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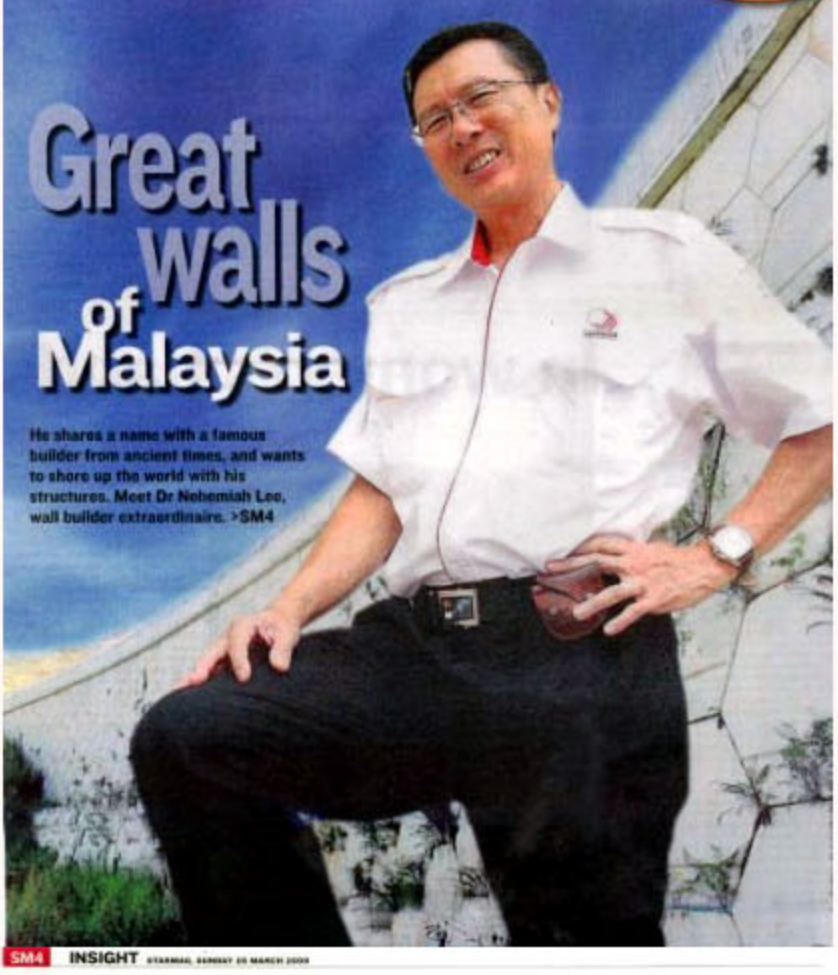

Great walls of Malaysia

He shares a name with a famous builder from ancient times, and wants to shore up the world with his structures. Meet Dr Nehemiah Lee, wall builder extraordinaire. >SM4

Shoring up the world

We see them everywhere, those concrete walls made up of hexagons, soaring across highways and bearing flyovers. They are Nehemiah Walls, proudly designed and built in Malaysia, and going global now.

By CHIN MEI YOON
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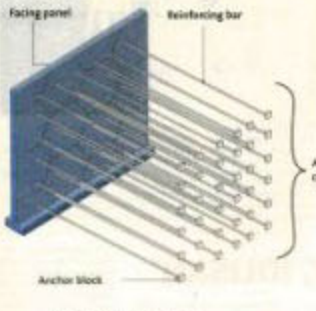
Nehemiah Walls can be funky! This vividly coloured one supports the Kuala Perlis-Changlang interchange. – Photos from Nehemiah



The Nehemiah anchored earth wall system

WHEN China's first emperor, Qin Shi Huangdi, commanded that a wall be built across the northern boundaries of his kingdom in the 5th century, he probably didn't think it would become one of earth's greatest man-made wonders.

The Great Wall of China, stretching over 6,000km, is a marvel of human industry, as it was constructed by hand, using stones and rammed earth.

Built over a period of three major components: a facade, reinforcing bars, and soil.

Its facade, or facing panel, comprises hexagonal (honeycomb-shaped) blocks of pre-cast concrete, each interlocked with dowel bars. But the real ingenuity lies behind these panels: the compressed soil, usually sand, that holds up the facade is strengthened with galvanised carbon steel rods running through it and into the panel. Each hexagon in the facade has at least four of these steel bars, with each bar secured by an anchor block (see graphic, right).

A major disadvantage of conventional reinforced concrete walls is their rigidity. A rigid concrete structure is unable to tolerate its load-bearing capacity, which remains the same during the entire structure, and will crack when loads change unexpectedly.

"And cracks are the start of failure," points out Dr Lee. "Water will seep through with soil into the cracks, internal erosion takes place, and water stagnates behind the wall and starts shifting it. The wall collapses."

A Nehemiah Wall's interlocking panels allow it to bear different loads along its surface up to a certain point. Their flexibility allows movement, and joints have fillers to allow water to escape but not soil.

Also, that nice hexagonal shape was chosen not for its good looks but because it is, structurally, the strongest shape. With conventional design, stress concentrates on the sharp corners, whereas with hexagons, any soil movement will cause pressure to dissipate along their six faces to offer better protection.

Even the reinforcing steel bars are corrosion-proof. The nuts securing the bars to the panels are also coated with epoxy.

Nehemiah Walls have vast potential as they can be used in slope repair, retaining walls, highway interchanges, mountainous highways, railway embankments, bridge abutments, harmful development, quarry operations, military walls (freestanding walls for camouflage), and even dam construction.

An added advantage is that these walls take half the time to be installed compared with conventional reinforced concrete walls, which require a waiting period for each batch of concrete to set. Nehemiah Walls are pre-cast in Kuang, Selangor, and are taken, ready to be assembled, to wherever they are required. Speedy construction saves cost and, more importantly, time – this is vital in situations when urgent support is needed, such as at landslides.

Low Shaw Shong, consultant engineer and director of G&P Geotechnics Sdn Bhd, likes the design. "We've used Nehemiah Walls for about 30 projects that were awarded through open tenders. The advantage of the walls is their design that can tolerate differential settlement of soil along a single stretch of wall. A typical reinforced concrete wall is unable to accommodate this and will crack."

Nehemiah Walls Sdn Bhd celebrated its 15th anniversary recently. It has 60 employees today, and a turnover of RM39mil last year, up from RM22mil in 2006 and RM18mil in 2005. The company has just signed an agreement with MMC-Gamuda worth RM537mil for a double-tracking rail project from Ipoh to Padang Besar, Perlis, slated for completion in 2010.

Nehemiah Walls currently commands a market share of 45%, and is expected to be publicly listed soon.

Apart from its technologically sound product, Lee offers another possible reason why the company has been so successful. "There are variations of reinforced earth walls but I Lee gave us the most competitive pricing on proposal. His team is very pleasant to work with, as its members are prudent, responsive and have integrity. They don't just simply do things. They even assessed the project before they job scope to offer technical advice to us."

> **»I've always been fascinated with the idea of building walls that are not for dividing people, but are strong, versatile, and useful.«**
> DR NEHEMIAH LEE

Ready, get set...

Dr Lee is a registered civil engineer with a Masters degree from the University of Notre Dame in the United States and a doctorate in geotechnical engineering from Universiti Malaya.

He began his career by spending five years in the Government sector, in the Drainage and Irrigation Department, before joining the private sector.

He smiles as he recalls the early days who he started out with a partner and one engineer in a tiny office in Penang.

"In the early 1980s I was working with Reinforced Earth, a concept developed in the 1960s by French engineer and architect Henri Vidal. He turned the concept into an engineered system and popularised the idea of using reinforced soil in construction.

"I studied the system, learnt the technology and modified it heavily for our country. My own modified system while working on my Masters degree," says Dr Lee, adding that, "I've always been fascinated with the idea of building walls that are not for dividing peop

Crucial to the design of Dr Lee's walls are the honeycomb-shaped blocks of pre-cast concrete, each interlocked with dowel bars to form the walls' flexible facades.

One of Dr Lee's engineers at a Nehemiah Wall along the Simpang Pulai-Kampung Raja stretch of East-West Highway 2. Despite the hilly terrain that posed many obstacles, Dr Lee is proud to say that his company built the country's highest reinforced soil wall. – SAIFUL BAHRI/The Star

but are strong, versatile, and useful."

Dr Lee's greatest inspiration remains his namesake, the Biblical character of Nehemiah who was tasked with rebuilding the walls of Jerusalem.

"Nehemiah was a very pragmatical person, and a man of prayer. We tend to think men of prayer are men of inaction who only sat and prayed – but Nehemiah acted on his plans. He faced great opposition and criticism but he never wavered.

"I think he'd make a very good project manager!" Dr Lee adds with a laugh, explaining that Nehemiah "completed the wall in just 52 days, so he must've had great organisational skills".

"I would like to become like this man. When I decided to venture out on my own, what better name to choose than Nehemiah's for both myself and my company?"

(Yes, Dr Lee picked out his own name, and what an auspicious choice it turned out to be! His Chinese name is Chee Hai.)

Coincidentally, in 2003, Dr Lee's workers repaired a collapsed earth embankment along the East Coast Highway in Kuantan in 52 days!

After working for the French company for six years and construction materials manufacturer Hume Industries for four, Dr Lee ventured out on his own.

With a decade of experience under his belt, he knew the construction business needed heavy capital investment. "As soon as I got a contract, I would have to buy materials, at least half a million ringgit for even a small project. Furthermore, I had to pay rental for my office where they charged for every phone call made and fax received!" he says.

But banks were sceptical because it was his first business and he lacked a track record. His life's savings of RM200,000 were insufficient. Finally, after being offered him a meagre RM150,000 loan, and he borrowed another RM300,000 from his brother and parents.

Then five months went by without a single job. Finally, the company was awarded a small project to construct a 6m high wall around a bungalow in Tanjung Bungah, Penang.

"Our first project was critical, we had to prove ourselves," says Dr Lee. "We were so desperate to get a job that I built the wall below cost – about RM80,000. I billed them around RM50,000. But it meant I had a track record."

With that, he was off and running.

Go!

Projects started coming in then, slowly but steadily, as word of Dr Lee's team spread – "They are professional, experienced, and knowledgeable," as Liew Tuck Ming, executive director of developers Sunrise Berhad, put it.

To get to the next level, though, Dr Lee needed infrastructure projects, and at that time, in the late 1980s and early 1990s, there weren't many companies involved in public sector work. But a breakthrough came when a former classmate, now a contractor, hired Dr Lee to build a Public Works Department (Jabatan Kerja Raya, or JKR) the Pantai Dalam flyover in Jln Sekamat near Pantai Hill, Kuala Lumpur.

"My quotation was the lowest they'd received for the project. In the 1980s there were only a handful of companies in this business and they charged massive amounts," says Dr Lee.

"So we were still a new company, our project was approved with the condition that there would have to be monitoring, but we pulled through efficiently!"

That was the start of more Nehemiah Walls around the country. They are now seen in numerous private housing developments, such as the posh enclaves of Mont Kiara and Solaris in Kuala Lumpur, and along the Damansara-Puchong Highway, the Penchala and Kerinchi Link Expressways, Gek Jeh Highway, and up in Cameron Highlands where they are vital in shoring up slipping hillsides.

In Sabah and Sarawak, Nehemiah Walls are found along Jalan Tuaran in Kota Kinabalu and supporting the approaches to the Merading Bridge in Sarawak.

Singapore's Upper Serangoon Road as well as various junctions and flyovers in India and Bangladesh also have approaches supported by Nehemiah Walls.

However, it is a local project that Dr Lee is most proud of: building a wall along the Simpang Pulai-Kampung Raja-Lojing-Kuala Berang stretch on the Second East-West Highway for the JKR in 2005. A section of the highway that was to pass through the mountainous terrain of Peninsular Malaysia's Main Range needed a long viaduct, and Dr Lee's company was awarded the project.

The remote area and steep terrain posed extremely challenging, as it prevented the use of heavy machinery. Nehemiah Walls came up with an alternative trapezoidal wall design with shorter reinforcing bars to minimise the amount of excavation.

Today, the wall stands proudly as Malaysia's highest reinforced soil wall at 20.5m, pushing to not once and for all a competitor's claim that Dr Lee's walls would never be higher than 3m!

Guided by God

In 2001, Nehemiah Walls was awarded the prestigious internationally-recognised ISO 9001:2000 Quality Management System standard by Lloyd's Register Quality Assurance.

But the quiet, philosophical Dr Lee is not one to show his own horn, saying humbly that he owes his success to "God's invisible hand" and to the practice of conducting his business with integrity. Now that, in the construction business, is truly something to boast about!

"We absolutely refuse to indulge in bribery or to practise any form of mismanagement whatsoever," he says solemnly. "My staff know the value of personal integrity. The day we do not live by this principle is the day we'll start seeing 'cracks' in our own 'walls', that is, in our character.

"I've been very disappointed on because of business lost by betrayals by trusted friends. One used my quotation and research to tender for a large project. But upon winning the contract, he appointed another company as the sub-contractor.

"Never mind that I lost a vital project, but I lost a friend too. Although, later I discovered that the project ran into trouble. Soil conditions posed unexpected problems; if I had taken on the project, I might not have detected that. It would have caused permanent damage to the reputation of my young company then.

"My faith in God was affirmed, as I believe He prevented me from a disastrous deal in His own mysterious way."

There must be something in Dr Lee's belief for even the 1997 economic downturn turned out to be a blessing in disguise for his company.

"We couldn't cope with the demand and we were working feverishly every minute on multiple projects. When the jobs slowed down, the period allowed us to catch our breath, to assess our operations, and plan. It also helped that the recession lowered the price of raw materials," says Dr Lee.

And while the current economic scenario has seen private housing projects slowing down, the public infrastructure sector is still humming along, and that's the area from which Nehemiah Walls gets most of its business.

A Nehemiah Wall can last up to 120 years, says Dr Lee. It may not last as long as the Great Wall of China or make history, but for a man who has only ever wanted to build useful walls, they will do.

Dr Nehemiah Lee was inspired from young by the builders of ancient times who worked wonders without machinery.