

# Nehemiah *in Action*

The official newsletter of Nehemiah

December 2011

| From the Desk of Dr. Nehemiah Lee |

## BUILT TO CONNECT, BUILT TO IMPROVE QUALITY OF LIFE

For many years, we have been asked this question, "What business is Nehemiah in?"

Instead of building walls, my answer to the question is very simply put: "We are in a business to connect people. We build walls which help to improve the quality of life."

The physical infrastructure – or the retaining walls – is only secondary. If it does not serve a purpose or mean something in the lives of others, the walls are as good as the Great Wall of China which no longer serves its original purpose of fending away invading armies from the North, or the Berlin Wall which was built to separate the East from the West during the Cold War.

Nehemiah connects people. Nehemiah walls, which often form an integral part of highway flyovers or interchanges, help to ease traffic jams and bring people together in lesser time or hassle.

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THE MANAGEMENT AND STAFF OF NEHEMIAH  
REINFORCED SOIL SDN BHD WISH EVERYONE  
A BLESSED CHRISTMAS AND A HAPPY NEW YEAR.





Ir Dr Nehemiah Lee was recently awarded "Entrepreneur of the Year" during The Star Outstanding Business Awards (SOBA) 2011. Seen in this picture is Dr Lee, with the staff of Nehemiah Reinforced Soil Sdn Bhd.

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Nehemiah walls help improve the quality of life. The walls help to support highways that traverse mountainous terrain, spanning over deep valleys, connecting people from west to east and from north to south. On a smaller scale, Nehemiah walls create space for houses where the garden can be extended to hold social functions.

With this simple philosophy in mind, as a company, we are committed to help other developing nations improve the quality of life for its citizens. We further envisage that, through innovation, creativity, research and development, we can reduce the cost of the walls. It may come a point in time when these wall panels may be fabricated in a way that they can be easily assembled by laymen in a "Do-It-Yourself" fashion, and the components of the walls can be shipped worldwide.

We will keep you updated. With every progress that we make, we are one step closer to the realization of this dream. Help us turn our dream into reality!

Ir. Dr. Nehemiah Lee  
Managing Director

# NEHEMIAH DESIGN COMPETITION 2011

Kuala Lumpur, 24 November 2011 (Thursday)

Civil engineering team, CI 08 from University Tunku Abdul Rahman (UTAR) today emerged as Champion in the Nehemiah Design Competition 2011.

The team, comprising Ng Kim Yeong, Ang Lip Hong, Bernard Wong King Hieng, Huan Han Cheong, Hew Yi Wen, Ngio Hua Jian, Ooi Zhong Yi, Sim Jiun Leong, Sim Teong Piao and Tan Soon Haw, took away a cash prize of RM5,000 and a plaque, at the annual event jointly-organised by Nehemiah Reinforced Soil and the Department of Civil Engineering, Faculty of Engineering, University of Malaya.

The event, which was held at the Dewan Tunku Canceled, Universiti Malaya, had attracted both public and private institutions of higher learning from as far as Kedah in the north and Johor in the South.

First Runner-up, which came with a cash prize of RM3,000 and a plaque, went to the host university's team, One Six Seven, while the Team AAVA from Legenda Education Group took home a cash prize of RM2,000 and a plaque being the Second Runner-up.

According to organising chairman, Senior General Manager of Nehemiah Reinforced Soil Sdn Bhd, Ir Tan Cheng Chong, Universiti Malaya was picked as the venue this year because it is the alma mater of Founder and Managing Director of Nehemiah Reinforced Soil Sdn Bhd, Ir Dr Nehemiah Lee Chee Hai.

"This year, the competition has attracted a good deal of response," he said. "We have selected a total of 12 teams from both private and public institutions of higher learning to enter into this competition as finalists. The judging was a difficult task and the winners deserved the prizes. However, those who participated but did not win have themselves to congratulate, because they were willing to work hard and do their best."

The objective of the competition was to encourage civil engineering students to look for creative solutions to solve challenging engineering problems. The challenge, Tan added, is based on a real-life scenario, where the participants have to imagine themselves as designers working with the JKR Slope Division. "The students were tasked with the challenge of solving the problem of major



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## THE JUDGES HARD AT WORK

1. Ir Kok Chan Wah (Master Builders Association of Malaysia, MBAM)
2. Dato Ir Dr Ashaari bin Mohamad (Road Engineering Association Malaysia, REAM)
3. Ir Dr Nehemiah Lee Chee Hai
4. Mohammed Ridzuan b. Jahidin (Institute of Highway & Transport, CIHTMB).
5. Ir Liew Shaw Shong (Institute of Engineers Malaysia, IEM)

## PRIZE WINNERS

6. 1st Prize RM5000 cash and a plaque  
Winner: CI 08 from UTAR
7. 2nd Prize RM3,000 cash and a plaque  
Winner: One Six Seven from Universiti Malaya
8. 3rd Prize - RM2,000 cash and a plaque  
Winner: AAVA from Legenda Education Group



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erosion and landslides that are destructive to both lives and properties in a particular location," he said.

Their task was to propose a solution that is practical in view of logistics and accessibility constraints with emphasis on time and cost savings. In view of the impending monsoon season, their task became extremely pressing in order to avoid another disaster. Students had to work as teams to look for creative and innovative solutions that are both structurally sound and aesthetically pleasing by incorporating 'green technology' features.

Judges for the competition were Dato Ir Dr Ashaari bin Mohamad (Road Engineering Association Malaysia, REAM), Ir Liew Shaw Shong (Institute of Engineers Malaysia, IEM), Ir Kok Chan Wah (Master Builders Association of Malaysia, MBAM) and Mohammed Ridzuan b. Jahidin (Institute of Highway & Transport, CIHTMB).



## ALL IN A FAMILY

About a hundred Nehemiah staff, and their family members, camped out for 3 days, 2 nights at D'Coconut Resort in Pulau Besar, Johor, from June 10-12. They came from as far as Penang, the East Coast of Peninsular Malaysia and India to enjoy the beauty of Mother nature in a family camp, which saw young and children of the staff playing different games. The Grey Group emerged as champion, with the highest score from the three games that they played – the Charlie Chaplin Walk, Lord of the Ring and Sand of Mermaid.





## 1. Kuala Lumpur – Kuala Selangor Expressway (LATAR Expressway)

### Background

**Client:** Lembaga Lebuhraya Malaysia (LLM)  
**Concession:** Kuala Lumpur - Kuala Selangor Expressway Berhad  
**Consultant:** DPI Konsult Sdn Bhd (Package 1)  
 Endeavour Consult Sdn Bhd (Package 2)  
**Main Contractor:** Mudajaya Corporation Berhad  
**Completion :** 2011

### Overview

**The Kuala Lumpur-Kuala Selangor Expressway (LATAR Expressway)** is a 33km long dual carriageway expressway which connects Kuala Lumpur at Templer's Park to Ijok in the district of Kuala Selangor. The LATAR Expressway was constructed to provide an alternative link road to the present Federal Road 54 from Kuala Lumpur to Kuala Selangor. It also forms part of the Government planned KL Outer Ring Road (KLORR).

Nehemiah Walls were constructed and being used as abutment walls, ramps walls as well as vehicular box culvert (VBC) walls. A total of 63 walls have been constructed for LATAR Expressway. The maximum height of completed Nehemiah Wall is approximately 15.75m.

Figure 1:  
LATAR Forms the North-East Link of KLORR

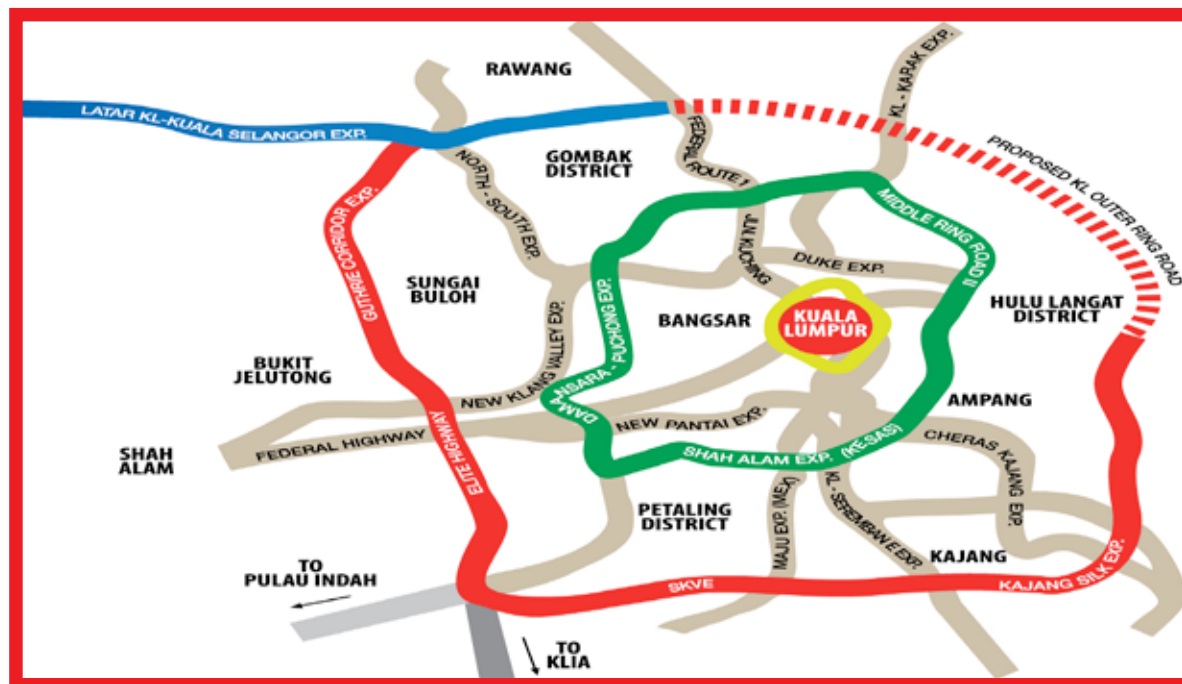


Figure 2: Nehemiah Wall at Bridge Abutment



Figure 3: Nehemiah Wall at Bridge Abutment/ Interchange





Figure 4: Nehemiah Wall at Ramp



Figure 5: Nehemiah Wall at Bridge Abutment as Wing Wall



Figure 6:  
Nehemiah Wall at Bridge Abutment  
and Above Soil Nail Wall

PROJECT UPDATE

## 2. Vijayawada – Chilakaluripet Highway Project (NH-5), India

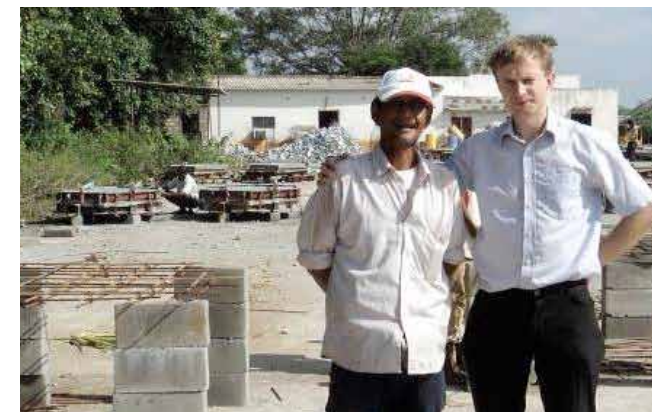
### Background

**Client:** National Highways Authority of India  
**Concession:** Vijayawada Tollway Private Limited  
**Consultant:** The Louis Berger Group, Inc. & Sheladia Associates Inc.  
**Completion :** In progress

### Overview

**The Vijayawada – Chilakaluripet Highway Project** comprises six laning of Chilakaluripet-Vijayawada Section of NH-5 from Km.355.000 to Km.434.150 in the state of Andhra Pradesh. This project is to be executed as BOT (Toll) on DBFO pattern under NHDP Phase V. The total length of the highway is 82.5 Km.

There are 15 Vehicular Underpasses (VUPs), two Pedestrian Underpasses (PUPs), five flyovers, two overpasses and one bridge, which require Nehemiah Wall as abutment and embankment walls. An estimated total of about 120,000m<sup>2</sup> of Nehemiah walls are expected to be erected for this project with maximum wall height of 12.40m.



Peter Ng (Site Supervisor) & Adrian Anderson (General Manager,  
Nehemiah Reinforced Soil India Pvt. Ltd.)



Nehemiah wall at Pedestrian Underpass (PUP)



Nehemiah wall at bridge abutment



# Applied 'carbon critical design': A comparison of the construction carbon footprint of Viaduct Flyovers, to Reinforced Soil Flyovers.

**Summary of a technical paper presented at Indian Road Congress Annual Session on 4<sup>th</sup> Nov 2011**

By Adrian Anderson, MEng CEng MICE (UK), General Manger, Nehemiah Reinforced Soil (India), Pvt Ltd., and Manoj Kumar, Regional Manager, Louis Berger (India), ME(Structures) MIE.

## Abstract

**T**wo common structures used in a typical flyover are the reinforced soil (RS) wall and the reinforced concrete (RC) viaduct. The RS wall, whilst also being more economical, has a carbon footprint of only 36% of the RC viaduct. This is primarily because the main material component of the RS wall is backfill material which has a lower value of embodied carbon than steel and concrete; the main material component of the RC viaduct. This paper outlines the principles of how this calculation was made using a renowned foot printing tool. It recommends the same, simple calculations be made for other infrastructure projects.

## Introduction

Climate change and resource depletion are globally recognised as the biggest long term threat to mankind. The economic case to take action now to prevent the worst effects of even a 2o C rise in global temperature (sea level rise, extreme weather events, ect.) is effectively highlighted in the 2008 Stern Review. The process of construction of buildings and infrastructure significantly adds to the worldwide annual emission of carbon dioxide, the gas which is the principle contributor to the atmospheric greenhouse effect causing the climate to change. The carbon footprint from construction activities can be measured in a meaningful way allowing engineers to compare different options; in this case i) the reinforced concrete (RC) viaduct and; (ii) the reinforced soil (RS) wall.

Often the better option for the environment is also more expensive; this is not the case here. Other studies show that the RS wall has approximately half the cost of the RC viaduct; this study shows it has only 36% of the carbon footprint. The highways design engineer may not be able to influence the carbon emissions of the highway's end use, but he or she can certainly use considered common

sense to reduce its construction carbon footprint, whilst also ensuring a cost effective solution.

## The Design Decision – RC Viaduct or RS wall

For modern urban highway flyovers, design engineers are faced with two main options of to how to support an elevated highway. Either a less expensive 'solid' reinforced soil (RS) wall is used, or a more expensive 'hollow' viaduct of piers and bridge sections is used constructed of reinforced concrete (RC); see figures 1 and 2. Of course the central section of the flyover will always be 'hollow' to allow traffic or trains or water courses to pass beneath. However the approach ramps, which form a large part of the cost of the flyover, is where the decision must be made between the two structures. Embankments can be used to support flyovers, though in an urban context, the additional land required means that this option is rarely considered. Whilst this paper highlights the lower carbon footprint of the RS wall in urban areas, engineering judgement and discretion must be applied to its use.

## Carbon Calculation

A construction carbon footprint consists of three components: the emissions from the manufacture of construction materials; the emissions from transporting material, labour and plant to site; and the emissions from the plant used during construction.

The UK's Environment Agency, has a leading construction carbon calculator spread sheet (freely available online), which was used for the analysis. The spread sheet multiplies the input figures, (usually in cubic meters or tons) by a corresponding embodied carbon value (Tons of CO2/unit of material). All assumptions involved are clearly stated in the spread sheet; the embodied

carbon figures for the materials used are sourced from the Inventory of Carbon and Embodied Energy, of the University of Bath.

A 'control viaduct flyover' which has recently been designed to the most up to date standards was chosen for the calculation. A 30m long section (27.5m wide and 8.5m high) of the bridge section of the Benzcircle flyover on NH9, Andhra Pradesh, India, was selected and a Nehemiah Reinforced Soil wall was designed using the same dimensions and foundation type.

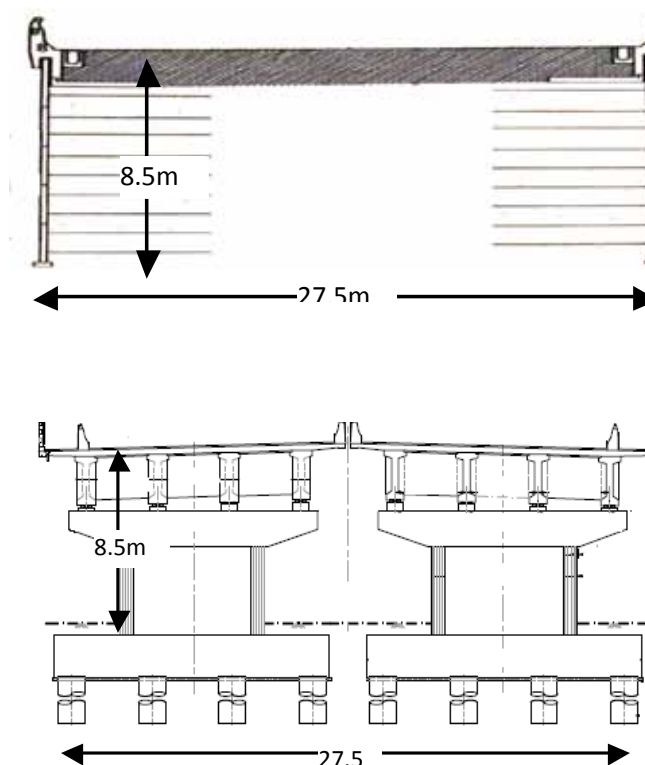


Figure 1 Sections through the reinforced soil (RS) wall (top) and a reinforced concrete (RC) viaduct (bottom): two of the main options for elevated highway flyovers.

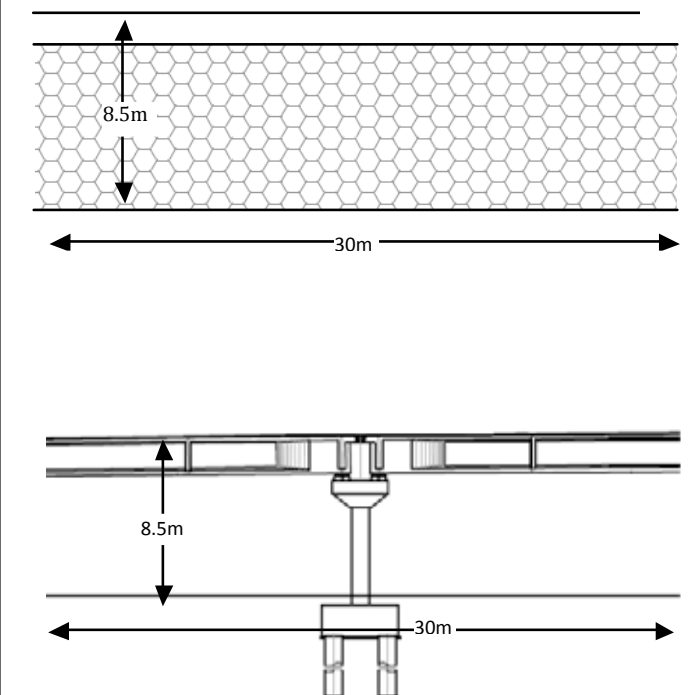


Figure 2 Elevation of same two structures

## Results

The volumes of materials in both structures, as well as the plant and labour requirements, were entered into the carbon calculator. The 30m long section of the Reinforced Concrete Flyover came to a total of 500 T CO<sub>2</sub>e (carbon dioxide equivalent); whilst the 30m long section of the Reinforced Soil Flyover came to 178 tonnes T CO<sub>2</sub>e, ie only 36%. It was found that one of the key reasons for this is the difference in the embodied energy of the primary material of the RC viaduct: Reinforced Concrete (0.223T CO<sub>2</sub>e/T material), whereas the primary material of the RS wall is backfill material (0.005T CO<sub>2</sub>e/T material).

## Recommendations

The first recommendation of this paper is that the low carbon status of the reinforced soil (RS) wall be given a higher precedence in the highways design process.

Secondly, low carbon cements should be used in concrete in place of Ordinary Portland Cement. The inclusions of cement replacement such as Granulated Blast Furnace Slag or Fly Ash can drastically reduce the embodied energy of the concrete with no reduction in strength.

Thirdly, similar analysis should be done for other infrastructure projects, and that carbon calculation alongside costs, should become an integral part of the construction optioneering process.

### References

STERN Review: The economics of climate change, 2006, Sir Nicholas Stern.

India Road Congress: Proceedings and papers from the "International Seminar on Reducing Carbon Footprint in Road Construction" February 2011, New Delhi, India

Environment Agency (UK government), Calculator of carbon footprint of construction projects: 'www.environment-agency.gov.uk/construction carbon calculator, 2009'

Lynsay Hughes et al, Highways Agency (UK government), Cambridge University, Arup Partnership, Blackwell Ltd, Proceedings of the Institution of Civil Engineers: 'Carbon Dioxide from earthworks: a bottom-up approach, May 2011'

B. Clarke, Professor of Civil Engineering, University of Leeds, Proceedings of the Institution of Civil Engineers: 'Carbon critical design, 2010'



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