



SIKA AT WORK THE TUNNEL PROJECTS

JUNE 2015 / SIKA LIMITED (VIETNAM)

BUILDING TRUST



TABLE OF CONTENTS

1	NEW ZEALAND	3
1.1	JOHNSTONE'S HILL TWIN TUNNEL	3
2	THAILAND	5
2.1	Bangkok – MRT Blue Line – Contract No.1	5
3	VIETNAM	6
3.1	Hai Van Pass Tunnel	6
3.2	Vo Van Kiet Boulevard	7
3.3	Hiep Hoa Tunnel	8
3.4	Ca Road Pass Tunnel	9
4	HONGKONG	10
4.1	CEDD - CV/2012/08	10
4.2	CEDD - CV/2012/08	10
4.3	MTR - C6564-11C	10
4.4	MTR - Kwun Tong Line Extension - KTE 1002	10
4.5	DSD HATS DC/2009/10	10
4.6	MTR - South Island Line (East) - Contract SIL 902	10
4.7	MTR - Shatin to Central Link - Contract 1103	10
4.8	MTR - South Island Line (East) SIL 901	10
4.9	DSD HATS DC/2007/24	10
4.10	CEDD - HK/2009/02	10
4.11	MTR - Express Rail Link (XRL) - Contract 823B	11
4.12	MTR - South Island Line (East) - Contract 902	11
4.13	MTR - Express Rail Link (XRL) 821	11
4.14	MTR - West Island Line (WIL) 705	11
4.15	TDD - Contract No. HK12/02	11
4.16	MTR - West Island Line (WIL) 708	11

1 NEW ZEALAND

1.1 JOHNSTONE'S HILL TWIN TUNNEL

Contractor: Northern Gateway Alliance

Client: New Zealand Transport Authority

Project

The tunnels run a total length of 640m and the tunnel design includes two cross-passages, lighting, ventilation and fire protection. The tunnels were constructed through a steep ridgeline clad with native forest. The decision to construct the tunnels option resulted in significant safety, aesthetic and environmental benefits.

Construction of the tunnels started in January 2006 and the project was completed middle 2009.

Challenge

The motorway had several engineering challenges including the site's location within a steep mountainous area high in ecological value. The initial tunnel support was to be sprayed concrete incorporating steel fibres, and the shotcrete mix had to meet the specified compressive and flexural strength tests. The batching plant was approximately 30 minutes away from the tunnel site, and it was the preference of the Tunnel Engineer that the mix was not to be dosed with admixture on site.

Sika Solution

Sika offered the following solutions for the concrete application to the tunnel:

- **Sika ViscoCrete SC305** - retarding superplasticiser
- **Sigunite L53-AF** - accelerating sprayed concrete at the nozzle during application
- **SikaTard-930** - set stabilising admixture, which controls cement hydration allowing the concrete to be sprayed 12-18 hours after batching.
- **Sika Aliva PM500** Robot Sprayed Concrete machine for the shotcrete application.



Breaking through to the otherside of Johnstone's Hill



The concrete tunnel lining was then poured against the Sikaplan membrane. The concrete contained Sika ViscoCrete 5-500 a superplasticiser for an ultra-smooth finish.



The Sika Aliva PM500 in action



The Sika Aliva PM500 robotic arm sprays the shotcrete containing Sika ViscoCrete SC305 retarding superplasticiser, and Sigunit L53-AF accelerator for sprayed concrete

Sika Products used in the Northern Gateway Johnstone's Hill Twin Tunnel Project:

GROUTING

Sika Grout-212, -215
 Sika Grout-212 HP
 Sika Grout GP
 Sikadur-31
 Sikadur-41
 Sikadur-42

CONCRETE REPAIRS

MonoTop Primer
 MonoTop Structural Mortar
 MonoTop High Build Mortar
 MonoTop Micro Concrete
 Renderoc LA 55
 Renderoc FC

Nitoprime Zinchrich
 Nitokit LV
 Nitokit TH

ARCHITEXTURES

Sika Blockbase

WATERPROOFING

SikaProof Torch-on 3P & 4P Mineral
 Sikaplan FPO

JOINT SEALANTS

Silaflex MS
 Sika Firerate
 Sika Firerate PU
 Plastiseal
 Sika Boom

Sikaflex Construction
 Sikaflex-11FC
 Sikaflex Tank

ADMIXTURES

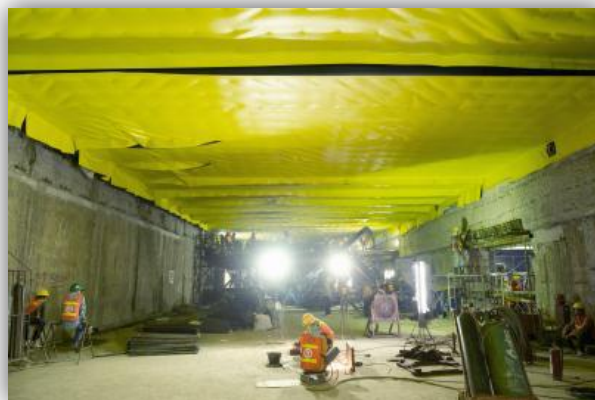
Sika ViscoCrete 5-500
 Sika ViscoCrete SC-305
 Formol
 Rugasol MH & Rugasol MH extra
 SikaFilm
 Separol WB-230
 Sigunit L53-AF
 SikaTard-930

2 THAILAND

2.1 BANGKOK – MRT BLUE LINE – CONTRACT NO.1

Client: Mass Rapid Transit Authority of Thailand
Consultants / Designer: ARUP
Contractor: Italian-Thai Development Public Company Ltd
Applicator: Kenber Geotechnics Ltd
Period: May 2014 – September 2014

Construction: B 11 Wang Burapha Station – pipe roofing



Project

Sika Products used in the Bangkok – MRT Blue Line – Contract No.1 Project:

Waterproofing:	SikaSwell® S2	Sika® Bond Breaker
Sikaplan®WP 1120 – 20 HL	Sikadur® 31 CF	SikaGrout® 212 HP
Sika® Geotextile	For other than Waterproofing	SikaGrout® 214-11
Sika®WP disc	ViscoCrete® 10	SikaLatex®
Sika® Dilatec® ER 350	Plastocrete® N	Sika® MonoTop® 614 T
Sika® Trumpet	Antisol® S	Sikadur® 31 CF
Sika® Special PVC penetration	Rugasol®	Sikadur® 32 TH
Sika® 102 Waterplug, Sikadur® 41 CF	Separol®	

3 VIETNAM

3.1 HAI VAN PASS TUNNEL

Owner: PMU85
Contractor: Hazama-Cienco 6, Korea's Dong Ah, Vietnam's Song Da Construction Corporation
Consultant: Nippon Koei Company Limited Japan, Louis Berger International Inc., USA, Vietnamese Transport Engineering Design Corporation (TEDI)

Project

Approval by government for US\$ 163 million, 5 km-long tunnel on proposed 1'880 km highway along Truong Son mountain range linking north with south of country in August 1997. The project will cost a total of US\$ 251 million. A joint venture of Hazama Construction (Japan) and Vietnam's Cienco 6 won the tender for package-1A north tunnel section, while Package-1B south tunnel section went to a joint venture of Dong Ah and Song Na

Construction. A consortium of Nippon Koei of Japan, Louis Berger of the US and the local Transport Engineering Design Inc. will serve as project designer and construction supervisor. Main tunnel 6.3 km-long, 7.5 m-high x 11.3 m-wide underway with parallel emergency tunnel 3.8 m-high x 4.7 m-wide with 11 x 22.3 m-long connections for pedestrians and for vehicles. Ventilation tunnel 1.8 km-long x 8.2 m-wide.

Challenge

Shotcrete as door opener for selling all possible Sika products during tunnel construction

Sika Solution

Concrete production with admixtures

Sikament®

Sigunit®

Joint sealing

Sikaflex®

Cementitious pouring

SikaGrout®

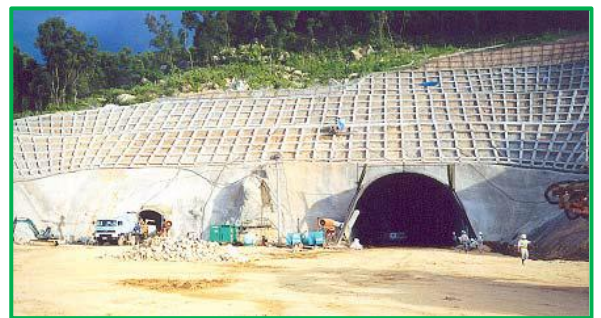
Other products:

SikaRock® anchor mortar

Sika® MonoTop® repair mortar, Sika® AnchorFix®,

SikaShot® ready for use accelerator mortar, Sika® Waterbars®,

Sika®-4a quick setting agent.



3.2 VO VAN KIET BOULEVARD

Owner: Management Board of East West Boulevard and HCMC Environment

Consultant: International Asia Pacific consultant Join (PCI, Nhật Bản)

Eastern Consultancy Company (Nhật Bản)

Tedi

Environment Technology Company

Main contractor: Obayashi – PS. Mitsubishi Joint Venture

Project

East – West Boulevard is a route through the heart of HCMC from the East to the West with the investment capital of 9.863 billion dong. This is a 21.89 kilometer long route across Saigon River by the Thuthiem submerged tunnel. The construction was started in 2005 and finished in late 2012.

Sika Solution

Sika Viscocrete 3000-20

Sikament NN

Sikament 2000AT

Plastiment 96

Antisol S

Rugasol C, F

Sika Aer

Separol

Sika Lightcrete 1-500

Sika Latex TH

Sika Monotop 610

Sika Monotop 615 HB

Sika Monotop R

Sikalatex

Sika Refit 2000

Intraplast Z



3.3 HIEP HOA TUNNEL

Main Contractor: Lúng Lô Underground Construction Company

Sika Applicator: Hùng Trang JSC

Owner : Pmu 46 0 Ministry Of Defence

Construction: Truong Son Dong Road

Project

Truong Son Dong is a new road connecting 7 mountainous provinces from Quang Nam to Lam Dong. There are 2 tunnels on this road. One of those locates in Quang Nam province, called Hiep Hoa tunnel. Its length is 240m and diameter is 10.75m. Total investment capital is 80 billion dong. The construction was started in 2011.

Sika Solution

Sika® ViscoCrete®-3000-20 M

Sigunit® L-53 MY

Sikament®-2000 AT (N)

Sikaplan® WP -1120-20HL

Sika® S Felt 500

Sikaplan® WP Disk C

Sika® Anchor



3.4 CA ROAD PASS TUNNEL

Owner: Deo Ca Investment JSC.
Consultant: Apave International & Teddi
Designer: Transportation Engineering Consultant JSC & Hoang Long Constuction & consultant Co.
Main contractor: Song Da, VinaViCo, Quang Trung Lung Lo



Project

Ca Pass tunnel connecting Phu Yen and Khanh Hoa provinces is a major project on National Highway 1A which aims to reduce traffic accidents, especially those caused by rockslides in rainy weather, and shorten the traveling time along Ca Pass by three-fourths. Its total investment capital is 15.603 billion dong. He entire project has a total length of 13.4 kilometers, with Ca Pass tunnel alone stretching 3.9 kilometers, Co Ma tunnel 500 meters, and linking roads and bridge over nine kilometers. It is expected to finish in 2016.

Sika Solution

Sigunit L-53 MY

Sigunit D54 AF

Sikament 2000AT (N)

4 HONGKONG

<u>PROJECT</u>	<u>CONSTRUCTION TYPE</u>	<u>MAIN CONTRACTOR</u>	<u>YEAR</u>
4.1 CEDD - CV/2012/08 Liantang / Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 2	Mid Ventilation Tunnel and North Tunnel	Dragages Hong Kong Limited	2015 (on-going)
4.2 CEDD - CV/2012/08 Liantang / Heung Yuen Wai Boundary Control Point Site Formation and Infrastructure Works - Contract 2	WSD Nam Chung Water Tunnel Strengthening Works (CV/2012/09)/R20/810/(F00039))	Dragages Hong Kong Limited	2014
4.3 MTR - C6564-11C Tsim Sha Tsui Station Entrance/Exit A1	Modification works using Sikaplan 14.6	Goldfield N&W Construction Company Ltd.	2015
4.4 MTR - KWUN TONG LINE EXTENSION - KTE 1002 Whampoa Station and Overrun Tunnel	Drill & Blast Overrun Tunnel	Chun Wo - Hip Hing J. V.	2014 (on-going)
4.5 DSD HATS DC/2009/10 Upgrading Works at Stonecutters Island Sewage Treatment Works	Shaft Waterproofing	Sun Fook Kong-Biwater Joint Venture	2014 (on-going)
4.6 MTR - SOUTH ISLAND LINE (EAST) - CONTRACT SIL 902 Nam Fung Tunnel and Ventilation Buildings	Shaft Waterproofing	Nishimastu Construction Company Limited	2014
4.7 MTR - SHATIN TO CENTRAL LINK - CONTRACT 1103 Hin Keng to Diamond Hill tunnels and Fung Tak Public Transport Interchange	Launching Shaft Waterproofing	Vinci Construction GRANDS PROJECTS	2014 (on-going)
4.8 MTR - SOUTH ISLAND LINE (EAST) SIL 901 Admiralty Integrated Station and SCL Enabling Works	Drill & Blast Tunnel	Kier Laing O'Rurke Kaden Joint Venture	2014 (on-going)
4.9 DSD HATS DC/2007/24 Construction of Sewage Conveyance System from Aberdeen to Sai Ying Pun	Drill & Blast Tunnel	Leighton - LNS Joint Venture	2013
4.10 CEDD - HK/2009/02 Wan Chai Development Phase II	Cut & Cover Tunnel	Chun Wo - GRGL Joint Venture	2013 (on-going)

Central-Wan Chai Bypass at Wan Chai East			
4.11 MTR - EXPRESS RAIL LINK (XRL) - CONTRACT 823B Shek Kong Stabling Sidings and Emergency Rescue Siding	Cut & Cover Tunnel	Maeda - China State Joint Venture	2013
4.12 MTR - SOUTH ISLAND LINE (EAST) - CONTRACT 902 Nam Fung Tunnel and Ventilation Buildings	Drill & Blast Tunnel	Nishimastu Construction Company Limited	2013
4.13 MTR - EXPRESS RAIL LINK (XRL) 821 Shek Yam to Mei Lai Road Tunnels	Drill & Blast Rail Tunnel	Dragages - Bouygues Joint Venture	2013 - 2014
4.14 MTR - WEST ISLAND LINE (WIL) 705 Kennedy Town Station & Overrun tunnel	Drill & Blast Rail Tunnel	Gammon Construction Ltd	2012 - 2013
4.15 TDD - CONTRACT NO. HK12/02 Central Reclamation Phase III Central Wanchai Bypass Tunnel	Cut & Cover Tunnel	Leighton - China State - Oord Joint Venture	2010 - 2011
4.16 MTR - WEST ISLAND LINE (WIL) 708 Site Magazine	Drill & Blast Magazine	Gammon Construction Ltd	2010

Sika products used: Sikaplan® 14.6 (Sikaplan® WP 1120-20HL) & Sika® Geotextile 500g/m2 (Sika® Geotextile S 050).

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