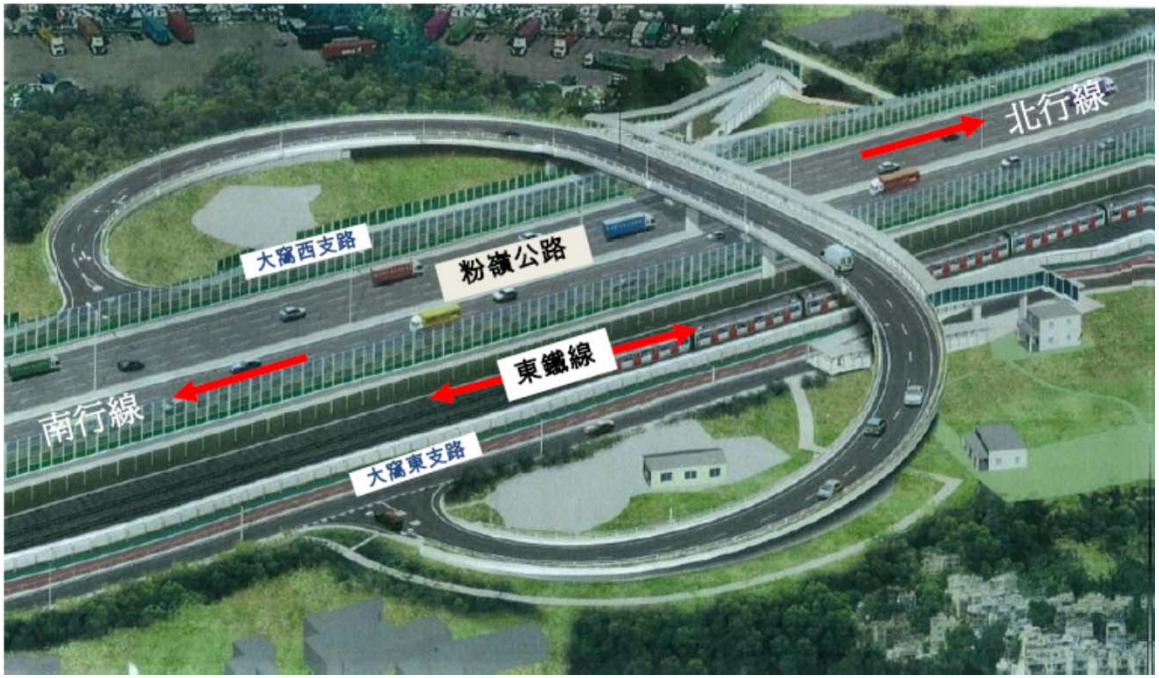
Safety Forum on Temporary Works

Contract No. HY/2012/06 – Widening of Fanling Highway – Tai Hang to Wo Hop Shek Interchange

Temporary Works for Construction of Kau Lung Hang Vehicular Bridge Over East Railway Line

Introduction

- Deck 2C of the proposed Kau Lung Hang vehicular bridge was constructed over the MTRC railway.
- First "Tandem Lifting" work adopted over MTRCL's railway – involved installation of 10 nos. precast concrete beams (max. 28m long, 57.6t)
- Design and construct temporary works for installation of beams
- Design and construct a full closure temporary working platform for construction of deck slab and parapets over the railway



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<u>Site Constraint/Limitation</u>

- MTRCL's properties
- OHL cable and its isolator are very close to permanent structure (about 1m)
- Limited time for beam installation and concreting: 1:45am – 4:15am during Isolation and Possession period (I&P)
- Limited Access to East Side of the proposed bridge – 3m headroom tunnel under railway, construction plants cannot pass through
- Existing watermains including DN1350 Dongjiang and DN600 watermains
- Lifting weight must be less than 80% of the lifting capacity of the plant as required by MTRCL

<u>Potential Risk at planning/design stage</u>

- Traffic impact due to full closure of Fanling Highway
- Train service disruption due to major collision
- Numerous amounts of night-works
- Damage to infrastructure and trackside equipment / Overhead line cables
- Malfunction of crane parts during lifting
- Overturning of crane
- Falling objects at construction stage

<u>Alternative Lifting Option – 750 ton Lifting Crane</u>

- Insufficient set-up time (~ 4 hours)
- Insufficient set-up area (required 12m wide)

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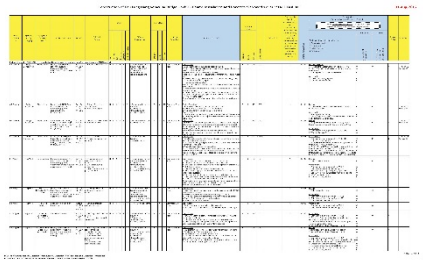
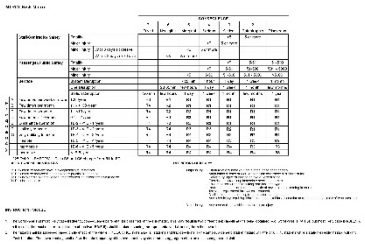
Temporary Works for Tandem Lifting of Precast Beam

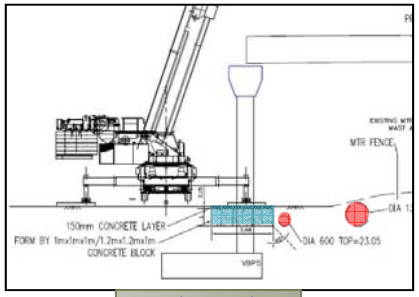




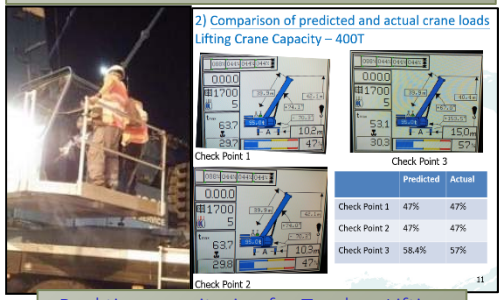
Detailed Risk Assessment and Contingency Plan

Trial Tandem Lifting

Automation Deformation Monitoring System

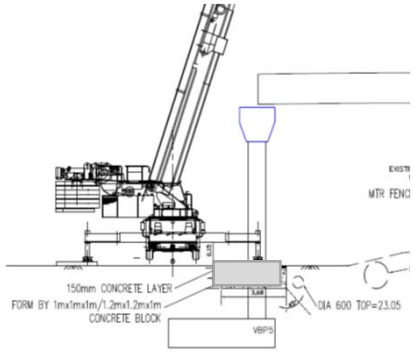


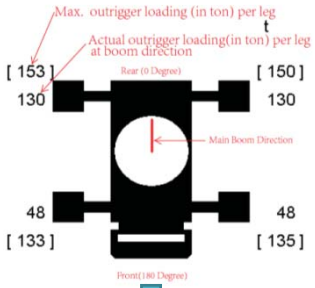
Footing Design



Real time monitoring for Tandem Lifting

Trial Tandem Lifting for of PRECAST BEAMS





Design of Footing for Outrigger

- Footing to level bottom of Existing DN600 watermain
- Use max. outrigger load to design footing
- To spread loading and avoid damage to watermain
- Apply surcharge load to prove minimal settlement

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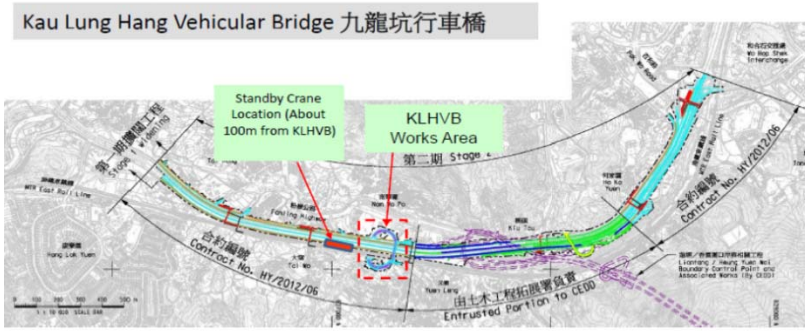

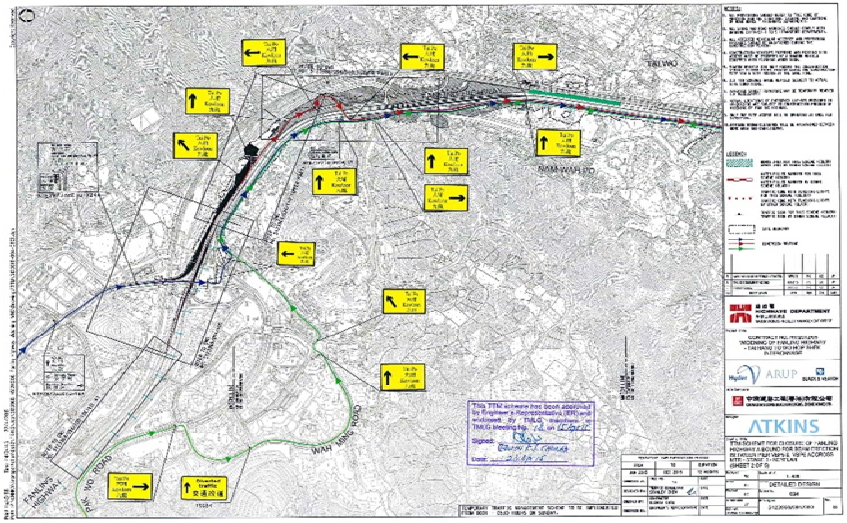

Standby Crane for Emergency Use

- Workshop250T standby crane for emergency use

Enhancement Measures for Expressway and Night Work

- Pre-work briefing prior to implementation of TTA
- Advanced Uniform with Reflective strip

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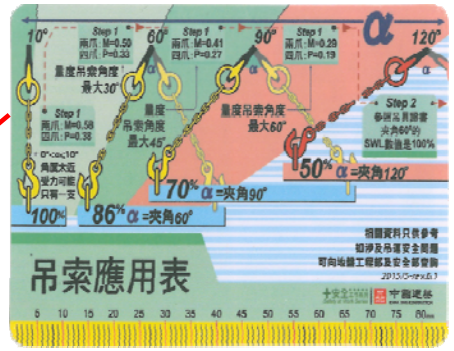
Control and Inspection for the Temporary Works

Pre-Work Briefing

Brief works procedure to the banksman, riggers, plant operators and worker prior to lifting

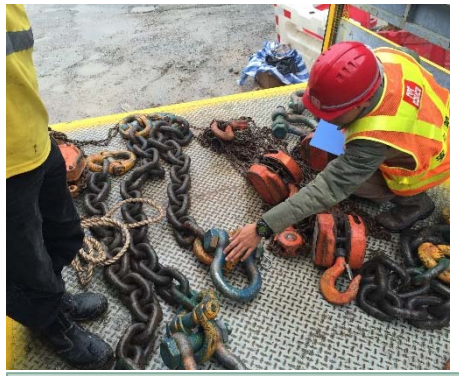


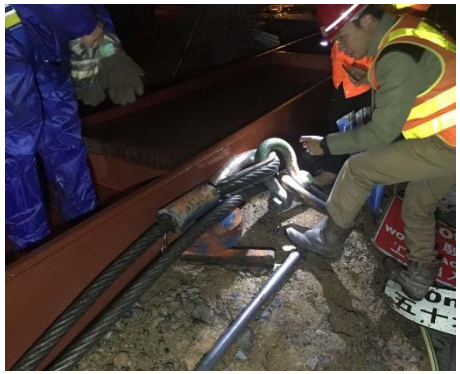
Lifting check card

Developed a lifting check card to assist the lifting supervisors/riggers in checking load capability of slings visually and quickly.

Monitoring during operation

- ICE to check footing of outrigger
- Set up check points to monitor the lifting load
- RPE to check lifting plant capacity





Checking of Lifting Gear

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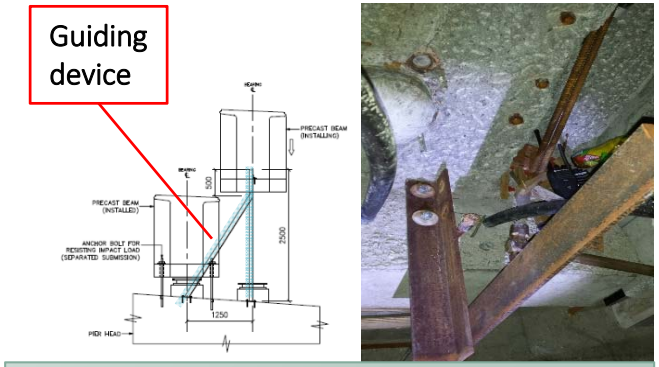
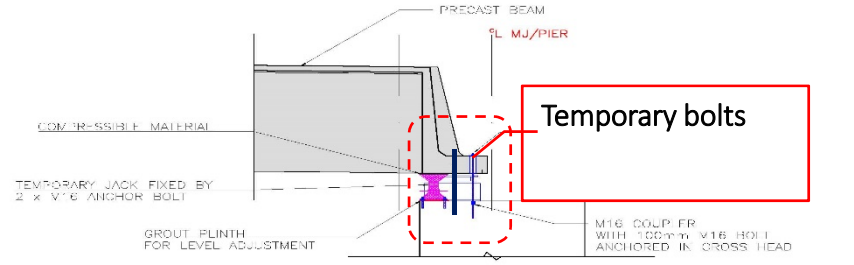


Guiding Device

- Avoid clash of adjacent precast beam
- Easier for installation to alignment

Temporary Support

- Use head jack for easy adjustment of level and installation



Temporary Fixing Bolt

- To avoid collapse of beam induced by impact during next installation

Successfully Completed

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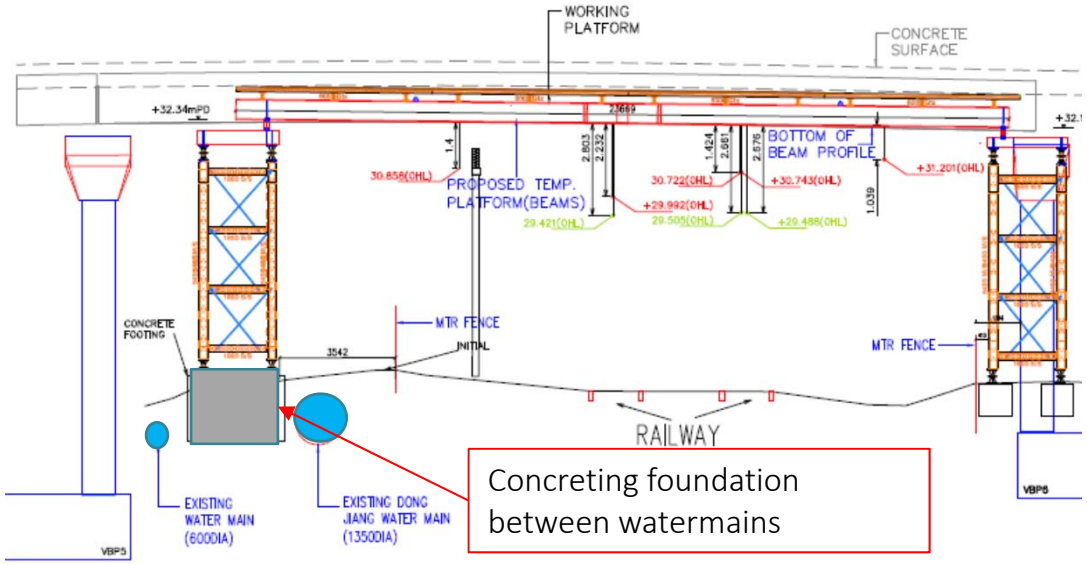
Design of Temporary Working Platform



Design Consideration

- Easy to install and remove
- Full closure temporary working platform for MTR railway during construction
- Concrete foundation below ground to prevent damage of watermains
- Use “Mega-shore” scaffolding – easy installation
- To keep distance for the cable and parapet, also to achieve the deflection of the platform, only 610UB can be used
- Keep sufficient distance away from the existing OHL cables
- Bolt and nut joint to avoid hot works adjacent to MTR, easy and fast to install
- Provide copper tape to connect MTR’s earthing system

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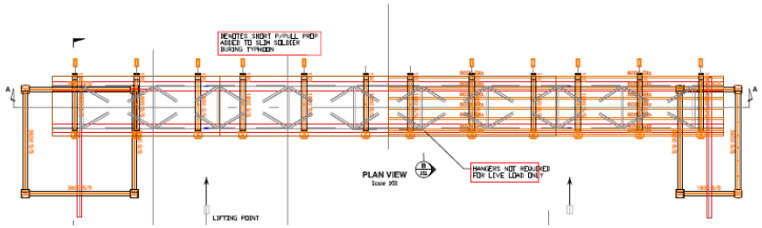
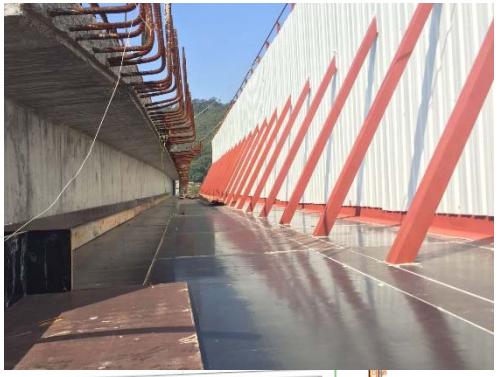
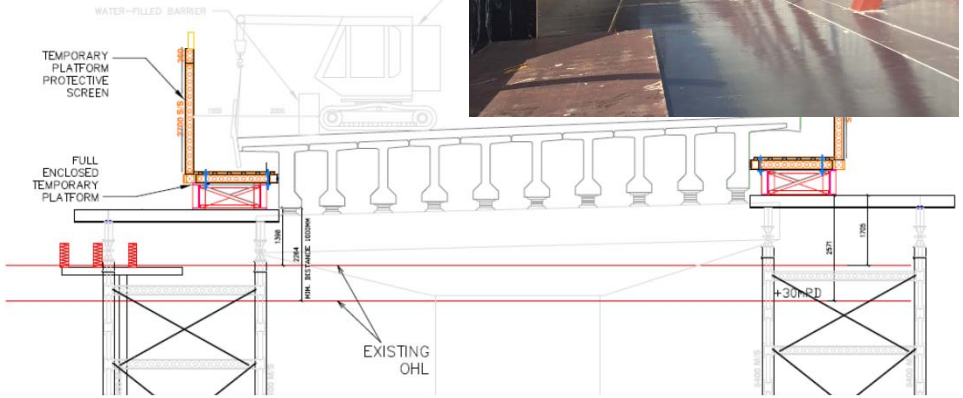


Temporary Working Platform

- Easy to installed
- Use 610UB as main beams
- Slim soldier and GTX beam as secondary beam
- Mage-shore for support towers at both side





Temporary Working Platform

- Close to existing OHL cable and isolator
- Full closure to prevent falling objects
- Consider working load and impact load from falling of parapet skin
- Check lifting capacity of plants before lifting
- Provide barriers to limit works area of plants

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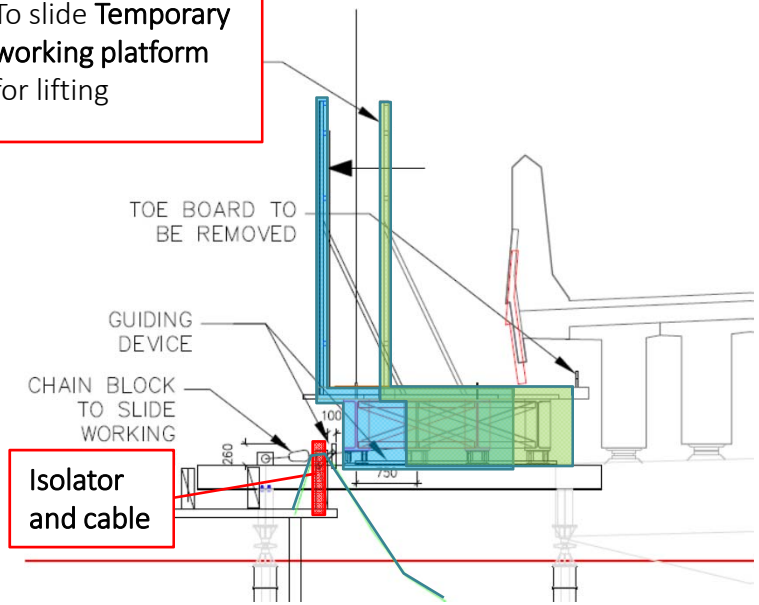
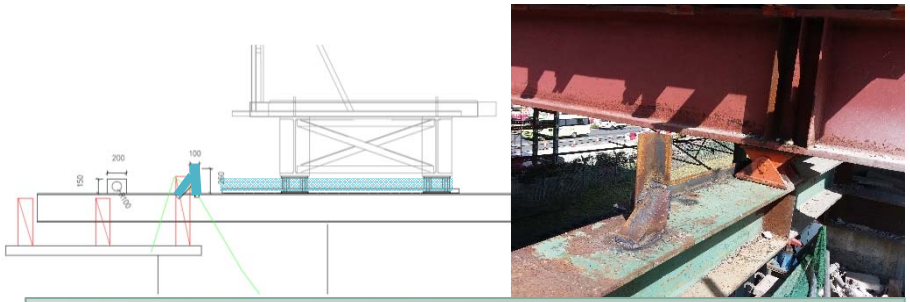
Dismantle of Temporary Working Platform

To slide **Temporary working platform** for lifting



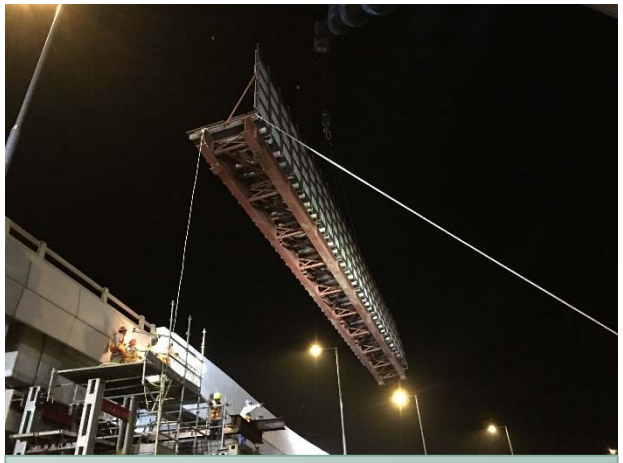
Temporary Working Platform

- Temporary working platform cannot be lift after installation of parapet skin
- It is require to slide the working platform for lifting
- Steel angles were provided as a guide for removal



Guiding Device

- Prevent clash to the isolator and cable during sliding and lifting



Successful Removal

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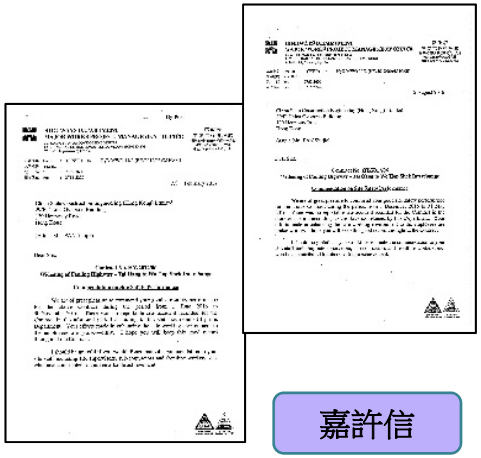

嘉許信

Recognition from HyD
Commendations from HyD

Recognition from MTR
"2016 Safety-First Award" from MTR for the lifting operation over East Rail Line

感謝信

Recognition from Nearby Resident
Celebrate the opening of Kau Lung Hang Vehicular Bridge with public

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