EXPERIENCE

RB is recognized for delivering the most efficient, economical and buildable design solutions and has gained the confidence of many of the major players in the construction industry. Thanks to RB’s breadth of experience, we are confident that we can offer clients an unrivalled depth of expertise and knowledge. We are highly specialized in developing interesting and innovative structural forms in the fields of bridges, tunnels and underground stations, covering the spectrum of civil, structural and geotechnical engineering.

RB has worked extensively for contractors as well as for user clients, preparing alternative designs or value engineering the existing designs. The essence of such commissions has been the issues of economy, buildability and speed of construction. In many cases we integrate the methods of construction and the temporary works as well as the permanent works. It is frequently the optimisation of the construction process or changes in the methodology that generate the real savings in materials and time.

RB has a unique culture inherited from a group with over 25 years of experience which has been organised around the integration of the construction process with design. We understand the constraints of construction and will always seek to work with contractors to integrate the sequencing of the project and the temporary works solutions in the permanent works designs.

RB always addresses safety issues during the design processes. We carry out safety assessments to mitigate and control all the risks associated with construction activities, temporary or permanent works. The production of safe designs, constructed using safe and simple working practices, is an essential component of our company doctrine.

RB provides service of the highest quality coupled with commercially attractive rates derived from our relatively low cost base in Malaysia.

Our vision is to be the Consultant of choice, designing creative solutions, adding value and making the complex simple.
FIELDS OF ACTIVITY

Bridges
- Highway and railway bridges in reinforced concrete, prestressed concrete and steel
- Footbridges in steel, timber and aluminium
- Maintenance and erection gantries
- Inspection and assessment
- Design Checking

Buildings
- Hotels and residential buildings
- Office buildings, complexes and commercial developments
- Retail and industrial buildings
- Transport buildings including railway and bus stations
- Schools
- Specialist buildings such as sports halls and prestressed concrete silos
- Design checking

Tunnels, Underground Structures and Stations
- Cut and cover tunnels and underground stations for urban highways and railway systems
- Bored tunnels and underground stations
- Deep basements, retaining walls and special foundations
- Settlement analysis and control

Construction Technology
- Methods and temporary works for the construction of underground structures, bridges, buildings and marine works
- Falsework design and checking
- Cofferdams
- Preparation of detailed shop drawings
- Segmental bridge alignment
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RB’s Relevant Projects

BRIDGES

- Penang Second Crossing, Malaysia
- KVMRT SBK Line – Packages V2 & V3, Malaysia
- Bayan Lepas Expressway, Penang, Malaysia
- SKYPARK LINK, Subang, Malaysia
- Sultan Yusof Bridge at Teluk Intan, Perak, Malaysia
- Electrified Double Track – Kedah Line, Malaysia
- Penang Bridge Widening, Malaysia
- Electrified Northern Double Tracking, Bukit Merah Viaduct, Malaysia
- Balakong Interchange, Kuala Lumpur
- KL Putrajaya Highway Package 1 Ramp 1
- KL Putrajaya Highway Package 5
- SPRINT Highway, SPRINT Highway Phase I, Kuala Lumpur
- Penchala Link, SPRINT Highway Phase II, Kuala Lumpur
- New Pantai Expressway Box Girder Ramps, Kuala Lumpur
- New Pantai Expressway Twin Rib Bridges 5&6, Kuala Lumpur
- New Pantai Expressway ‘T’ Beam Bridges 7&8, Kuala Lumpur
- Pasir Panjang Semi-Expressway, Singapore
- Sentosa People Mover System, Singapore
- Sungai Dinding Main Arch Bridge, Perak, Malaysia
- Sungai Dinding Incrementally Launched Approach Bridge, Perak, Malaysia
- Upgrading of Middle Ring Road Batu Caves, Kuala Lumpur
- Putrajaya Ring Road Bridge 2
- Putrajaya Ring Road Bridge 4
- East Coast Expressway Package 1F1 & 1G1, Kuantan Malaysia
- Express Rail Link - Federal Highway Crossing, Kuala Lumpur
- Jambatan Cisomang, Indonesia
- Express Rail Link- Kuala Lumpur to KL International Airport, Malaysia
- Upgrading of Jalan Loke Yew, Kuala Lumpur
- Upgrading of Jalan Sungai Besi, KL Seremban Highway, Kuala Lumpur
- Upgrading of Jalan Sungai Besi, Viaducts over KTM & ERL, Kuala Lumpur
- STAR Light Rail Transit System, Kuala Lumpur

BUILDINGS
- CN Gallery, Kuala Lumpur, Malaysia
- Pan Pacific Hotel, Penang, Malaysia
- KL Sentral Station, Kuala Lumpur, Malaysia
- Bukit Beruntung Housing Development, Selangor, Malaysia
- STAR LRT Stations, Kuala Lumpur, Malaysia
- Legends Golf & country Resort, Malaysia
- Telekom Building, Kuala Lumpur, Malaysia
- Nam Cheong Station, Hong Kong
- Dubai Airport Expansion, UAE

TUNNELS, STATIONS & UNDERGROUND
- New Doha International Airport-Mid Field And FTZ Tunnels
- Kuala Lumpur Conventional Centre Tunnel
- Singapore MRT North East Line Contract C705, Singapore

SHOP DRAWINGS & CONSTRUCTION ENGINEERING FOR BRIDGES
- Al Raha Beach Project
- Al Sowwah Island Project Phase 1
- Improvement of Jamarat Bridge, Mina, Saudi Arabia
- Waiwera Viaduct, New Zealand
- Lingkaran Luar Butterworth Package 1B-Bridge Over Sungai Prai
- Westlink M7, Australia
- Telok Blangah and Pasir Panjang Semi- Expressway
COMPANY PROFILE

BRIDGES
**Project**
PENANG SECOND CROSSING

**Location**
PENANG, MALAYSIA

**Client**
UEM CONSTRUCTION SDN BHD.

**Owner**
JAMBATAN KEDUA SDN BHD.

**Value**
RM 2.2 BILLION (US$ 600 M)

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**Description**

The Penang Second Crossing Project consists of a 22km fixed link with a total of 16.5 kilometres of bridge works of which around 15 km is over water.

The Marine Bridge consists of the 16km of Approach Viaduct with a signature bridge over the navigation span. The Approaches consist of an externally prestressed twin concrete box girder deck constructed using precast concrete segments and erected using the whole span segmental construction method. The overall width of each box is 14.4m and span lengths are 55m.

RB’s design provided over RM 350 million in material savings alone when compared to the design put forward by UEM’s JV partner.

RB was appointed as the bridge specialist designer for the Marine Approach Viaduct in this design and build contract in which we also produced the shop drawings and carried out the alignment control of the deck.
<table>
<thead>
<tr>
<th>Project</th>
<th>KVMRT SBK LINE – PACKAGES V2 &amp; V3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>Klang Valley, MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>MUDAJAYA CORPORATION BHD.</td>
</tr>
<tr>
<td>Owner</td>
<td>MRT CORPORATION SDN BHD.</td>
</tr>
<tr>
<td>Value</td>
<td>RM 270 MILLION (US$ 77 M)</td>
</tr>
</tbody>
</table>

**Description**

THE Klang Valley MRT project involves the construction of a rail-based public transport network which, together with the existing light rail transit (LRT), monorail, KTM Komuter, KLIA Ekspres and KLIA Transit systems, form the backbone of the Greater Kuala Lumpur/Klang Valley region.

RB carried the concept and preliminary design of 40km of twin track segmental box girder for the precursor to the KVMRT Line 1. Following approval and amended designation to the KVMRT Line RB carried out the detailed design of 8km of twin track box girder through an urban environment between Kota Damansara to TTDI as elements of Packages V2 and V3 of the 51km long KVMRT Blue Line from Sungai Buloh to Kajang. This section comprised typically of simply supported externally post-tensioned precast segmental spans.
Description

The Bayan Lepas Expressway comprised the upgrading of the existing at-grade dual carriageway suffering extreme traffic congestions due to its proximity to the airport, an industrial zone and the recently completed Second Penang Crossing.

The project consists of an elevated highway extending approximately 3km for which RB carried out the detailed design for the entire length. The innovative use of a single 2.8m diameter bored piles and single columns placed within the central carriageway, avoiding any services, not only avoided traffic diversions and disruptions to traffic, but also managed to create savings well in excess of RM100 million.

In addition a three-span major structure crossing Sungai Kluang with a main span of 170m was designed by RB. The structure was opened to traffic in 2016.
Project | SKYPARK LINK  
Location | SUBANG, MALAYSIA  
Client | SKYPARK LINK SDN BHD  
Owner | KERETAPI TANAH MELAYU BHD  
Value | RM 1.5 BILLION (US$ 420 M )

### Description

The SkyPark Link is an 8km spur from the existing Port Klang Branch of the KTM to the SkyPark Terminal at Subang Airport. **RB were engaged by SkyPark Link Sdn Bhd to carry out a Value Engineering Design for the box girder structures.**

The in situ sections have span lengths varying from 40m to 150m, built in balanced cantilever. The total deck area for the box girder structures of approximately 16,000m². The **Value Engineering Design saved in excess of RM 25 million** compared to the conforming Design.
Description

The West Coast Expressway is built on the west coast of Peninsular Malaysia. It connects Taiping, Perak to Banting in Selangor. WCE engaged RB to complete an assessment of the existing Sultan Yusof Bridge, with a main span of 160m, including a seismic study, and to carry out the detailed design of the duplicate Sultan Yusof Bridge also with a main span of 160m. The overall length of the new bridge is approximately 1.1km.

The bridge consists of 350m of a main bridge with 368.5m and 335m of approach viaducts. The main bridge is a 3-span cast in-situ balanced cantilever box girder with spans of 95m-160m-95m, these main spans represent close to the longest of this structure type in Malaysia.
**Description**

The main viaduct is 453m long and consists of two sections each approximately 226m long. One section spans the roundabout at Jalan Telok Wan Jah, the second spans the existing and the new railway. The viaduct runs along the main central reserve of the existing Jalan Telok Wan Jah. One of the key criteria for the alternative design was to minimize traffic disruption to this existing road.

The viaduct superstructure consists of precast post tensioned T beams with insitu slab stitches placed as simply supported structures but made integral with the pier and are continuous for live loads.

The viaduct substructure consists of a precast post tensioned crosshead which is made integral with the deck. The pier is supported on a single 2.8m diameter bored pile used for the first time for a bridge project in Malaysia.

This form of extension viaduct construction over the busy road has minimised service relocation, land acquisition, reduced traffic congestion and temporary works costs.
<table>
<thead>
<tr>
<th><strong>Project</strong></th>
<th>PENANG BRIDGE WIDENING – ALTERNATIVE PILE DESIGN</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Location</strong></td>
<td>PENANG ISLAND, MALAYSIA</td>
</tr>
<tr>
<td><strong>Client</strong></td>
<td>UEM CONSTRUCTION SDN. BHD.</td>
</tr>
<tr>
<td><strong>Owner</strong></td>
<td>PENANG BRIDGE SDN. BHD.</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>RM450m (US$125m)</td>
</tr>
</tbody>
</table>

**Description**

The project involves the widening and upgrading of the existing Penang Bridge Marine Approach viaducts and land interchanges.

The project consists of additional bridge deck area added on both carriageways along with additional substructure and piling adjacent to the existing foundations. In the conforming design the foundations consisted of 60m to 90m deep bored piles within a full length non-structural steel casing.

RB’s alternative design dispensed with full-depth boring by utilising the structural capacity of the steel casing thereby saving 30-40% of the boring costs as well as speeding up construction significantly.
## Project
ELECTRIFIED NORTHERN DOUBLE TRACKING – BUKIT MERAH VIADUCT

## Location
BUKIT MERAH, MALAYSIA

## Client
MMC-GAMUDA JV

## Owner
KERETAPI TANAH MELAYU BHD.

## Value
RM 75 MILLION (US$ 22M)

## Description
Tasik Bukit Merah Viaduct, with a total deck area of 41,000m², consists of 3.5km of reinforced concrete ribbed slabs supported on pile caps over driven pile foundations and is one of the major structures of the Northern Double Tracking project to replace the existing single track causeway.

The deck structure consists of 4No. precast reinforced concrete beams erected and stitched together transversely and spanning 15m. **Module lengths between expansion joints are 14 spans in order to minimize maintenance issues. Most piers were made monolithic** with the superstructure thereby, again, **saving on bearings and maintenance**.

RB was appointed as the bridge specialist consultant for the design and supervision services.
Description

The project involves the upgrading of the existing Jalan Balakong, congested and high traffic volume area which led to a complex alignment with a three tiers interchange and a half-diamond interchange.

The project consists of elevated ramps and an extension area. Ramp ‘A’ is a two-lane 2nd tier U-shaped through girder with monolithic deck slab. This innovative and unusual form of construction was chosen to reduce the overall construction depth, thus leading to substantial savings of overall bridge length for the higher level structures.

Ramps ‘B’ and ‘D’ are 3rd tier combination of in situ box girder and prestressed concrete twin ribs designed for maximum economy.

The overall width of ramps are between 7.9m to 8.9m with total length of 1.2km. Spans vary between 25m and 65m, with a total deck area of 13,600m².

RB was appointed as the bridge specialist designer in this design and build contract which was completed in under 2 years from our appointment.
Project: KL PUTRAJAYA HIGHWAY PACKAGE 1 RAMP 1  
Location: KUALA LUMPUR  
Client: LEIGHTON CONTRACTORS (M) SDN BHD  
Owner: MAJU HOLDINGS BHD  
Value: RM 6M (US$1.7M)

Description
Alternative Design of a 150m long 9.7m wide 3-span bridge over one of the busiest roads in Malaysia - Jalan Tun Razak in Kuala Lumpur. The deck consists of continuous steel composite twin box girder with a highly curved main span of 63m and side spans of 43.5m and 49.1m.

The steel box girders were erected in a total of 8 night possessions in order to satisfy the very tight programme. Construction of the bridge deck commenced in September 2007 and is due for completion by mid-November 2007.

RB was appointed as the specialist bridge design consultant with the scope of designing the steel composite bridge deck and to provide construction technology and temporary works services to the contractor.
<table>
<thead>
<tr>
<th>Project</th>
<th>KL PUTRAJAYA HIGHWAY PACKAGE 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>KUALA LUMPUR</td>
</tr>
<tr>
<td>Client</td>
<td>LEIGHTON CONTRACTORS (M) SDN BHD</td>
</tr>
<tr>
<td>Owner</td>
<td>MAJU HOLDINGS BHD</td>
</tr>
<tr>
<td>Value</td>
<td>RM1.3b (US$485m )</td>
</tr>
</tbody>
</table>

**Description**

The 42km KL Putrajaya Highway starts at Jalan Tun Razak / Kampung Pandan Roundabout, traversing central KL, southern Selangor and Cyberjaya development before terminating at the new KL International Airport at Sepang.

RB was appointed as the specialist bridge design sub-consultant with the scope of designing the precast segmental crossheads and to provide construction technology and temporary works services to the contractor.
Description

Design of five 1.4 km of high level ramps over highly trafficked existing Highways at two interchanges as part of a traffic dispersal scheme on the western side of Kuala Lumpur.

The interchanges requiring high level ramps are part of a larger system to be built and operated as a toll concession. RB was appointed by the contractor as the bridge specialist designers, also providing shop drawings, alignment control, temporary works and construction technology services as part of a total engineering package.

The five ramp structures consist of precast segmental concrete box girders having a maximum span of 65 m carrying two-lane carriageways. The project was completed in 2000.
**Project**
PENCHALA LINK, SPRINT HIGHWAY

**Location**
KUALA LUMPUR, MALAYSIA

**Client**
PERSYS SDN. BHD.

**Owner**
GMMJV / GAMUDA BERHAD

**Value**
RM15m (US$4M)

**Description**
Penchala link is one of several links of what is known by SPRINT highway or previously The Western Kuala Lumpur Traffic Dispersal Scheme, having several high-level ramps and loops. RB was appointed by the contractor as the bridge specialist designers, also providing shop drawings, alignment control, temporary works and construction technology services.

This link consists of **two ramps with a total length of 573m**, namely Ramp 1/3 and Ramp 1/4 constructed over the LDP highway with Ramp 1/3 as a dual carriageway consisting of 7 spans with a total length of 340m and a deck area of 3005m² and Ramp 1/4 as a one-lane carriageway deck with a total length of 233m with 7 spans and a total deck area of 1870m². Both ramps were built using the precast segmental balanced cantilever method in this design and build contract.

The substructure for both ramps comprised of large diameter bored piles socketed into the granite rock formation, with a rigid pilecap supporting the Y-shaped freestanding columns.
<table>
<thead>
<tr>
<th>Project</th>
<th>NEW PANTAI HIGHWAY – DIRECTIONAL RAMP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>KUALA LUMPUR, MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>ROAD BUILDER (M) SDN. BHD.</td>
</tr>
<tr>
<td>Owner</td>
<td>NEW PANTAI EXPRESSWAY SDN. BHD.</td>
</tr>
<tr>
<td>Value</td>
<td>RM25m (US$7m)</td>
</tr>
</tbody>
</table>

**Description**

The New Pantai Highway is a privately financed project by Road Builder (M) Sdn Bhd. RB was appointed by Road Builder as the bridge specialist designers, providing shop drawings, alignment control, temporary works and construction technology services.

Several interchanges (free flowing junctions) were required with 4 high level ramps constructed over rivers, existing live highway and KTM railway tracks.

The deck consists of a single carriageway with a total width of 8m of prestressed concrete box girders with spans varying between 30m and 50m, with a total length of 1.6km.

The deck box girders were crane-erected using the balanced cantilever method. Cantilevers were stabilised during construction by means of a prop/tie system.

This project won the Construction Industry Development Board’s Award for Excellence in Construction in 2005.
**Project**  
NEW PANTAI HIGHWAY – BRIDGES 5 & 6

**Location**  
KUALA LUMPUR, MALAYSIA

**Client**  
ROAD BUILDER (M) SDN. BHD.

**Owner**  
NEW PANTAI EXPRESSWAY SDN. BHD.

**Value**  
RM35m (US$10m)

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**Description**

Bridges 5 and 6 designed by RB utilises cast in-situ construction of the deck and substructure. Each span length has been maintained at 25 m to standardise the spine beam deck and substructure formwork design.

The deck of both bridges consists of twin in-situ spine beam and slabs. The post-tensioned deck is continuous longitudinally and monolithic with the piers. Expansion joints in the deck are placed at the pier, every 5 to 6 spans, and there are no bearings at all within the viaduct thus minimising maintenance costs.
**Project**  
NEW PANTAI HIGHWAY – BRIDGES 7 & 8

**Location**  
KUALA LUMPUR, MALAYSIA

**Client**  
ROAD BUILDER (M) SDN. BHD.

**Owner**  
NEW PANTAI EXPRESSWAY SDN. BHD.

**Value**  
RM40m (US$11M)

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**Description**

RB was appointed as the bridge specialist designers, providing shop drawings, temporary works and construction technology services.

The bridge consists of 1.2km Precast post-tensioned ‘T’ beams supported on post-tensioned precast segmental crossheads cantilevering 12m over busy roads. The crossheads are supported on single central columns and spans are typically 38m.

RB introduced the technique of Precast Segmental Crossheads for the first time to Malaysia, and this method has become widely used ever since. The use of single columns and single piles eliminated the need for pilecaps, and reduced the space in-take in the road leading to savings in road diversions and permanent works costs as well as reducing the disruption to traffic during construction.
**Description**

Alternative Design and Construction Technology of 2.5km of main line viaducts and ramps. The balanced cantilever precast segmental box girder deck is monolithic with the single leaf reinforced concrete piers which are positioned within the central reservation, thus minimising the number of bearings and their associated maintenance costs.

The deck was supported on post-tensioned precast segmental crossheads cantilevering 15m over busy road supported on a single column placed within the central reserve, thus minimising traffic disruption during construction.

RB introduced this technique for the first time to Singapore.
<table>
<thead>
<tr>
<th>Project</th>
<th>SENTOSA PEOPLE MOVER SYSTEM</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>SINGAPORE</td>
</tr>
<tr>
<td>Client</td>
<td>INNOVATIVE STRUCTURAL SYSTEMS PTE LTD.</td>
</tr>
<tr>
<td>Owner</td>
<td>SENTOSA DEVELOPMENT CORPORATION</td>
</tr>
<tr>
<td>Value</td>
<td>RM69M (US$20M)</td>
</tr>
</tbody>
</table>

**Description**

This project involved the **detail design, alignment control and construction technology for monorail guideway beams**, and substructure for an elevated twin monorail with a total length of approximately 2.0 km.

The guideway beams consist of precast post-tensioned hollow rectangular concrete beams. The beams are supported on a common crosshead rising off a single pier column. On approaches to stations the beams are supported off a portal structure comprising two columns and a cross-beam. **The beams are continuous over supports and are monolithically connected to the columns without any bearings, with the benefit of reduced construction and maintenance costs.**

RB carried out the concept design and the detailed design of typical modules, and successfully transferred the technology to a Singapore based consultant to complete the detailed design of the whole project. **RB also carried out the complicated alignment control programming for a high precision precasting system. In addition RB assisted the contractor in developing a contractor friendly method of precasting the beams to achieve the stringent casting tolerances imposed by the train manufacturers.**
<table>
<thead>
<tr>
<th>Project</th>
<th>SUNGAI DINDING BRIDGES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>HMS PERUNDING SDN. BHD.</td>
</tr>
<tr>
<td>Owner</td>
<td>DEPARTMENT OF PUBLIC WORKS, MALAYSIA</td>
</tr>
<tr>
<td>Value</td>
<td>RM300M (US$85M)</td>
</tr>
</tbody>
</table>

**Description**

For this design and build contract RB was Benaim Group’s lead consultant responsible for the procurement of and coordination of the detailed design, construction technology services, and temporary stage designs for the contractor on this **1.2km long main bridge** carrying a new road over the Sungai Dinding Estuary.

The design was completely integrated with the construction process to ensure ease of construction. The Bridge consists of reinforced concrete arches with spans from 45m to 90m supporting a steel beam and concrete slab composite deck. The arches were built *in situ* using the balanced cantilever method employing temporary steel towers and cable-staying. Two other bridges were also designed over Sungai Sitiawan and Sungai Tebok Raja Samalon with a combined length of 900m. These are prestressed concrete box girders with 45m spans built by incremental launching—the **first to be built by this method in Malaysia**. Construction started 1997 and was completed in 2000.
Description
Detailed design of two bridges over Sungai Sitiawan and Sungai Tebok Raja Samalon of 650m and 250m lengths respectively. The bridge decks consist of prestressed concrete box girders with 45m spans built by incremental launching – the first to be built by this method in Malaysia. Construction started 1997 and was completed in April 2000.

RB was appointed by the contractor as the bridge specialist designers and also providing temporary works and construction technology services.
Description
Design of a bridge structure with a total length of 1.1km and width of 27m, carrying a dual three-lane carriageway over two junctions on the heavily congested Middle Ring Road in Northern Kuala Lumpur.

With spans of 38m, the structure was constructed as precast prestressed concrete ‘U’ beams placed over a single central column, which were chosen due to their relatively low cost to meet the tight budget constraints.
Project: PUTRA JAYA RING ROAD – BRIDGE BR2
Location: MALAYSIA
Client: ACPI / PERSYS SDN. BHD.
Owner: PERBADANAN PUTRA JAYA
Value: RM7.4m (US$2m)

Description
Alternative design of 180m bridge carrying a (2/3 – lane) dual carriageway over the live KLIA Express rail Link. The deck consists of prestressed concrete precast segmental box girders. The twin boxes are crane-erected using the balanced cantilever method and made continuous by means of continuity prestress. Construction commenced in December 2001 and completed in 2002.
Description
Alternative design of a two 60m span continuous post-tensioned in-situ concrete box girder bridge, 39.5m wide and consists of two twin-cell box girder with varying depth from 2.25m to 42.5 long along its 120m total length.

The box girder was constructed and post-tensioned with the prestressing tendons anchored at ends eliminating the need for intermediate concrete blisters thus simplifying construction. The bridge was founded on 1500m diameter bored piles. The entire bridge superstructure was constructed on falsework.

RB’s alternative design achieved over 40% material savings as well compared to the conforming design as simplifying and speeding up the construction process.
<table>
<thead>
<tr>
<th>Project</th>
<th>EAST COAST EXPRESSWAY PACKAGE 1F1 &amp; 1G1 BRIDGES</th>
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</thead>
<tbody>
<tr>
<td>Location</td>
<td>KUANTAN, MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>NGL BUILDERS SDN. BHD.</td>
</tr>
<tr>
<td>Owner</td>
<td>MALAYSIAN HIGHWAY AUTHORITY</td>
</tr>
<tr>
<td>Value</td>
<td>RM40m (US$11m)</td>
</tr>
</tbody>
</table>

**Description**

Design and Construction Supervision of a 495m long multi-span prestressed concrete T-beam viaduct over Sg. Kuantan and six other integral bridges of varying span lengths carrying the East Coast Expressway project in the state of Pahang, Malaysia.

Some of the bridge designs on this turnkey contract featured integral abutments and monolithic piers eliminating bearings and expansion joints altogether thus enhancing durability, reducing maintenance costs and improving rideability. Construction was completed in September 2003.
**Project**: EXPRESS RAIL LINK – FEDERAL HIGHWAY CROSSING  
**Location**: KUALA LUMPUR, MALAYSIA  
**Client**: SPYTL  
**Owner**: EXPRESS RAIL LINK  
**Value**: RM6M (US$2M)

**Description**

Detailed design of 200m length of a highly skewed continuous bridge across the busiest highway in Malaysia.

The prestressed concrete segmental bridge employs a combination of internal and external post-tensioning and was built using precast segments match-cast by the short-line method and erected by crane using the balanced cantilever technique employing a temporary prop-tie system.

RB was appointed by the contractor as the bridge specialist designers, also providing shop drawings, alignment control, temporary works and construction technology services.
<table>
<thead>
<tr>
<th>Project</th>
<th>JAMBATAN CISOMANG</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>INDONESIA</td>
</tr>
<tr>
<td>Client</td>
<td>PT L&amp;M PRESTRESSING (INDONESIA)</td>
</tr>
<tr>
<td>Owner</td>
<td>PT JASA MARGA</td>
</tr>
<tr>
<td>Value</td>
<td>RM7.6M (US$2M)</td>
</tr>
</tbody>
</table>

**Description**

Detailed Design of a 190m long bridge carrying a new toll road over Sungai Cisomang’s within a heavy seismic zone in Indonesia over a deep valley.

The bridge consists of two parallel carriageways with a total width of 26.9m supported on 38m span precast post-tensioned ‘T’ beams featuring 2-stage prestressing and monolithic connections with the RC columns up to 50m tall. The structure was designed to resist heavy earthquake forces using the latest “push-over” analysis techniques.
<table>
<thead>
<tr>
<th>Project</th>
<th>EXPRESS RAIL LINK – KUALA LUMPUR TO KL INTERNATIONAL AIRPORT</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>SYARIKAT PEMBENAAN YEOH TIONG LAY SDN. BHD. (YTL)</td>
</tr>
<tr>
<td>Owner</td>
<td>EXPRESS RAIL LINK SDN. BHD.</td>
</tr>
<tr>
<td>Value</td>
<td>RM2.9B (US$830M)</td>
</tr>
</tbody>
</table>

**Description**

Design of 40 bridges for this new railway system. The bridges vary from simple footbridges to cut-and-cover box bridges and viaducts. The longer viaducts are designed using twin precast post-tensioned T-beams for economy in materials. The longest viaduct is 2.3km and the largest box bridge is 110m in length. Construction started 1997 and was completed in 2001.
<table>
<thead>
<tr>
<th>Project</th>
<th>UPGRADING OF JALAN LOKE YEW</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>KUALA LUMPUR, MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>NGL BUILDERS SDN. BHD.</td>
</tr>
<tr>
<td>Owner</td>
<td>DEWAN BANDARAYA KUALA LUMPUR</td>
</tr>
<tr>
<td>Value</td>
<td>RM 26M (US$7M)</td>
</tr>
</tbody>
</table>

**Description**

This alternative design project consists of 5 bridges part of the widening of the heavily trafficked Jalan Loke Yew in the vicinity of the KTM railway and STAR LRT lines, in central Kuala Lumpur.

An alternative design solution was adopted here for the main bridge over the existing railway comprising a pair of three-span structures, with a main span of 50 m, and side spans of 22 m. Continuous prestressing and monolithic connection to substructures were used to enable an unusually shallow structural depth thus avoiding the need for supports within the railway zone, and this was the winning alternative design solution.
**Project**
UPGRADING OF JALAN SUNGAI BESI – KL-SEREMBAN HIGHWAY OVERPASS

**Location**
KUALA LUMPUR, MALAYSIA

**Client**
LAN KONSULT SDN. BHD.

**Owner**
BESRAYA (M) SDN. BHD.

**Value**
RM10m (US$3m)

**Description**
Design of 300m long bridge carrying the upgraded Jalan Sungai Besi Carriageway over the KL-Seremban Highway. The deck consists of prestressed concrete precast segmental box girders continuous over 38m spans constructed using the balanced cantilever method, by crane erection and a stabilising steel prop-tie system. Construction was completed in January 1999.

RB was appointed by the contractor as the bridge specialist designers, also providing shop drawings, alignment control, temporary works and construction technology services.
<table>
<thead>
<tr>
<th>Project</th>
<th>UPGRADE OF JALAN SUNGAI BESI – VIADUCTS OVER KTM &amp; ERL</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>KUALA LUMPUR, MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>LAN KONSULT SDN. BHD.</td>
</tr>
<tr>
<td>Owner</td>
<td>BESRAYA (M) SDN. BHD.</td>
</tr>
<tr>
<td>Value</td>
<td>RM20m (US$6m)</td>
</tr>
</tbody>
</table>

**Description**

Design of 700m of elevated viaducts carrying the upgraded Jalan Sungai Besi Carriageway over the existing live KTM and Future ERL Railways at Salak Selatan in Kuala Lumpur.

The viaducts consist of **prestressed concrete precast segmental box girders** continuous over 38 m spans **constructed using the balanced cantilever** method. The segments are erected using mobile cranes and the balanced cantilevers are stabilised during launching using a temporary structural steel prop/tie system supported off the permanent works pilecaps.

Design was commenced on 1st April 1998 with viaduct construction completed in January 1999, under a year from our appointment.
Project: STAR LIGHT RAIL TRANSIT SYSTEM
Location: KUALA LUMPUR, MALAYSIA
Client: TRAVERS MORGAN (MALAYSIA) (PHASE 1)
Owner: SISTEM TRANSIT ALIRAN RINGAN SDN. BHD.
Value: RM202M (US$57M)

Description
Design of 5.6km of elevated twin track railway viaduct through the centre of Kuala Lumpur. RB designed the viaduct to carry part of the load for the elevated stations. The viaduct is part of a 20km system, built and operated as a concession. The deck was built with a launching girder using the precast glued segmental technique. Completed 1998.

Where possible columns were supported on single piles, thereby avoiding the need for pilecaps and minimizing disruption to the city street.
C N Gallery
Kuala Lumpur, Malaysia

RB was appointed to provide an alternative design for the contractor whose brief was to construct a six-storey basement structure with three tower blocks above, up to 30 stories high. The contractor required a design that would add value through time and cost savings.

The basement was built top-down using steel plunge columns within the bored piling that allowed simultaneous construction of the substructure and the superstructure. The tower blocks were all value engineered to incorporate both beam and slab construction, and concrete flat slabs and shear walls.

Pan Pacific Hotel
Penang, Malaysia

RB was appointed to carry out a redesign of the Pan Pacific Hotel.

The construction of this high rise hotel in marine clay involved the use of diaphragm walls at basement level with the car park ramps and slabs acting as struts and walings.

The superstructure was of reinforced concrete construction with large spans over entrance foyers featuring transfer structures.
KL Sentral Station  
Kuala Lumpur, Malaysia

RB International carried out the detailed design of the Auditorium and approach ramps of the KL Sentral Station, the integrated transportation hub of Kuala Lumpur.

The ramp structures utilise post-tensioned precast shell beams built in staged with maximum spans of 31m built over live rails. The auditorium deck utilises precast double tee slabs with spans of 7m length built over live rails.

Bukit Beruntung Housing Development  
Selangor, Malaysia

Structural design of blocks F, G and K for this development by MK Land. The development consists of 3 and 4-storey commercial and residential blocks with open plan ground floors requiring transfer beams at 1st floor level.

STAR Light Rail Stations  
Kuala Lumpur, Malaysia

RB International designed this innovative light rail system, which was constructed through the heart of Kuala Lumpur. Work included a series of stations constructed on top of the widened and strengthened viaduct.
Telekom Building, Kuala Lumpur, Malaysia
Legends Golf and Country Resort, Malaysia

These two projects demonstrate the range of services that RB International can provide.

Value engineering input was provided to the contractor for the design and construction sequencing for the 25 storey high-rise Telekom Malaysia building in Kuala Lumpur.

RB International has also provided geotechnical advice for the design of foundations on the Legends Golf and Country Resort.

Nam Cheong Station, Hong Kong
Dubai Airport Expansion, United Arab Emirates

As part of the Benaimgroup, RB International has assisted its sister offices in several building projects providing RC drafting and coordination services involving design input.
**Project**  NEW DOHA INTERNATIONAL AIRPORT-MID FIELD AND FTZ TUNNELS  
**Location**  DOHA, QATAR  
**Client**  SINOHYDRO GAMUDA WCT JV  
**Owner**  QATARI CIVIL AVIATION AUTHORITY/OVERSEAS BECHTEL, INC  
**Value**  RM1.8b (US$515M)

**Description**

With an overall footprint of about 5.8km by 4.0km NDIA is located on the coastal strip immediately east of the existing Airport west of Doha.

RB’s scope in this design and build contract currently under construction includes the detailed design of 2 road tunnels built using the cut-and-cover method.

The Midfield Access Road Tunnel, with a total length of 1.1km and width of 50m, and the Free trade Zone Tunnel, with a total length of 1.1km and width of 37m pass beneath the runway and are subject to heavy A380 aircraft loading.
Description
The KLCC Tunnels project comprises the construction of 1 pedestrian and 1 vehicular tunnel in a design and build contract. The tunnels connect the existing landmark KLCC twin Towers to the new Convention Centre.

The total tunnel length is approximately 250m with a width of 6-8m.

Both tunnels are reinforced concrete structures built using the cut-and-cover construction method. Each tunnel was designed using a ground bearing base slab.

RB’s scope included the permanent works design as well as temporary earth retaining structures. Significant cost and programme savings were achieved through careful design optimisation by RB.
Description

RBI Singapore was Benaim Group’s lead consultant responsible for the procurement and coodination of the detailed design for the contractor. This project comprised two underground stations which were also designed as civil defence shelters each capable of holding 7,500 people and withstanding a direct bomb blast.

The stations had to be constructed beneath the busy Upper Serangoon Road and immediately adjacent to commercial and housing structures.

Working together with the contractor in this design and build project the team developed a “semi-top-down” method of construction where parts of the permanent works were used as temporary works to provide the strutting system for the diaphragm walls, thus not only making the construction simpler and safer, but also reduced the temporary works costs very significantly.
**Project**
AL RAHA BEACH PROJECT

**Location**
ABU DHABI, UAE

**Client**
ALDAR LAING O’ROURKE.

**Owner**
ALDAR

**Value**
AED 54 BILLION (US$ 15BN)

---

**Description**

Al Raha Beach is a 500 ha mixed-use waterfront development adjacent to the main highway leading into Abu Dhabi from Dubai in the United Arab Emirates.

It consists of eleven mixed-used precincts over a length of 11km and includes six major interchanges with the existing highway; 75 bridges and extensive road, light rail and canal networks.

RB was appointed by Aldar-Laing O’Rourke to value engineer interchange bridges and retaining wall structures as well as to carry out temporary works designs for the bridge structures. RB also seconded senior staff to carry out audits on buildability and value management on existing designs.
**Project**
AL SOWWAH ISLAND PROJECT PHASE 1

**Location**
ABU DHABI, UAE

**Client**
AL NABOODAH CONTRACTING LLC

**Owner**
MUBADALA

**Value**
AED 3.0 BILLION (US$ 800M)

---

**Description**

Al Sowwah Island Project is an 105 ha commercial development located between Al Reem Island, Abu Dhabi Island, and Mina Zayed in the United Arab Emirates.

The transport network will include 13 bridges and a mass transit system with both light and heavy rail and will connect Sowwah Island and Abu Dhabi Island to Al Reem Island and Mina Zayed.

RB was appointed by Al Naboodah Contracting to carry out temporary works designs and checks for the bridge structures as well as providing advice on construction and design issues.
Description

The Jamarat Bridge consists of a 600m long by 100m wide building on four floors each consisting of a succession of precast segmental box girders to create a 100m wide column free space.

RB provided Shop drawings for Casting and Erection of the structure along with detailed stage by stage temporary prestress calculations.

Production of all shop drawings along with casting and erection of over 1200 segments of the first floor was completed in just 14 months. More than 5000 segments are required overall to complete the structure.
Description

The Waiwera Viaduct consists of 2no. 8-span variable depth continuous bridge decks supported on reinforced concrete piers and bored piles. The superstructure is a precast segmental box girder, to be cast using the short line method and installed by the balanced cantilever method using an overhead launching gantry. At three of the 7no. intermediate piers, the box girder superstructure will be monolithic with the columns.

There are a total of 356 segments, each of length 2909mm, giving a total length of 517m for each bridge. The two bridge decks have identical span lengths but differing horizontal and longitudinal alignments. The box width is 5.4m, the top flange is 11.705m wide and the box depth varies linearly from 4.3m at the piers to 2.4m midspan.

RB provided Construction Technology Services in determining the Precamber and Alignment Control for Casting and Erection of the Bridge. All the work on this project was carried out in our Kuala Lumpur office allowing our contractor client to obtain an excellent service while benefiting from the lower cost base in Malaysia.
<table>
<thead>
<tr>
<th>Project</th>
<th>LINGKARAN LUAR BUTTERWORTH PACKAGE 1B-BRIDGE OVER SUNGAI PRAI</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>MALAYSIA</td>
</tr>
<tr>
<td>Client</td>
<td>BALLAST NEDAM (MALAYSIA) SDN BHD</td>
</tr>
<tr>
<td>Owner</td>
<td>LINGKARAN LUAR BUTTERWORTH (PENANG) SDN BHD</td>
</tr>
<tr>
<td>Value</td>
<td>RM230M (US$66M)</td>
</tr>
</tbody>
</table>

**Description**

Shop drawings and alignment control for segmental precasting of 1.8km of elevated dual carriageway viaduct including a 185m cable-stayed main span and 1.3km of ramps all to be erected using the span-by-span method.

**RB** also provided design services for the segment precasting yard, factory building and erection and precasting temporary works.
<table>
<thead>
<tr>
<th>Project</th>
<th>WESTLINK M7</th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td>SYDNEY, AUSTRALIA</td>
</tr>
<tr>
<td>Client</td>
<td>ABIGROUP-LEIGHTON JOINT VENTURE.</td>
</tr>
<tr>
<td>Owner</td>
<td>WESTLINK CONSORTIUM</td>
</tr>
<tr>
<td>Value</td>
<td>RM 4.4b (US$1.3b)</td>
</tr>
</tbody>
</table>

**Description**

Alignment control services to the contractor for 34 no. precast segmental bridges comprising 2700 segments built as part of Sydney's Westlink Project.

Erection was carried out using a range of methods including balanced cantilever method, on falsework and using underslung gantries.
**Project**
**Location**
**Client**
**Owner**
**Value**

**TELOK BLANGAH AND PASIR PANJANG SEMI-EXPRESSWAY**
SINGAPORE
L&M PRESTRESSING (SINGAPORE)
LAND TRANSPORT AUTHORITY
RM130M (US37M)

---

**Description**

Construction Technology advice on setting-up of precast yard, procurement of equipment and suppliers, design of temporary works and establishing segment precasting procedures.

**RB** also seconded staff to the precasting factory to assist in the match-casting of 1500 segments for the Telok Blangah Semi-Expressway Viaducts.
Registration Certificate

This is to certify that the Management Systems of

RB INTERNATIONAL SDN BHD

have been assessed by AGM Certification Sdn Bhd and registered against the requirements of

QUALITY MANAGEMENT SYSTEM
ISO 9001:2008

Certificate No.: AGM15/10221 Date of Original Registration: 10/12/2001
Date of Expiry: 17/06/2018 Date of Re-Registration: 15/05/2015

[Signature]

PRESIDENT, AGM CERTIFICATION

AGM™

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This certificate is issued in respect of the locations and scope of registration.
This certificate is the property of AGM Certification Sdn Bhd and must be returned on request to AGM Certification Sdn Bhd at Suite B-3-18, Capital 2, Oasis Square Ara Damansara, No. 2, Jalan PJU 1A/7A, 47301 Petaling Jaya, Selangor Darul Ehsan, Malaysia.
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Registration Certificate

This is to certify that the Management Systems of

RBI SINGAPORE PTE LTD

have been assessed by AGM Certification Sdn Bhd
and registered against the requirements of

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ISO 9001:2008

Certificate No.: AGM15/10223 Date of Original Registration: 10/12/2001
Date of Expiry: 17/06/2018 Date of Re-Registration: 15/05/2015

PRESIDENT, AGM CERTIFICATION

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STANDARDS MALAYSIA

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Achievement of Excellence

to

RB INTERNATIONAL SDN. BHD.
as the Project Manager

for


under

THE BEST PROJECT AWARD
(Infrastructure Project-Major)

in

The Malaysian Construction Industry Excellence Awards 2015

DATO' SRI IR. DR. JUDIN ABDUL KARIM
Chief Executive
CIDB Malaysia
MASTERCLASS

MILLI WOODS
GLOBAL AWARDS 2013
31st October 2013 | Kuala Lumpur, Malaysia

ENHANCED VALUE ENGINEERING

Afshin Forouzani
RB International Sdn Bhd

Dato' Raymond Liew
President, McMillan Woods
ROAD ENGINEERING EXCELLENCE AWARD
2014
presented to
China HDPI Consultant Co. Ltd.
and
RB Perunding Sdn Bhd
as Principal Designers for
Jambatan
Sultan Abdul Halim Mu’adzam Shah
Pulau Pinang

Dato’ Seri Ir. Haji Mohd Noor bin Yaacob
PRESIDENT

Datuk Ir. Haji Adanan bin Mohamed Hussain
DEPUTY PRESIDENT
AKTA PENDAFTARAN JURUTERA 1967
PERATURAN-PERATURAN PENDAFTARAN JURUTERA 1990
(PERATURAN 35)
No. Perakuan: 1699-1000-BC-570

LEMBAGA JURUTERA MALAYSIA
PERAKUAN PENDAFTARAN SEBAGAI AMALAN JURUTERA PERUNDING

INI ADALAH UNTUK MEMPERAKUI BAHAWA

Nama:
Pertubuhan Perbadanan
RB PERUNDING SDN. BHD.

Alamat:
UNIT 519 BLOK A KELANA CENTRE POINT
3 JALAN SS 7/19
KELANA JAYA
47301 PETALING JAYA SELANGOR

Cawangan Kejuruteraan:
** CIVIL **

yang telah mematuhi kehendak-kehendak Akta Pendaftaran Jurutera 1967 dan telah membayar fee pendaftaran didaftarkan sebagai suatu AMALAN JURUTERA PERUNDING dalam cawangan kejuruteraan yang dinyatakan di atas tertakluk kepada syarat-syarat yang dinyatakan di bawah.

Syarat-syarat:

Hanya Ir. Yap Yoon Cheong aktif di RB Perunding Sdn. Bhd. manakala

Perakuan pendaftaran ini akan habis tempoh pada 31 DESEMBER 2016

(DATUK Ir. ADANAN BIN MOHAMED HUSSAIN)
Yang Dipertua

(Ir. HIZAMUL-DIN BIN AB. RAHMAN)
Pendaftar

Tarikh dikeluarkan:
30 DECEMBER 2015

** No. Resit 267644 ** MZU 29122015/2870257407 ** RM1,000.00 ** Tarikh bayaran:30-12-2015**
[ RM1,000.00(Renewal Fee) ]
Pengesahan pendaftaran hendaklah disemak di sana kan web www.bem.org.my
KEMENTERIAN KEWANGAN MALAYSIA
SIJIL AKUAN PENDAFTARAN FIRMA PERUNDING

NO SIJIL : J22005392651541109
NO RUJUKAN PENDAFTARAN : 465-02030825
TEMPOH SAH LAKU : 26/11/2015 - 25/11/2018

Bahawa dengan ini diperakui Firma Perunding:

RB PERUNDING SDN BHD (475555X)
UNITS 519, BLOCK A, KELANA CENTRE POINT,
NO.3, JALAN SS7/19, KELANA JAYA
PETALING
47301 PETALING JAYA
SELANGOR, MALAYSIA

Telah berdaftar dengan Kementerian Kewangan Malaysia dalam bidang perkhidmatan perunding di bawah bidang dan sub-bidang seperti di Lampiran A1. Kelulusan ini adalah tertakluk kepada syarat-syarat seperti yang dinyatakan di Lampiran B1. Individu yang diberi kuasa oleh firma perunding bagi urusan perolehan Kerajaan adalah seperti berikut:

AFSHIN FOROUZANI
761243314
GENERAL MANAGER

L.L.

DATO’ HASHMUDDIN BIN MOHAMMAD
Bahagian Perolehan Kerajaan
& Ketua Setiausaha Perbendaharaan
Kementerian Kewangan Malaysia

Tarikh Berdaftar Dengan Kementerian Kewangan Malaysia : 26/11/2015

(Sijil ini adalah cetakan komputer dan tidak memerlukan tandatangan)