# ”BEST PRACTISE” BAGI KERJA-KERJA PENYELIAAN PEMBINAAN JAMBATAN

# DO & DONT’S IN BRIDGE CONSTRUCTION

# DONT'S

# DONT'S



## Ministry: NKVE link developer ignored safety rules

BY SHOW TEOH

PETALING JAYA: The developer of the NKVE-Jalan Meru Link neglected safety regulations by allowing motorists to travel on the road below the incomplete flyover that collapsed on Sunday, said Deputy Human Resource Minister Datuk Abdul Rahman Bakar.

"It's an offence to allow traffic on roads where there is construction, as this will expose motorists and the public to danger.

"Unfortunately, this is happening at many places around the Klang Valley. Rightfully, those sections should be cordoned off and detours should be created for traffic to bypass those areas.

"Safety should be our priority, in spite of the inconveniences we have to face," he said when opening an international conference, Managing Future Workplace Issues and Challenges In The Borderless World, organised by Universiti Teknologi MARA's Faculty of Management and Technology yesterday.

He remarked that the developer, SP Setia Bhd, and the main contractor it appointed, Chung Hyup Yoon Sdn Bhd, had failed to fulfill safety conditions when carrying out the project.

Nine Bangladeshi labourers were injured when eight girders of the flyover near Bukit Raja collapsed on Sunday.

In Seremban, Department of Occupational Safety and Health (DOSH) director-general Abu Bakar Che Man said he would seek a report from SP Setia on how the company intended to dismantle the remaining structure of the collapsed flyover, reports SIMON KOMO.

"Although the debris on the road had been cleared, parts of the elevated interchange at the Meru Link are still hovering precariously.

"Since the Bukit Raja-Shah Alam stretch is expected to be opened by Thursday, all measures must be taken to ensure it would not endanger passing motorists," he said after opening a seminar on safety and health management.

Abu Bakar said DOSH would send several officers to assist the Public Works Department in investigations into the cause of the flyover collapse.

Meanwhile, after further discussions with the authorities yesterday, SP Setia said it would submit a follow-up report with more detailed information by today.

"We are working closely with the external specialist contractors and consultants to prepare the follow-up report and will hand it over to the authorities," said Khor Chap Jen, a director of SP Setia.

# DONT'S

**Don't have JKR bridges collapse during construction**

# DONT'S

**Arrangement of reinforcement for tranverse beam not following construction drawing.**

**Insufficient reinforcement anchorage length provided at arch beam.**

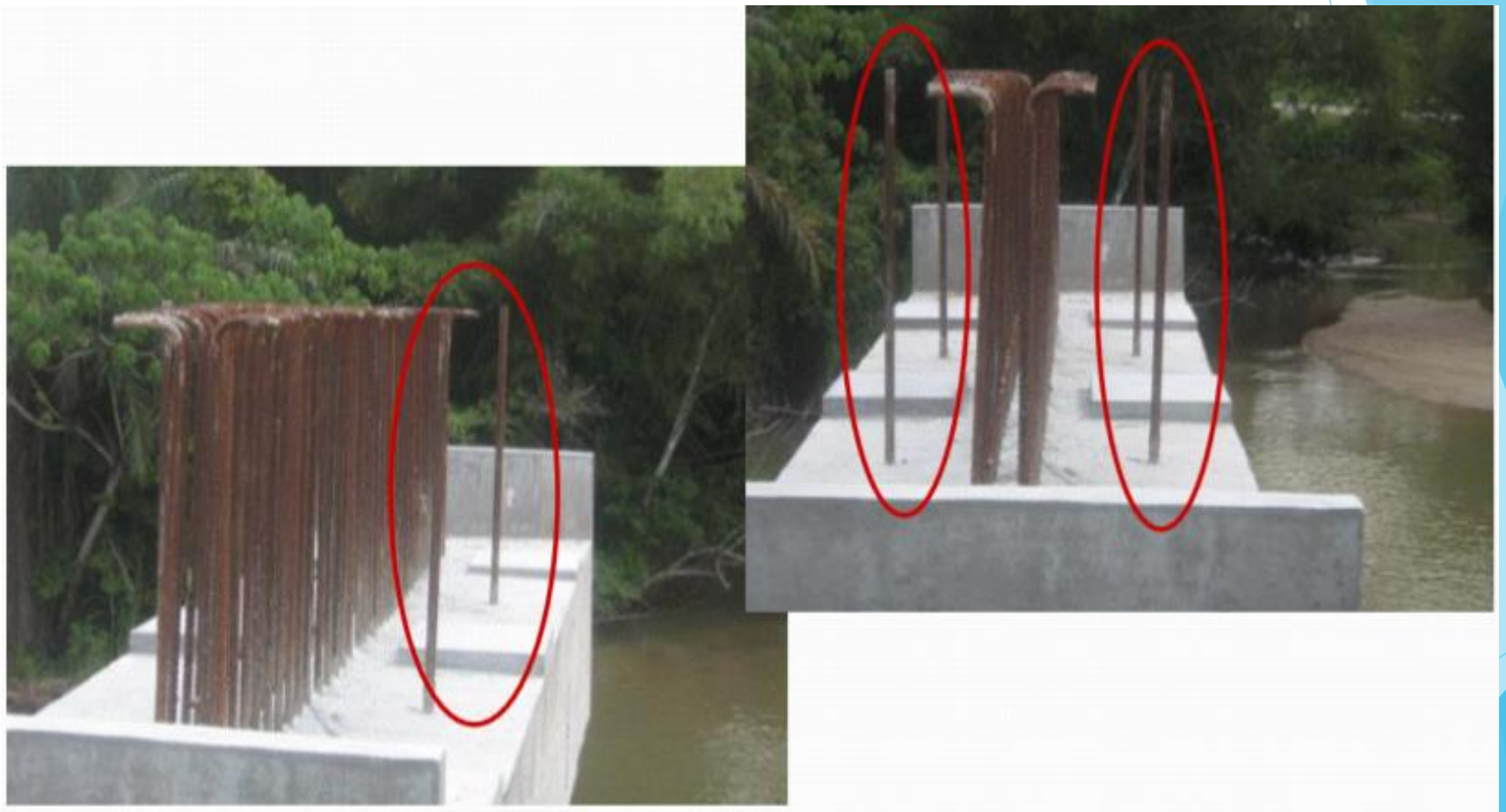
# DONT'S

Spacing of reinforcement does not follow specification

# DONT'S

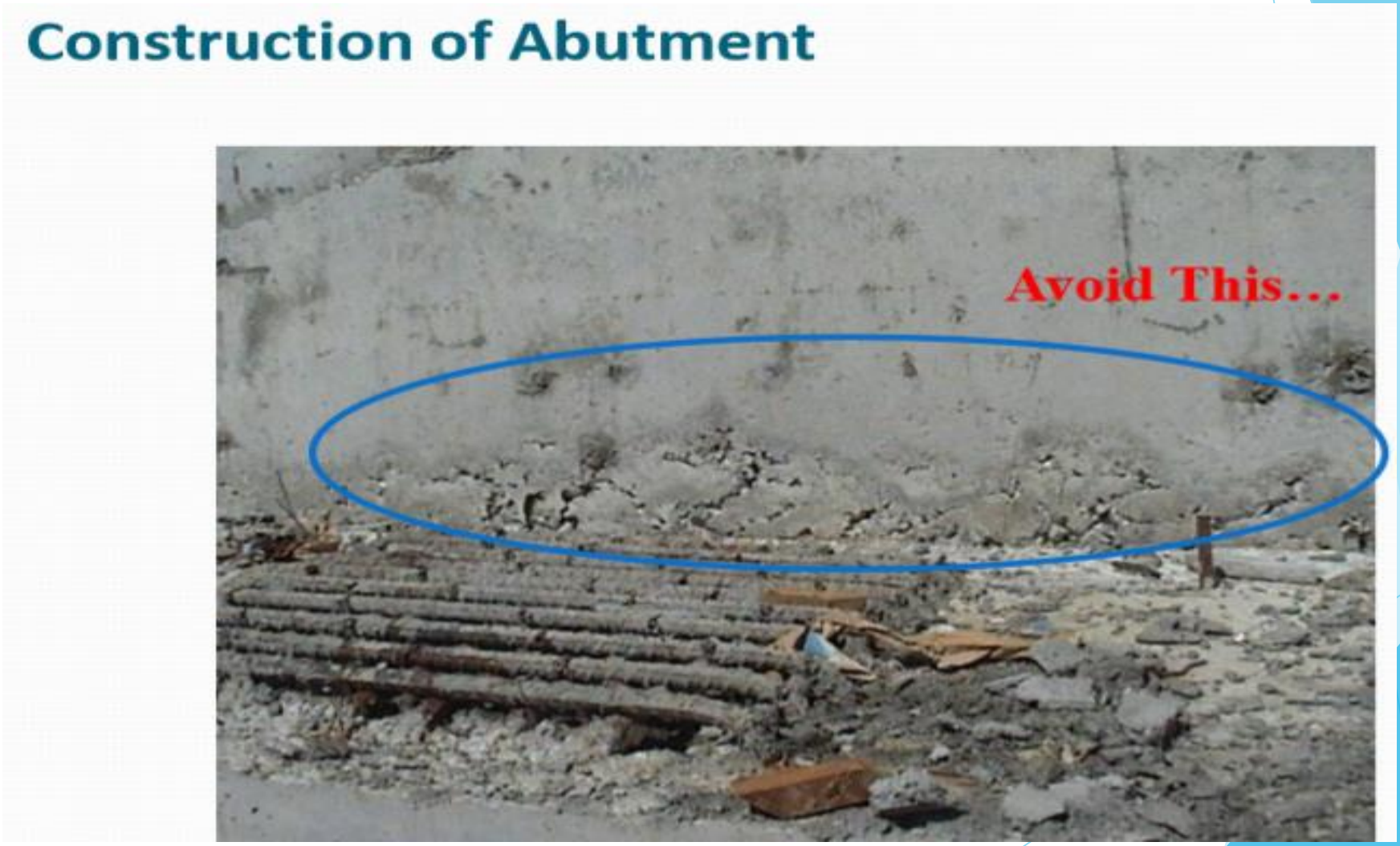

**Joint in adjacent sheaths shall be staggered by at least 300mm**

# DONT'S



**Installation of steel reinforcement at pier crosshead does not follow construction drawing**

# DONT'S



# DONT'S

**Do have common sense**

**Don't let prestressing tendon exposed to weather to avoid corrosion.**

# DONT'S

**All prestressing tendons shall be stored clear of the ground and protected from weather in accordance to the specification.**

# DONT'S

Tendon was corroded and not protected as per specification

# DONT'S

**Distance between edge of beam to ballast wall exceeded the designated distance (50mm)**

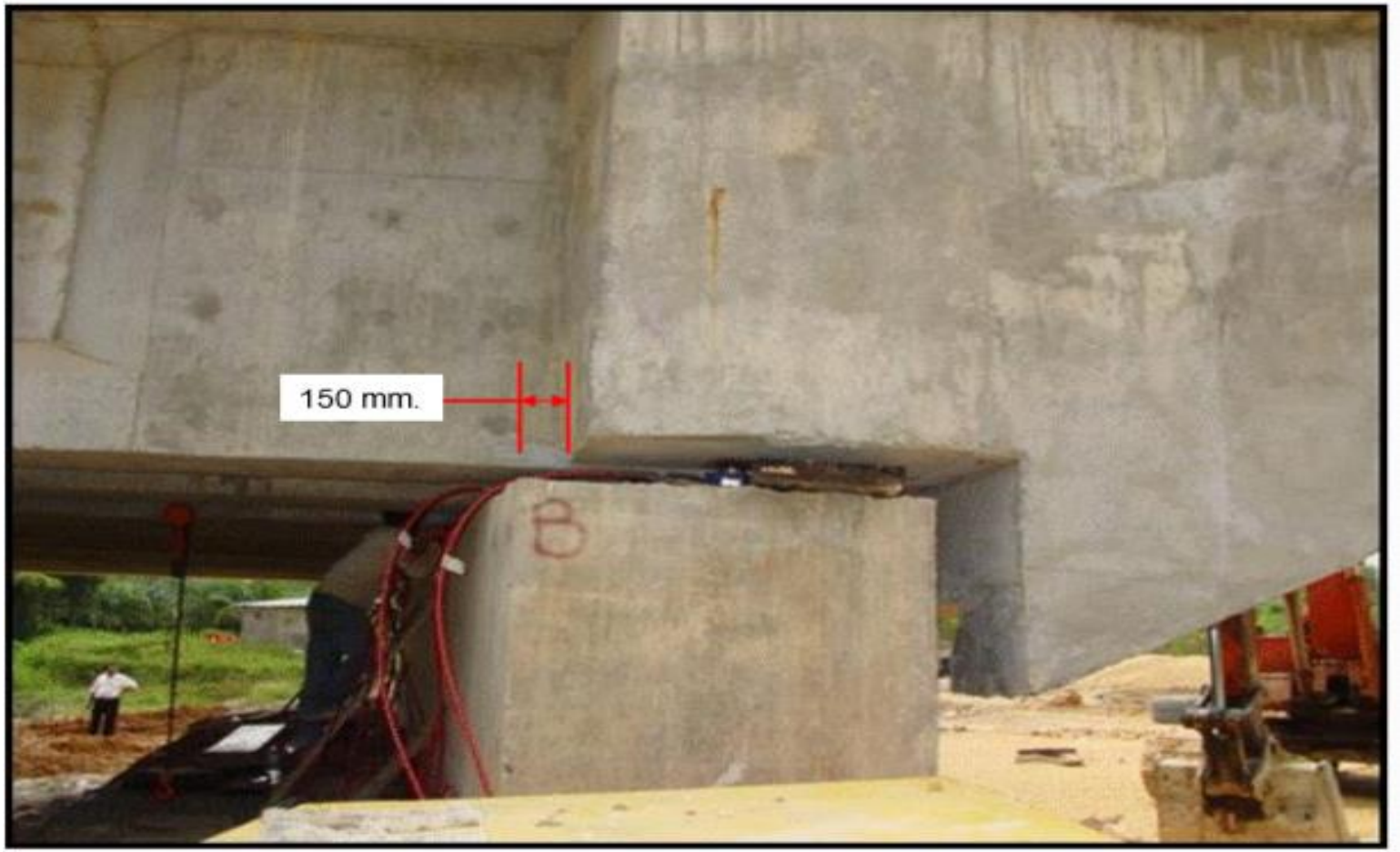
# DONT'S

**10mm minimum diameter vent shall be provided at all high and low point on cable profile in accordance to the specification for the purpose of monitoring during grouting works. The maximum permitted grout pressure at the point of injection inlet shall be 1.0 N/sq.mm.**

# DONT'S


Abutment 'B' was shifted 150mm towards river due slope failure of approach embankment.

# DONT'S




Abutment has been shifted approximately 150mm.

# DONT'S

Sagging of walk way slab

Tranverse beam not constructed below walk way slab (Not following construction drawing)

# DONT'S

Pocket for end stress bar not immediately grouted.

Pocket for end stress bar not immediately filled with shrinkage compensating concrete.

# DONT'S

Walkway not constructed in line between main span with approach road.

Kink at parapet could be hazards to drivers due direct impact of vehicles.

# DONT'S

Insufficient concrete cover

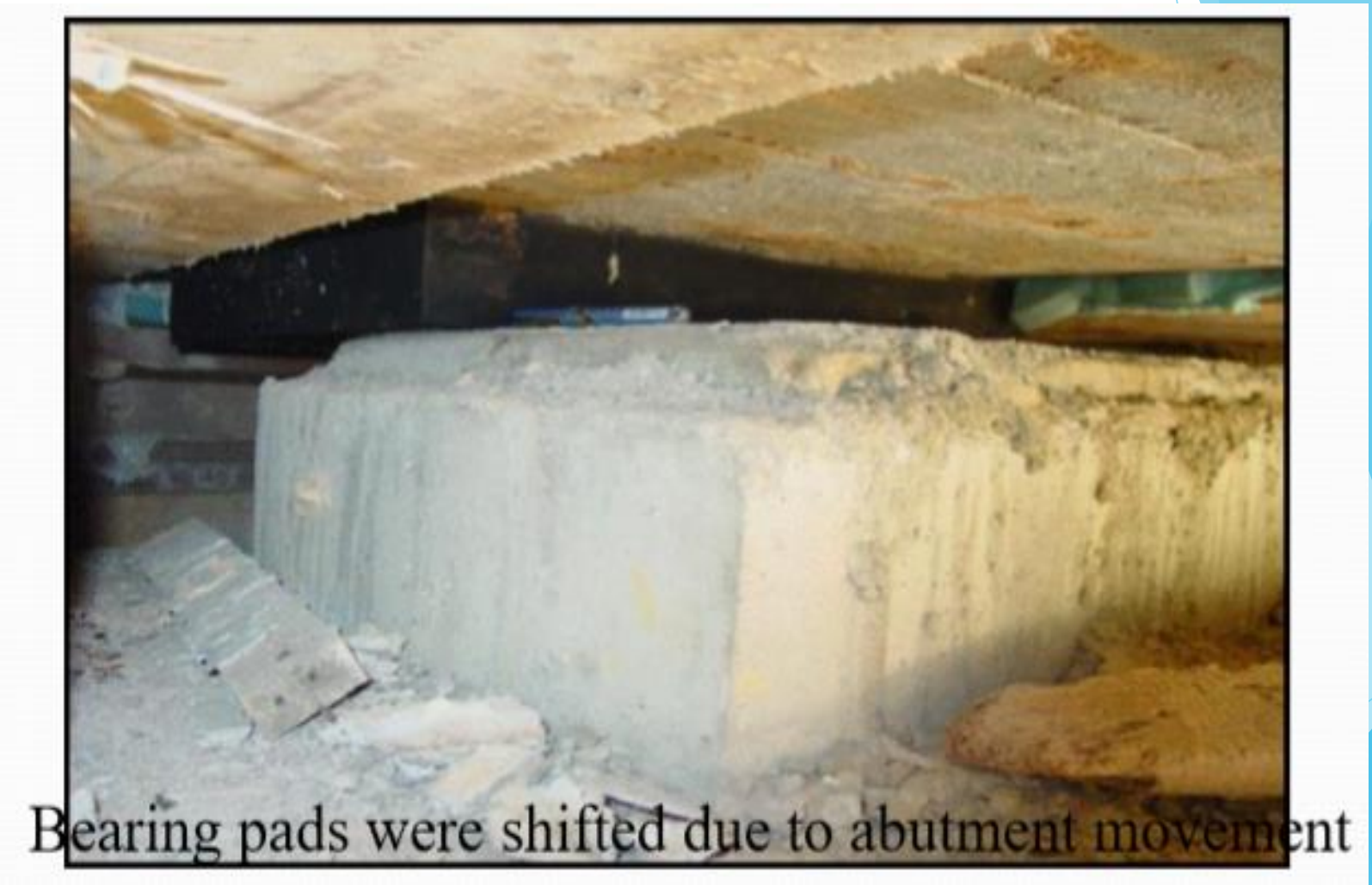
# DONT'S

Cracking at beam exposing the reinforcement

# DONT'S

Damaged shear keys

# DONT'S

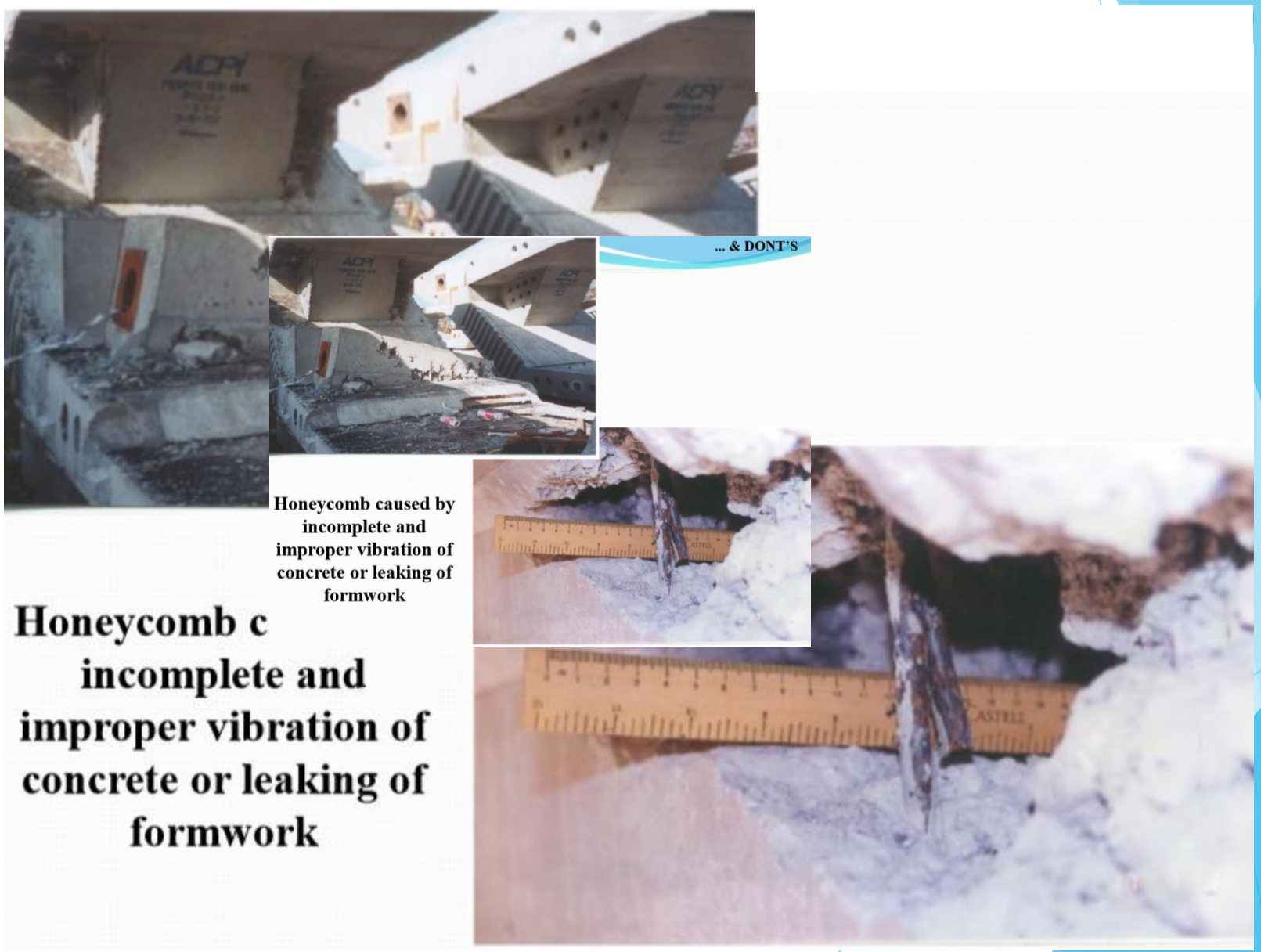


Bearing pads were shifted due to abutment movement

# DONT'S


**Don't certify a project completed**
**Starter bars there, but intermediate diaphragm not constructed.**

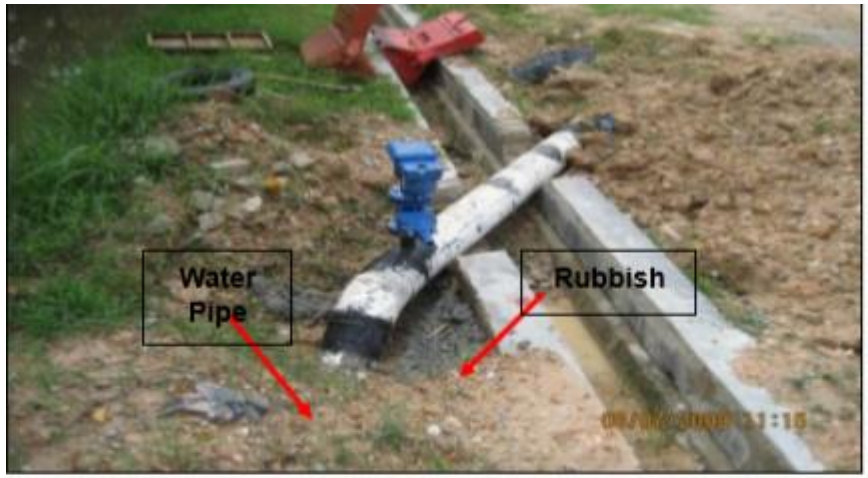
# DONT'S


... & DONT'S
Honeycomb caused by incomplete and improper vibration of concrete or leaking of formwork
Honeycomb c
incomplete and
improper vibration of
concrete or leaking of
formwork

# DONT'S

Accidental impact of construction machinery

# DONT'S




Water pipe was laid by punching through the wall of roads side drain.

Deviation of anchor bolts deviated from the centreline of pile cap.

**Don't have poorly constructed works**

# DONT'S


**Precast parapet panel fallen down**

# DONT'S


**No leveling mortar before installation of precast parapets**

# DONT'S

**Broken and fractured anchoring bolt of precast parapet**

# DONT'S

**Corroded M24 h.d. used to tie the precast parapet shows that h.d. bolt was installed without approved resin or grouts**

# DONT'S


**Anchor bolts shall be casted together with parapet wall to receive handrail.**

# DONT'S


Buckling at steel baseplate occured.

# DONT'S

- Existing painting/coating was not removed before welding being carried out.
- The purpose is to avoid the mixing of chemical between painting and weld materials (contamination).
- Disburb/Affect the welding strength

# DONT'S

Don't backfill earthwork from one side only

# DO’S

# DO’S


**Do have a proper design for all D&B project**

# DO’S

**Good quality of bridge works.**

# DO’S

Do have concrete for bored piles poured at least 1000mm above cut-off level to remove the low quality concrete such as laitance and mud before concreting for pile cap.

# DO’S

**Do use steel formworks to produce high quality of concrete finishing.**

# DO'S

Piers: Good concrete finishing

# DO’S

**Scaffolding was designed for the safety and to produce high quality of superstructure work.**

# DO'S

**Temporary bridge was designed according to Code of Practice for the safety of temporary works at site.**

# DO'S

ASSOCIATION OF CONSULTING ENGINEERS MALAYSIA

**Engineering Award 2006**

This certificate recognises the fostering of engineering excellence by

Jabatan Kerja Raya Malaysia

in respect of

Bridge over Sungai Pahang at Chenor in Pahang

for which consulting engineers

Arup Jururunding Sdn. Bhd.

received a

Gold Award of Special Merit

Category 1 – Civil & Structural Engineering

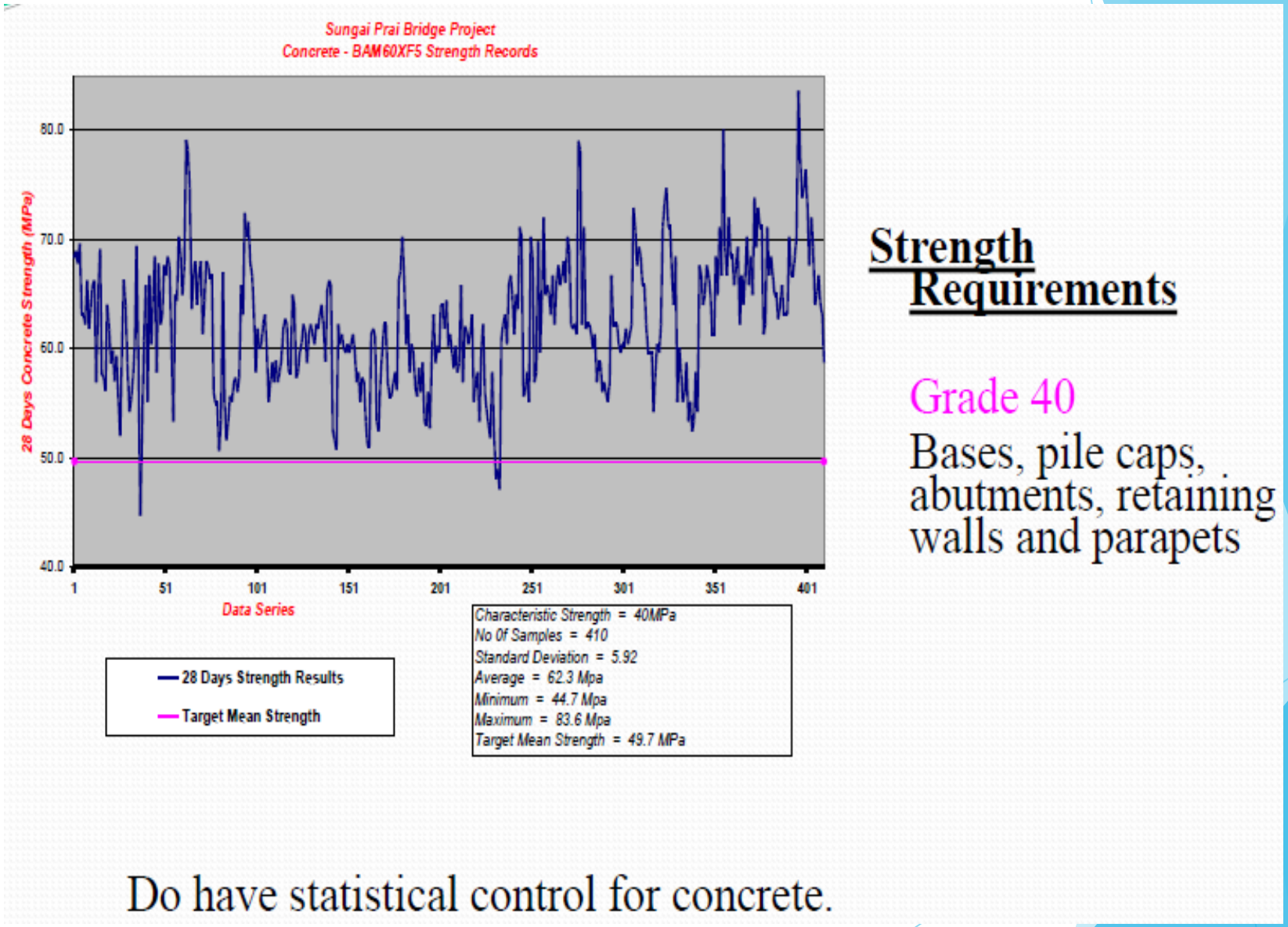
*given this 17th day of June 2006*

*Ir. Mohd Rosadin b. Hassan*
*President*

*Ir. Yap Kok Ming*
*Deputy President*

*Ir. Wira Rahali bi Wan Mahi*
*Honorary Secretary*

# DO'S




**Strength Requirements**

Grade 40

Bases, pile caps, abutments, retaining walls and parapets

Do have statistical control for concrete.

# DO'S

## Durability Requirement

| Concrete Mix | |
|---|---|
| 20mm graded granite (kg/m$^3$) | 1086 |
| River sand (kg/m$^3$) | 715 |
| Water (kg/m$^3$) | 150 |
| OPC Type (kg/m$^3$) | - |
| Mas 30 (kg/m$^3$) | 410 |
| Silica Fume (%) | 5 |
| Slump (mm) | 150 |
| Retarder (ml/m$^3$) | 1500 |
| Daracem (ml/m$^3$) | 10000 |
| Agg/Binder Ratio | 4.19 |
| Water/Binder Ratio | 0.34 |

## Control Heat Of Hydration

The actual pile cap size was 17m x 14m x 2.50m. It was recorded that the maximum concrete temperature of the mix exceeded 90°C and the temperature differentials were in order of 35 to 40°C.

In order to control the heat of hydration, a mix which contained less cement and silica fume was introduced together with using internal cooling system to properly control the generated heat and temperature differentials.

# DO'S

## Durability Requirement

| | Initial Surface Absorption Test (ISAT) (ml/m2/s) | Rapid Chloride Permeability (RCPT) (coulombs) |
|---|---|---|
| Insitu Concrete (Grade 40, 60 & 80) | 0.1 | 1000 |
| Precast Concrete (Grade 60) | 0.5 | 500 |


ISAT TESTING IN PROGRESS


RCPT TESTING IN PROGRESS

# DO'S

Curing of segment with automatic sprinkling system


Curing of segment with mist (fogging)

## QUALITY CONTROL DURING CONSTRUCTION

The segments were water cured for fourteen (14) days, followed by the application of a curing compound for a further seven (7) days. In this period of curing, the segments were protected from direct wind and sun in the curing chamber.

# DO'S

## STACKING OF RAMP SEGMENT

The stripping of mould for each segment could only be done once the segment reaches a compressive strength of 12 MPa.

## LIFTING OF COMPLETED SEGMENT

Whereas the segments could only be lifted until the concrete strength reached a minimum strength of 25 Mpa. The lifting was carried out by a straddle carrier capable of lifting the heaviest segment of 125 tonne.

# DO’S

The completed bridge

# DO'S

View of Twin Leaf
Pier Ribbed Finishes

General View of The Ramp

# DO'S

*Final Connection of Main Segments And Site Frames*

Structural Awards 2006

**Award for Transportation Structures**

**Winner**

awarded to

**Dar Al-Handasah Consultants**

for

**Sungai Prai Bridge**

Project Team

Transportation Awards

Structural Awards 2006

**Supreme Award for Engineering Excellence**

**Winner**

awarded to

**Dar Al-Handasah Consultants**

for

**Sungai Prai Bridge**

Project Team

# Do understand our CONTRACT

- Obligation of the Government
- Obligation of the Contractors

# Do look at DRAWINGS

- Construction drawings
- Details
- Notes

# Do look at
# BQ, MOM & SPECIFICATIONS

- Method of Construction
- Quality of finish product

# Thank you