specified at affordable prices for key industry workers.

The Blenheim centre is one of the largest regeneration sites in the country. Work has started on the foundation and substructure. The chosen waterproofing was RAWMAT® HDB pre-hydrated Bentonite membrane and RAWSEAL® Waterstops. The pockets of perched water across the brown field site meant Norwest Holst and their nominated sub contractor Lancsville would be constructing the basement in difficult conditions. The mid-winter start date further added to the trying conditions.

RAWMAT® HDB Type P was used as the under slab waterproofing laid directly onto the compacted formation, the 2m wide x 50m long rolls of the membrane allowed large sections of slab to be poured. The walls of the basement were constructed by a combination of fixing the RAWMAT® HDB Type S to the shutters prior to casting and post applying to the walls in other areas. The swift and simple installation of the versatile waterproofing system has enabled Lancsville to keep to a very tight programme.

The development is set to continue over the next few years. The date scheduled for the completion of phase one is Autumn 2006 at this time phase two of the project will commence. The building of the Blenheim Centre is set to bring about major regeneration to the Houslow area with benefits to transport links and increased tourism.

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WWW. www.rawell.com E-mail. postmaster@rawell.com

v. 060810

Case History

CLIENT: VENEZIA FUTURA
ENGINEER: FAVERO-MILAN (MILANO)
CONTRACTOR: SPOLADORE (PADOVA)

Waterproofing
Structural Waterproofing from Rawell

VENEZIA FUTURA, VENICE-MESTRE, ITALY

In 1998 work was started in Venice-Mestre to construct a multi-purpose two structure building allocated for use for tourism, hotels, retail and commercial usage. Building work included the construction of a wet dock between the two buildings allowing a direct connection to Venice lagoon by boat. The excavation for the wet dock and a three story car park beneath the buildings required an excavation more than 10 metres deep. Consequently, due to the location of the site, and being subject to the inflow of saline water from the water table such wet conditions meant a bentonite waterproofing system would be the ideal system to be used.

The site specifications required the installation of specialised materials in the building foundations. The sandy nature of the soil required an effective diaphragm wall system, whilst the presence of salt water required a pre-hydrated bentonite system be used. RAWMAT® HDB membrane was used and remained unaffected by the saline conditions encountered. In comparative testing carried out by the contractors, dry bentonite was seen to be severely affected by the salt water and therefore proven unsuitable for use. These tests demonstrated that the RAWMAT ® HDB prehydrated bentonite membrane however, functioned satisfactorily in the saline conditions. RAWMAT® HDB pre-hydrated bentonite was also chosen for its ease of installation in wet conditions allowing the works to proceed quickly and on schedule.

The RAWMAT® HDB was laid between two blinding concrete layers under the slab then linked vertically along the perimeter against the diaphragm wall to obtain continuity of the waterproofing. The diaphragm walls had previously been smoothed with concrete mortar. The walls of the canals were cast in double layers, with RAWMAT® HDB sandwiched in the middle. Along any horizontal corner, a triangle-shaped RAWSEAL® TR35 waterstop was installed before the installation of RAWMAT® HDB to provide additional security to the membrane in this critical area.

The magnificent structure has been completed and the basement remains dry and the dock walls leak free.





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v. 060810

Case History

CLIENT: COPENHAGEN METRO CORPORATION
ENGINEER: COWI CONSULT
CONTRACTOR: COMET GROUP

Waterproofing
Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions — The Secure Option

COPENHAGEN METRO, COPENHAGEN, DENMARK

Following the 1992 report into the future of the transport grid in Copenhagen, it was proposed that a metro system should be built to increase the efficiency of the transport system and transport people effectively and 'in style' through the city. In 2002 plans were realised when the Danish capital got its first metro line running fully automated from east to west. The line is divided into two sections, one to the heart of Ørestad and the other to Copenhagen's airport in the south-east. The line runs 20-30m below ground level and boasts numerous elevators, escalators and platforms along its 9 underground stations and 14 above ground stations.

The tunnels for the underground system were built from the top down with a total of nine kilometres of twin bored tunnels constructed in this project. The Rawmat® HDB membrane was applied as a negative side waterproofing fixed directly the secant piled formation cut into the limestone bedrock, the 500mm reinforced concrete station box was cast directly against the membrane. At depths of 25 metres below ground level the membrane was subjected to very high water pressures. In addition to the challenge the great depths of the construction offered, the ground water entering the excavation through weeping in the piles was brackish and so the ability of the prehydrated bentonite membrane and waterstops to function in a saline environment were crucial to the performance of the material. The ground water calcium content was further increased as the bedrock into which the station boxes we constructed was limestone. The Rawmat® HDB was a great success providing dry, leak free structures and allowing the project to be delivered on time and within budget.

The Copenhagen Metro system is yielding great success in providing a valuable resource to commuters, with departures taking place every 90 seconds during rush hours. The metro is reaping the benefits of cost-effective waterproofing that is set to provide secure watertight tunneling well into the future.

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Case History

CLIENT: CORK CITY COUNCIL
ENGINEER: MICHAEL PUNCH & PARTNERS
CONTRACTOR: CLEARY DOYLE

Waterproofing
Structural Waterproofing from Rawell

CORK CITY HALL, CORK, IRELAND

In the Autumn of 2006 the City of Cork will reap the benefits of an additional 9,000m² of office space, constructed adjacent to the existing Cork City Hall building. This new construction costing €30m, will provide modern office accommodation for council staff, drawing together 340 key workers currently working in separate offices around the city. The new offices will allow services such as planning, housing, roads and finance to take place from one central location.

As testimony to the state-of-the-art design, the building will be linked to the existing City Hall by two flying corridors and will house parking lots on two levels - the basement and the roof. As the proximity of the structure is located near to the River Lee, the construction has utilised a unique waterproofing barrier in the basement that guarantees a watertight environment.

The basement on this development consisted of a contiguous concrete pile wall to the south elevation and a section of steel sheet piles on the north elevation. The waterproof membrane had to be such that it could be easily attached to the undulating surfaces of the piles and onto a compacted sub base below the slab. The waterproofing was a critical element, according to the designers, due to the proximity of the River Lee which flows less than 15m for the site. The River Lee presented the problem of a fluctuating saline watertable leading to high tide watertable levels, less than 1m from ground level. Other projects adjacent to the site had unsuccessfully used other waterproofing systems that resulted in leaking basements. The Designers stated that in order to waterproof the basement a material resistant to saline conditions was essential and Rawmat HDB® Type P prehydrated bentonite liner together with Rawseal® waterstops were chosen as the most secure option. It was considered a great advantage that the Rawmat HDB® Type P could be shot fired directly onto the piled walls without additional preparation of the surface, the joints in the sheets were formed with an effective self sealing overlap. The ease of installation allowed the main contractor to produce a cost effect method of waterproofing which was completed to schedule and within budget.

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v. 060810

Case History

CLIENT: WELLINGTON CITY COUNCIL
ENGINEER: OPUS INTERNATIONAL CONSULTANTS
CONTRACTOR: JUNO CIVIL

Waterproofing Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions THE SECURE OPTION

ARAMOANA RESERVOIR, WELLINGTON, NEW ZEALAND

Over the course of 2004 a project was carried out at Aramoana, on the Miramar Peninsula on the outskirts of Wellington, to construct a potable water reservoir to supply the local community water requirement. In adhering to public feeling, the reservoir specifications were to design a structure that would be more aesthetically pleasing than an average water storage tank facility. The solution was to build the 3.5 million-litre reservoir below ground level and bury the structure leaving only a grassed over mound visible to the local residents.

The nature of the project (in holding water for human consumption) required a water proofing system that would guarantee and maintain water sanitation requirements for the design life of the tanks . RAWMAT® HDB was the chosen water proofing membrane, providing quality sealing, long-life durability and ease of application in the shortest possible time. Also, RAWMAT® HDB has the ability to be installed in wet conditions without primers or extended curing times required with bituminous based systems; this was an important benefit in the wet winter months the construction period of this project covered.

The installation of the waterproofing membrane was undertaken by a team of 3 workers and the installation of approximately 2000m^2 was completed in 2 days. The membrane was laid onto a concrete substrate, RAWSEAL® TR35 waterstop was placed into the parapet junction and the membrane was installed over this to confine it. The 100mm concrete protective screed was placed over the RAWMAT® HDB Type S membrane, a layer of 300mm soil was placed over this to allow vegetation to grow and give a more aesthetically pleasing appearance.

The reservoir combined with others in the Wellington area are testimony to the success of underground engineering and quality waterproofing. Residents in the area are provided with a more aesthetically acceptable method of water storage which provides easier and more accurately programmed engineering.

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Case History

CLIENT: ITALIAN RAILWAYS
ENGINEER: METROPOLITANA MILANESE
CONTRACTOR: PICENO S.C.A.R.L

Waterproofing Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions THE SECURE OPTION

PASSANTE FERROVIARO TUNNEL, MILAN METRO, ITALY

With over 1.5 million inhabitants, Milan is Italy's second largest city and home to the impressive Milan Metro system. In 1999 a project was carried out to build a new stretch of rail tunnel along the Passante Ferroviaro line, runiing between Piazza Dateo and Porta Vittoria. The extended route provided commuters with a better transfer to the metro. Following an extensive building project, Porta Vittoria station opened to travel on 12th December 2004 completing the Passante Project and allowing through service from east to west across the Milan metro.

The waterproofing to this section of the running slab and the tunnel arch involved the application of the Rawmat® HDB Type S1 membrane as part of a composite lining system. The Rawmat® HDB Type S1 membrane was applied to the shotcreted rock tunnel by nailing into the rock through the membrane, the fixings enabled the welding of a PVC based sheet membrane as the second part of the composite waterproofing. Once the two membranes had been applied to the tunnel a protective geotextile was placed prior to the pouring of the cast in-situ tunnel lining.

The Rawmat® HDB Type S1 membrane allowed the simple and swift installation of a self sealing lining to the tunnels. The swelling ability of the prehydrated bentonite provides the primary waterproofing of the composite as the water pressure is applied from the ground on to the Rawmat® HDB Type S1. The prehydrated bentonite in the membrane seals to the shotcrete/rock and bonds to the PVC membrane applied directly to it thus preventing any tracking between the membranes in the event of the Rawmat® HDB Type S1 being punctured.

Today, the new stretch of tunnel is fully operational with the waterproofing system in place providing both a cost-effective solution for the client and the project contractor and security in a long-term watertight finish.

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v. 060810

Case History

CLIENT: NORWEGIAN RAILWAYS
ENGINEER: AAS-JACOBSEN A/S
CONTRACTOR: SCANDINAVIAN ROCK GROUP (PEAB)

Waterproofing Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions THE SECURE OPTION

BOXED ROAD TUNNEL, ÅRÅSEN, GARDEMOEN RAIL LINK, NORWAY

In 1992 the Storting, the Norwegian Parliament, resolved to develop Gardemoen Airport as the main airport facility in the Oslo region. Consequently, it was decided such an airport would require a high-speed rail link connecting the airport to the centre of the city of Oslo. The new link allows speeds of 200 km/hr and a journey time of 19 minutes

The project involved the construction of several tunnels, underpasses and culverts which required a waterproof lining system against ground water as well as the environmental considerations of protection against the potential spillage of oil and fuel. In addition there was a need for protection against the application of de-icing chemicals and the accidental spillage of transported bulk chemicals. The in-situ cast concrete box section tunnel has a single span roof totalling 17m wide. This allows three separate rail tracks to run within the structure. With a total height of 9.5m and a length of 85m, the structure has a varying position within the existing ground along its length, varying from almost all cut to all fill. An envelope of RAWMAT® HDB prehydrated high density sodium bentonite membrane was installed to the walls and roof of the tunnels. A selection of RAWSEAL® Waterstops and RAWPASTE Mastic were used for providing continuity of the membrane at penetrations for the ducts and cables passing through the walls of the tunnels.

Environmental considerations required that the tunnel had a 'green' roof. Agricultural fertilisers are a well known source of contamination which can cause the breakdown of traditional “dry” bentonite GCL’s through a process known as cation exchange, when this occurs the bentonite converts from sodium to calcium causing the bentonite to crack and failure to occur. Extensive testing was undertaken on the Rawell membrane for this project to prove RAWMAT® HDB’s resistance to cation exchange in addition to it’s resistance to potassium acetate, ethylene glycol and other de-icing fluids.

The Airport and Rail Link were opened in 1998 and the RAWMAT® HDB prehydrated high density sodium bentonite membrane proved to be a very successful waterproofing system for this environmentally sensitive project.

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Case History

CLIENT: GARDEMOEN AIRPORT RAIL LINK
ENGINEER: AAS-JACOBSEN A/S
CONTRACTOR: VEIDEKKE ASA

Waterproofing Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions THE SECURE OPTION

ARCHED RAIL TUNNEL, GARDEMOEN RAIL LINK, NORWAY

In 1992 the Storting (Norwegian Parliament) resolved to develop Gardemoen Airport as the main facility in the Oslo region requiring a high speed rail link to/from Oslo. The new link allows speeds of 200 km/hr and a journey time of 19 minutes. The project involved the construction of many tunnels, underpasses and culverts which required sealing against ground water as well as the environmental considerations of protection against the regular spillage of oil and fuel, application of road de-icing chemicals and the accidental spillage of transported bulk chemicals.

The in-situ cast concrete arched tunnel spans 12m to allow two separate rail tracks to run within the structure. With a total height of approximately 9.5m and a length of 200m, the structure is substantially a cut and cover construction. Walls and roof are 600mm thick and fully lined externally with RAWMAT® HDB membrane with a sand backfill between the structure and excavated ground. An envelope of RAWMAT® HDB membrane was installed on the walls and roof.

Environmental considerations required that the tunnel had a 'green' roof. Agricultural fertilisers are a well known source of contamination which can cause the breakdown of traditional “dry” bentonite GCL’s through a process known as cation exchange, when this occurs the bentonite converts from sodium to calcium causing the bentonite to crack and failure to occur. Extensive testing was undertaken on the Rawell membrane for this project to prove RAWMAT® HDB’s resistance to cation exchange in addition to it’s resistance to potassium acetate, ethylene glycol and other de-icing fluids.

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v. 060810

Case History

CLIENT: MANCHESTER AIRPORT
ENGINEER: W.S. ATKINS
CONTRACTOR: AMEC/TARMAC J.V.

Waterproofing
Structural Waterproofing from Rawell

A538 BOX ROAD TUNNEL, R2, MANCHESTER AIRPORT, U.K.

In 1997 planning permission was granted for the construction of a second runway to accommodate the expansion of Manchester Airport to increase to passenger usage from the current 20 million to 40 million by 2015. The construction of the runway combined with the ongoing terminal expansion makes Manchester Airport one of the busiest and most efficient airports in the world

Running parallel to runway 1 and maintaining the environmental programme established by the Airport, created several major challenges for tunnel designers, WS Atkins. The construction took place with a backdrop of severe public environmental scrutiny and so a long-term and secure waterproofing methodology was essential. The new runway crosses both the A538 highway and the 24m deep Bollin Valley (see separate case history). The 29m wide and 5.5m (internal) high box section tunnel is curved on plan. The hydrated and chemically resistant RAWMAT® HDB membrane was used to provide high security waterproofing to the roof and walls.

Extensive testing of Rawell's high-density bentonite membrane assured a long-term performance against runway anti-icing fluids, compression loads of 600 kPa and common impurities such as calcium contained in fertilisers and limestone sub-base material. Backfill comprising natural clay from site and a 1m wide sand and gravel cover was placed against the waterproofing to afford additional drainage and compaction protection. The flexible 1m x 5m rolls were applied longitudinally to the vertical walls and 2m x 50m rolls used to seal the roof. A cross fall of approximately 1:33 was created in the roof to shed ground water.

The ability to provide a long term waterproofing system created a buildable and cost effective solution which allowed the joint venture contractors AMEC/Tarmac to complete the contract in time for the official opening in February 2001.

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v. 040914

Case History

CLIENT: STANDARD LIFE ASSURANCE CO.
ENGINEER: BLYTH & BLYTH
CONTRACTOR: SIR ROBERT McALPINE / O' ROURKE

Waterproofing
Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions — The Secure Option

STANDARD LIFE ASSURANCE HQ, EDINBURGH, UK

The construction of a highly prestigious office building for one of the country's largest Life Assurance Companies in Edinburgh's prime location assured that close scrutiny of all aspects of the project would take place. Standard Life's new Headquarters adjoining the historic Caledonian Hotel on Lothian Road was constructed with 7 storeys above the ground and a large single storey basement. RAWMAT® HDB was chosen as the waterproofing system for the project.

The basement structure was constructed within a bored secant piled ring wall to one third of the building to which the RAWMAT® HDB membrane was fixed. The membrane/piles were used as the back shutter and the structural slab and walls poured directly against the membrane. The site was heavily piled below the slab for the support of pad foundations and structural columns to prevent loading being transferred to the Victorian brick arched railway tunnels below.

The structural columns presented a question as to the long-term service performance of the hydrated bentonite core under pressures of up to 3,000kN/m^2. Continuity of the membrane was essential in such areas and the engineers were concerned the bentonite core had to be retained and would not squeeze out under these loads. To ensure the performance of the RAWMAT® HDB system in these conditions RAWMAT® HDB Type R was used. This product incorporates a High-Density Polyethylene geonet within the core of the prehydrated bentonite, the cellular structure of the net retains the clay within the grid whilst absorbing the pressure of the loading and preventing displacement or deflection of the bentonite.

The versatility of the RAWMAT® HDB system was certainly tested on the Standard Life Project. The materials proved capable of meeting all the requirements and the project was completed successfully as a result. The basement remains dry and functions as a document store and computer room (BS8102 Grade 4 usage) as well as an underground car park.

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Case History

CLIENT: SCOTTISH WIDOWS ASSURANCE CO.
ENGINEER: W.A. FAIRHURST
CONTRACTOR: JOHN LAING / JOHN DOYLE

Waterproofing
Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions — The Secure Option

SCOTTISH WIDOWS ASSURANCE CO. EDINBURGH, UK

One of Edinburgh's most prestigious projects to date is the £63 million Scottish Widows Headquarters development at Port Hamilton, in the heart of The Exchange, Edinburgh's Financial District.

The prestigious 350,000ft^2 development consists of 8 storey office accommodation above ground level; the building also provides car parking for more than 500 cars. Including 200 short stay public spaces located in two levels of basement below ground level.

The RAWMAT® HDB system was chosen as the waterproofing membrane as the site suffered significant contamination of the underlying mudstone and sandstone bedrock on to which the basement slab was cast. The contamination is believed to have arisen primarily from the escape of approximately 18,000 litres of petrol from a garage formerly on the site. The Engineers specified a vacuum extraction system to be constructed within the footprint of the building to remove the gas contamination from the site. Consequently, not only did the RAWMAT® HDB membrane have to withstand hydrocarbon contamination within the ground, it also acts as a barrier to the vapours generated. To ensure an immediate gas and watertight barrier was achieved when the membrane was installed the overlap between each sheet of membrane was sealed by the application of RAWPASTE mastic.

The membrane was laid directly onto the compacted formation without an over-site blinding concrete layer beneath it. The membrane was then protected with a 50mm protective concrete screed to allow the construction of the slab to progress quickly without damage occurring to the RAWMAT® HDB membrane as the steel fixers constructed the reinforcement for the basement slab. The base area footprint of the site was in excess of 22,750m^2. Unlike "dry" bentonite membranes, the RAWMAT® HDB membrane and RAWSEAL® waterstops provided a secure waterproof and gas proof barrier which required no on-site hydration of the bentonite, even in the polluted conditions in which it was being utilised.

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Case History

CLIENT: MASS TRANSIT RAILWAY CORP.
ENGINEER: FREEMAN FOX MAUNSELL
CONTRACTOR: AOKI CORPORATION

Waterproofing
Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions — The Secure Option

MTRC AIRPORT RAIL LINK, HONG KONG

By 1986 the need for an additional airport and infrastructure in Hong Kong had become apparent with existing facilities reaching saturation point more rapidly than expected. A decision was taken to construct a new airport at Chep Lap Kok on Lantau Island together with a major transport proposal for both road and rail links to the new airport. Major sections of the road and rail links would be routed in tunnels, many of these tunnels built within major reclamations constructed as much needed extensions to the existing land mass within Hong Kong's crowded boundaries.

Between the Kowloon section of the Western Harbour Crossing and Olympic Station are a series of in-situ reinforced concrete tunnels making up part of the Airport Express Line. Also, beneath this section of tunnels is the Cherry Street Underpass which links the Mong Kok district of Kowloon to the waterfront berths of the harbour. RAWMAT® HDB membrane and RAWSEAL® waterstops were the specified waterproofing system on these projects.

RAWMAT® HDB was the chosen waterproofing due to its proven ability to perform in the heavily contaminated saline environments within which the reclamations were created. Tests carried out on the RAWMAT® HDB membrane proved that even after continual wet dry cycles in 100,000 ppm salt water the permeability of the prehydrated high density sodium bentonite products achieved K values of $<10^{-12}$ m/sec. On the Cherry Street Underpass section of the project the RAWMAT® HDB system was installed below the floor slab and the RAWSEAL® Waterstops placed into the longitudinal and transverse joints to the floor/walls and walls/roof. Once the box was completed the RAWMAT® HDB membrane then encapsulated the concrete structure prior to backfilling and saturation from the ground water.

The new 34km Airport Express Line , opened in July 1998, offers a fast passenger link between Chek Lap Kok and central Hong Kong. Journeys take 23 minutes, with intermediate stops at Kowloon and Tsing Yi. The RAWMAT® HDB provided a secure waterproofing system in all applications where the system was the sole waterproofing tanking the concrete structures.

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Case History

CLIENT: SINGAPORE GODOWN
ENGINEER: MAUNSELL
CONTRACTOR: OBAYASHI CORPORATION

Waterproofing
Structural Waterproofing from Rawell

Rawell
Waterproofing & Environmental Solutions
THE SECURE OPTION

SINGAPORE GODOWN WAREHOUSE, 25 TAGORE LANE, SINGAPORE

Faced with an extremely tight construction deadline of only 15 months Obayashi Corporation were faced with a number of issues to hand over this project on time. They were therefore keen to introduce changes to the original specifications that would enable their project to progress swiftly.

One of the proposed changes to the original design made by Obayashi was the introduction of the RAWMAT® HDB prehydrated sodium bentonite system as the waterproofing for the basement, this replaced the polyurethane liquid applied membrane originally specified (and requiring arduous and costly installation procedures likely to be hindered by the weather). Obayashi's experience using RAWMAT® HDB elsewhere in Singapore gave them the confidence of knowing the ease and speed of installation of the system would give them a considerable advantage getting the basement construction completed within the time allowed in the contract.

By constructing the basement with the RAWMAT® HDB system no oversite lean concrete was required below the membrane as a relatively dry and well compacted sub base was achievable. Upon installation of the RAWMAT® HDB the membrane was immediately protected with 50mm layer of blinding concrete. Within 7 days the whole basement slab of approximately 5,000m^2 was waterproofed. This was a considerable saving on the original time period as 3 weeks were allowed in the programme. The sealing of all construction joints and waterproofing of approximately 2,000m^2 of basement walls was completed in just over a week.

Construction of the basement section of this project took place during the monsoon season in Singapore, and as a result many periods of heavy rain were encountered during the installation. The RAWMAT® HDB membrane stood up to the challenge of producing a leak free structure and provided a solution no other membrane could have achieved in the time and weather conditions.

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Case History

CLIENT: NORTHAMPTON COUNTY COUNCIL
ENGINEER: BUILDING DESIGN PARTNERSHIP
CONTRACTOR: KAJIMA

Waterproofing
Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions — The Secure Option

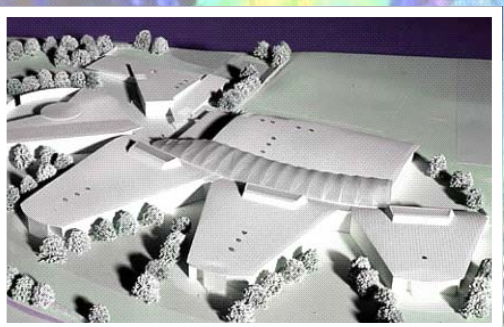
WOOLDALE CENTRE FOR LEARNING, NORTHAMPTON, UK

In their brief to produce a new education facility in Northampton, Building Design Partnership's Manchester office where tasked with a design to produce a highly articulated building form which would accommodate the site contours and take account of the need for protection from Radon gases prevalent in this area of Northamptonshire.

The result comprises six separate elements, linked by a covered external street and taking advantage of the fall across the site. The six elements are the learning resource centre, primary school, three learning houses (containing the main teaching accommodation) and a dining / assembly / sports building. The design was formulated around the idea of the shapes of Fruits

The RAWMAT® HDB prehydrated sodium bentonite system was chosen to provide both the waterproofing and gas protection functions to the buildings. The membrane was applied under the floor slabs of the lower teaching blocks, to the retaining wall separating the upper and lower blocks and across the roof of the service structure which doubles up as the central street through which access is gained to the blocks. The RAWMAT® HDB membrane provides a waterproofing membrane which also prevents the ingress of gases. The membrane can withstand movement in the structure which would rupture other waterproofing systems.

Work began on the site in Spring 2003 and it is planned that pupils will first start at the centre in September 2004. The building area is 14,759 m^2, site area totals 10 ha, construction cost is £16m. The complex will house over 1,700 pupils from primary to sixth form. The pioneering project is being paid for through the Private Finance Initiative investment awarded by the Department for Education and Skills. Responsibility for delivering the national curriculum and all educational needs will remain with the Governors and County Council while Kajima will provide all the buildings and the management services to run them.



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Rawell Environmental Ltd, Carr Lane, Hoylake, Wirral, Merseyside CH47 4AZ.
Tel. +44 (0) 151 632 5771 Fax. +44 (0) 151 632 0252
www.rawell.com E-mail. postmaster@rawell.com

v. 060810

Case History

CLIENT: NETWORK RAIL
ENGINEER: HALCROW
CONTRACTOR: COSTAIN

Waterproofing
Structural Waterproofing from Rawell

Rawell
Waterproofing & Environmental Solutions
THE SECURE OPTION

STROOD AND HIGHAM TUNNEL RELINING, KENT, UK

The Strood and Higham Railway Tunnels in Kent opened more than 150 years ago and were constructed of concrete and steel. Over the years the inside of the tunnels have been prone to closure due to chalk falls, including a major landslide in 1999 that derailed four carriages of a train. The rise in track disruption prompted the need for restoration work to take place in January 2004. The limitations imposed by the clearance of the tunnel have enabled trains to once again travel through the tunnels at speeds of 70mph rather than the imposed restrictions of 20mph. ultimately, this delivers the benefit of uninterrupted travel for rail commuters.

The project was split into two halves, firstly the lining of the unlined sections of the tunnels and secondly, a complete track renewal. The design was critical to ensure no water ingress was evident in the tunnel. The primary waterproofing is a new 200mm concrete lining; the concrete is cast between steel "I" beams. The potential first line of entry for water was anticipated to be the joint between the "I" beams and the concrete. To counter this Halcrow's Tunnelling division designed RAWSEAL® Prehydrated high density bentonite waterstops to be fixed into the inside radius of the "I" beam. Another RAWSEAL® profile was placed into the construction joint between the "footing" and the wall.

The simple tight fitting profile supplied by Rawell allowed a fast and simple installation of the waterstop. In addition the design called for an injectable hose to be fixed to the inner radius of the "I" beam in case of ingress through the RAWSEAL®. The injection hoses have not been required as the RAWSEAL® waterstops have been totally effective in preventing any ingress of water.

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v.060810

Case History

CLIENT: AUCKLAND CITY COUNCIL
ENGINEER: OPUS INTERNATIONAL/ JASMAX
CONTRACTOR: DOWNER CONSTRUCTION

Waterproofing Structural Waterproofing from Rawell

Rawell Waterproofing & Environmental Solutions THE SECURE OPTION

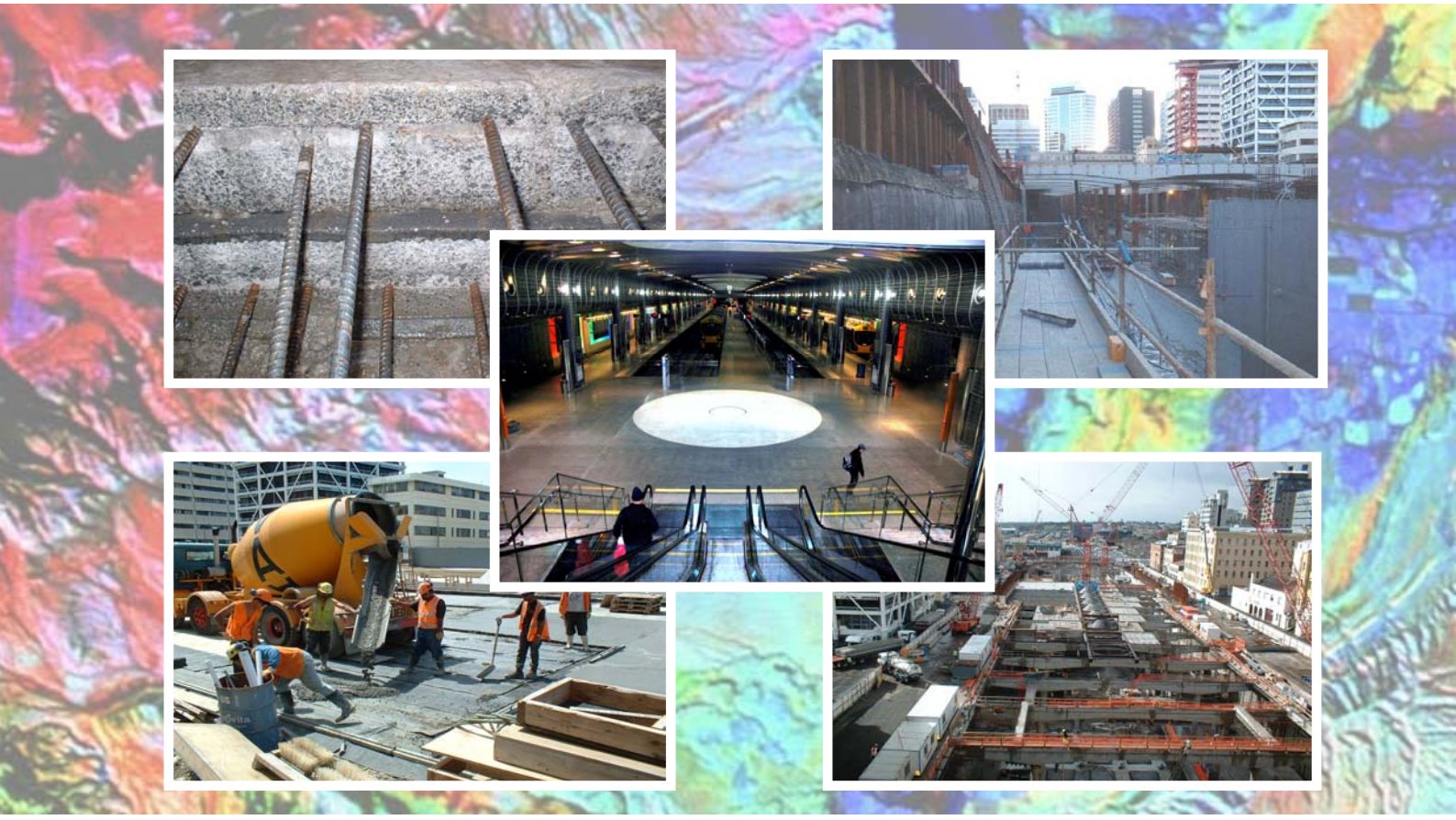
BRITOMART TUNNEL, AUCKLAND, NEW ZEALAND

On the morning of 7th of July 2003 history was made in Auckland City, New Zealand when for the first time in 70 years trains arrived at the new underground Britomart Transport Centre. The Centre includes an underground tunnel constructed to provide a rail link between Quay St to Britomart Place and measures 506m in length. The project was constructed at a cost of NZ$30 million.

High standards of engineering were paramount in this project due to the challenge of constructing a concrete structure circa 100 metres from the sea and 6 metres below sea level. As Britomart was a wet site, it was necessary to use a bentonte waterproofing system. RAWMAT® HDB pre-hydrated bentonite was chosen to provide a self-healing membrane along with RAWSEAL® TR35 and RC50 slab waterstops to give the ultimate waterproofing solution. The pre-hydrated bentonite materials were used due to their proven performance in saline environments—conditions which precluded dry bentonite products.

The Britomart project benefited from the versatility of RAWMAT® HDB pre-hydrated Bentonite to meet tight deadlines in construction. RAWMAT® HDB was the ideal choice for quick installation as the material can be installed in all weather conditions, so no time was lost onsite. Also, RAWMAT® HDB pre-hydrated Bentonite is highly resistant to the effects of contaminants in the ground or water table.

The finished tunnel is fully operational and was compiled on time. It provides an impressive sight on entering the platform with stainless steel meshing and hundreds of lights creating atmosphere. The rail link provides a valuable resource for commuters and members of the public within Auckland and its surrounds.



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