中國建築-瑞安聯營
CHINA STATE - SHUI ON JOINT VENTURE

# Application for Temporary Works Excellence Award 2017

Project No. : SS A501

Project Title : Design and Construction of Centre of Excellence in Paediatrics

Name of Client : Architectual Services Department

Name of Participant : China State – Shui On Joint Venture

## Subject : Safe Design for Heavy Duty Falsework

# Safe Deign for Heavy Duty Falsework

## Design Objectives

- A steel structure bridge is required to be constructed in order to link-up 2 building blocks of the Hospital (Figure 1)

- Due to some site constraints, heavy lifting method is not feasible. The steel structure is pre-fabricated as segments in the factory and assemble on site.

- The bridge is around 60m in length, 300 ton in weight and is located 48m above the ground level.

- A heavy duty falsework, by use of RMD's "Megashor" system, is erected in order to provide a temporary support for the bridge segments (Figure 2)

- The falsework design should include any necessary provision for assemble and disassemble of the falsework

Figure 1 : Steel Structure Link Bridge

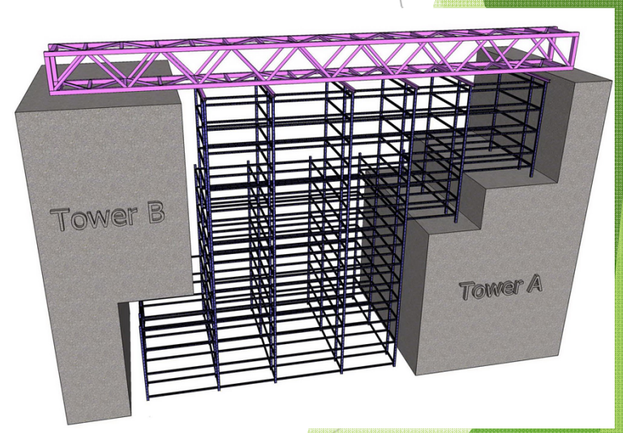


Figure 2 : RMD's Megashor Falsework

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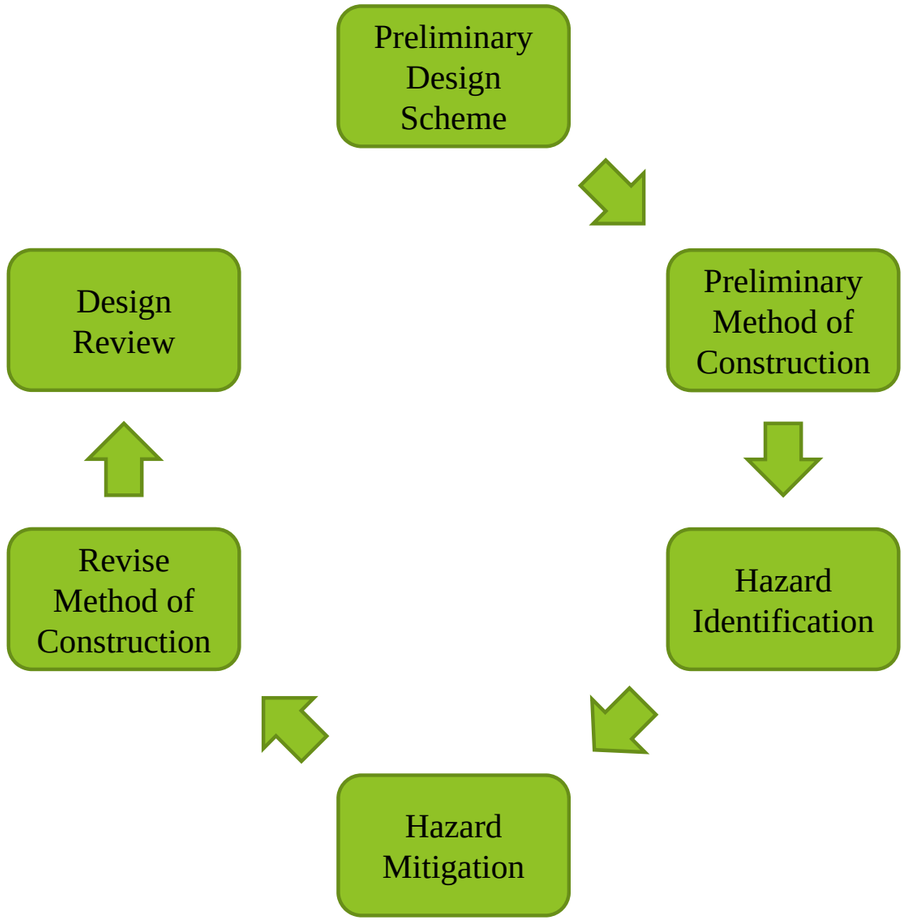
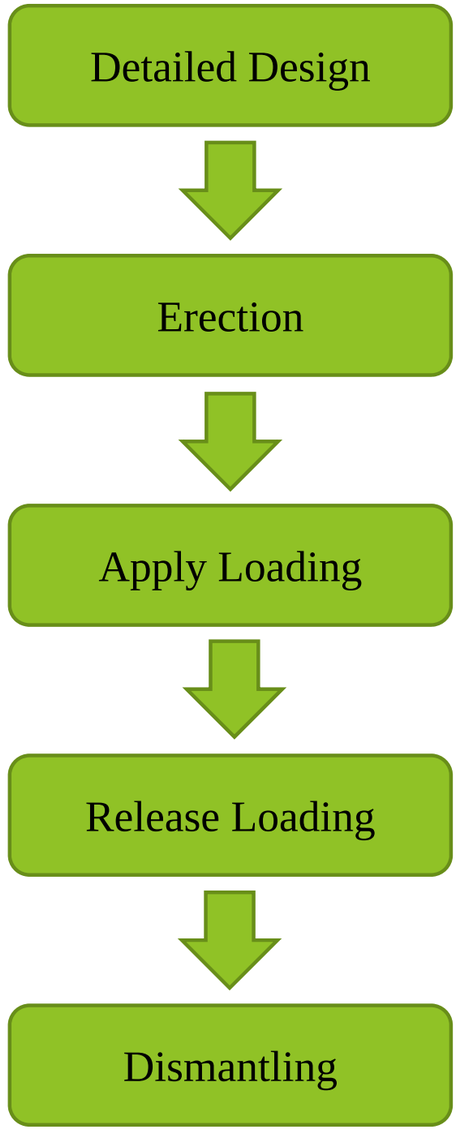
# Safe Deign for Heavy Duty Falsework

## Safe Design Process

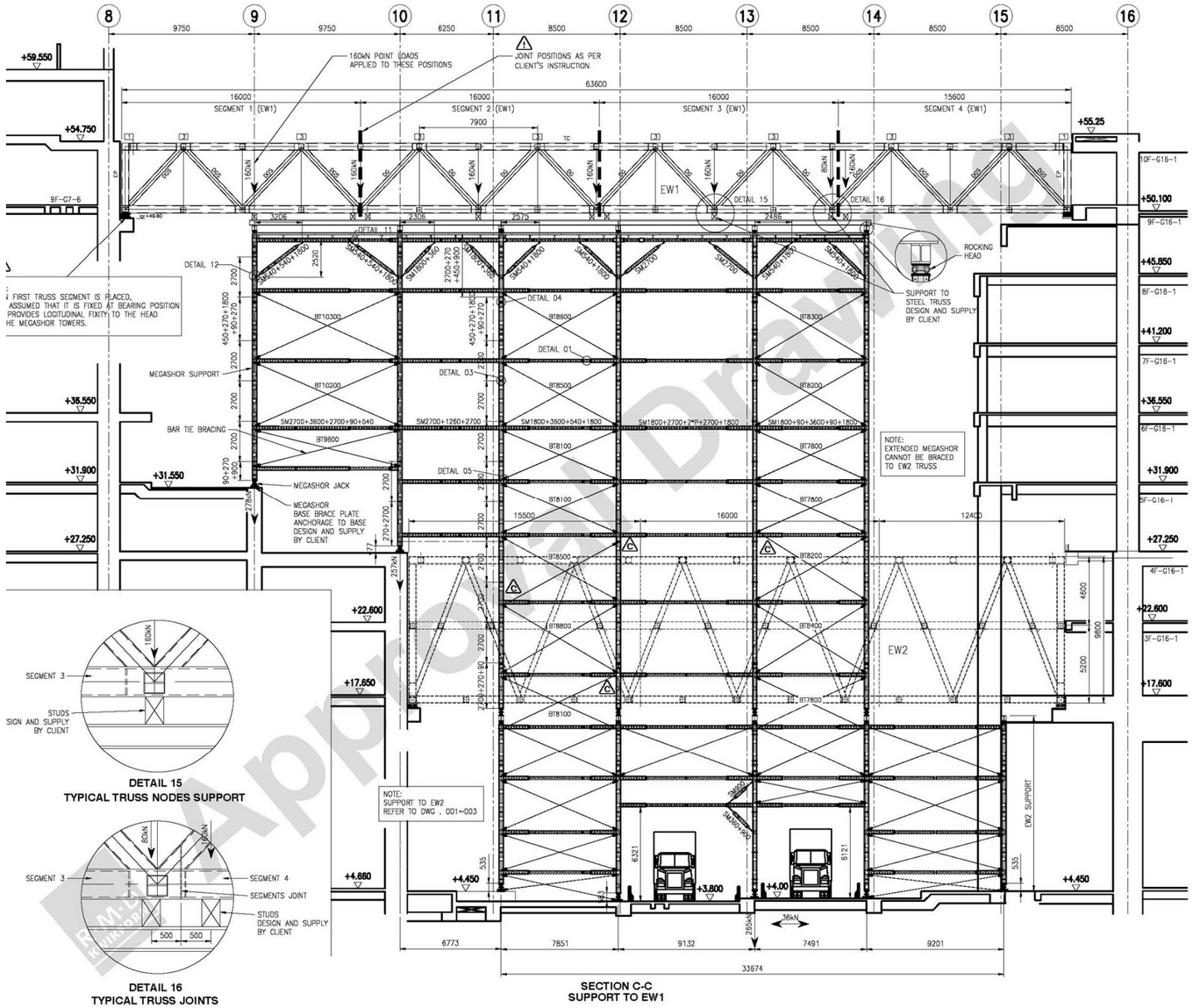


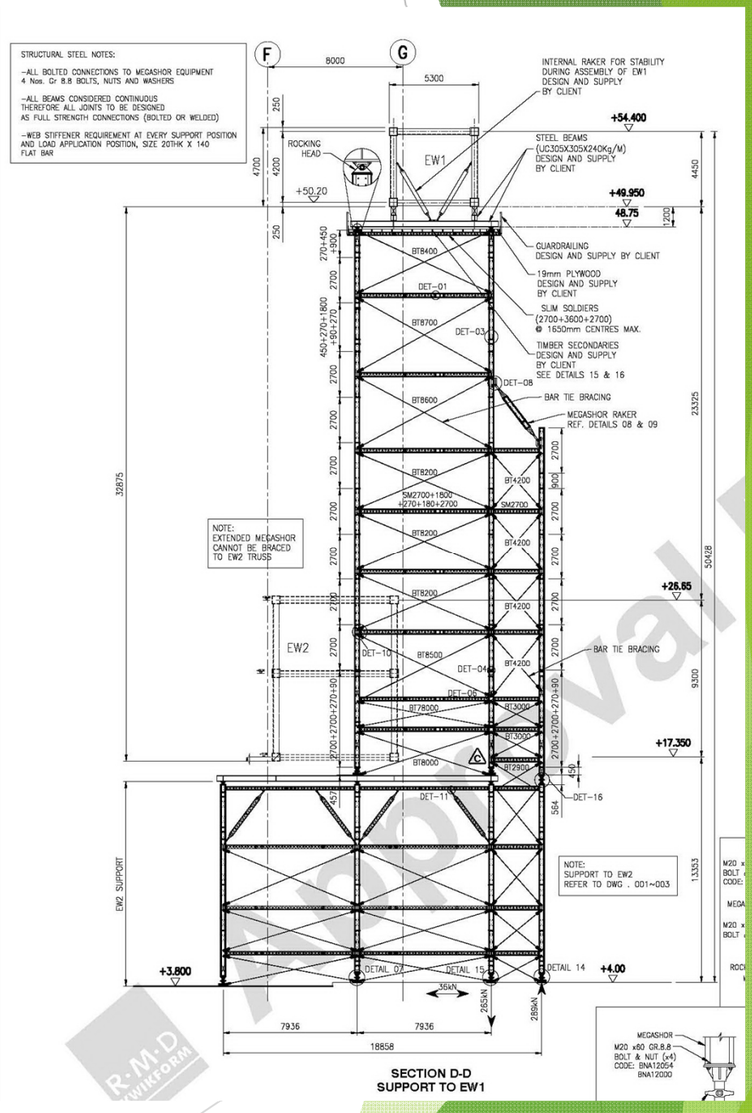

## Falsework Life Cycle



# Safe Deign for Heavy Duty Falsework

## Preliminary Design Scheme



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# Safe Deign for Heavy Duty Falsework

## Preliminary Erection Method – By Light Duty Working Platform

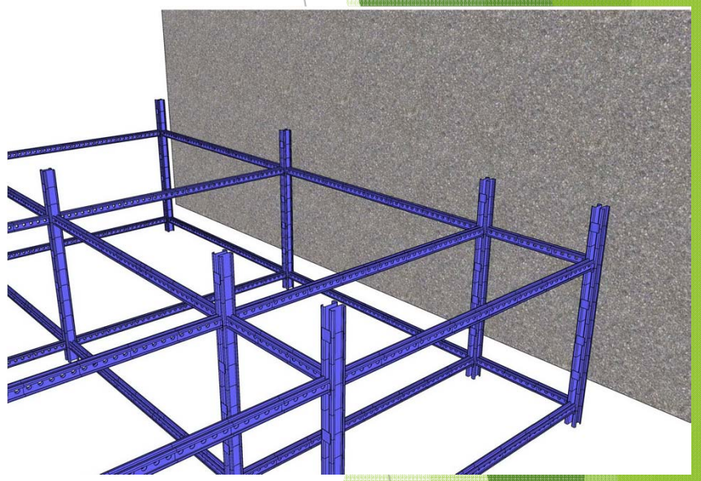
- Erect 1st layer of “Megashor” falsework
- Erect light duty falsework as a working platform for assemble of 2nd layer “Megashor” falsework
- Erect 2nd layer of “Megashor” falsework
- Erect light duty falsework as a working platform for assemble of 3rd layer “Megashor” falsework
- Repeat the steps until the “Megashor” falsework reaches the required height

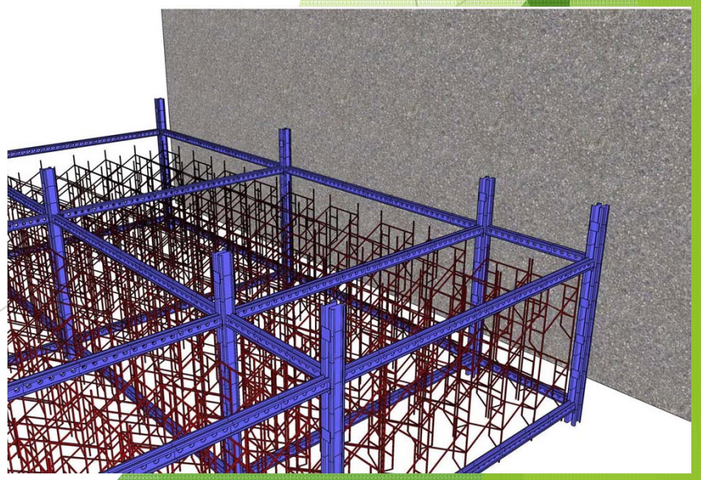
## Potential Hazard

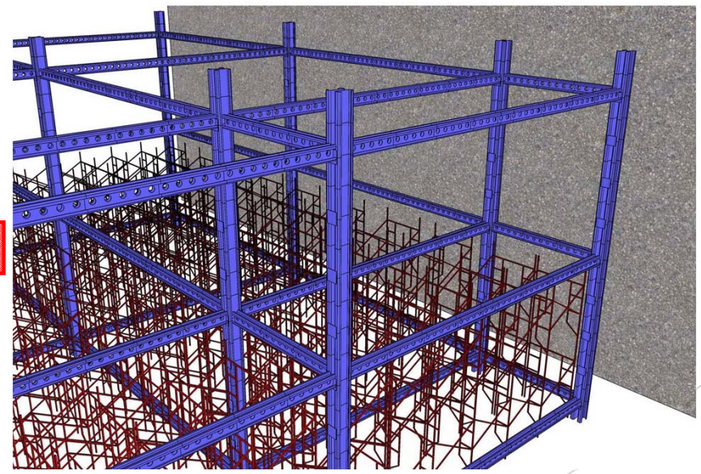
- Workers expose to high risk of work at height for both “Megashor” falsework assemble and light duty working platform falsework
- Total high risk exposure = 10 workers x 26 working days x 9 hrs / day = 2,340 man-hour

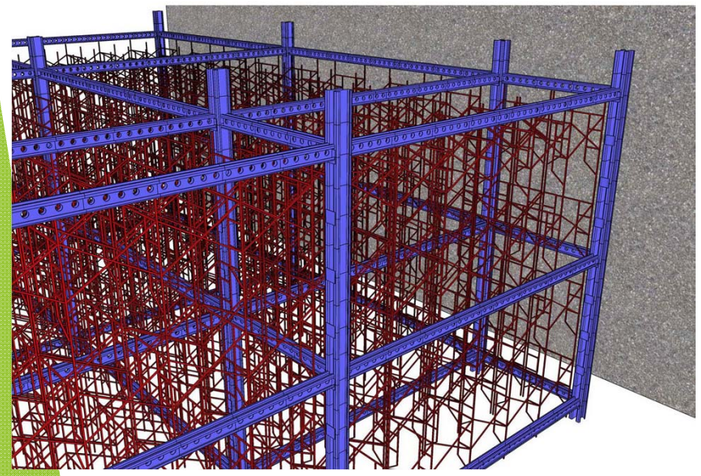
**High Risk Exposure = 2,340 man-hour**

**Un-acceptable**









# Safe Deign for Heavy Duty Falsework

## Hazard Identification and Mitigation

| Life Cycle | High Risk Hazard | Mitigations |
|---|---|---|
| Erection | Working at High | ● Provide suitable working platforms<br>● Reduce time of high risk exposure |
| Apply Load | Uneven loading application causing falsework local failure | ● Monitor the verticality of the Megashor during erection and loading application<br>● Restrict the link bridge segment installation sequence |
| Dismantling | Working at High | ● Provide suitable working platform<br>● Reduce time of high risk exposure |
| Dismantling | Removal of I-beams on top of the Megashor | ● Provide pre-fabricated anchor points on the bottom of the link bridge for I-beams removal |

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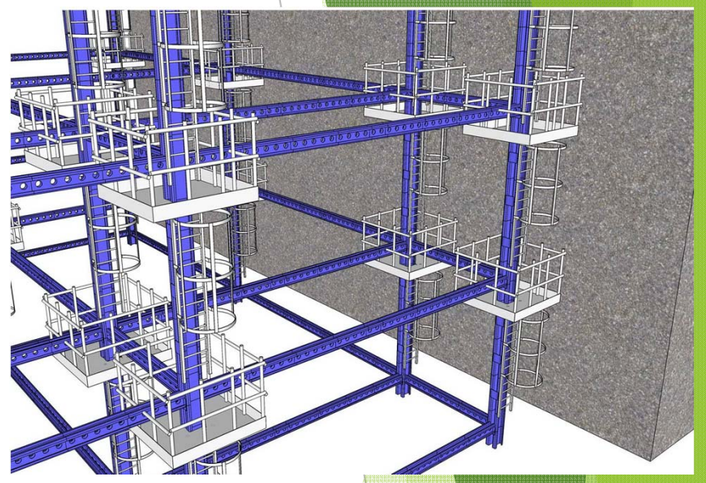
# Safe Deign for Heavy Duty Falsework

## Revised Erection Method – By Integrated Working Platform

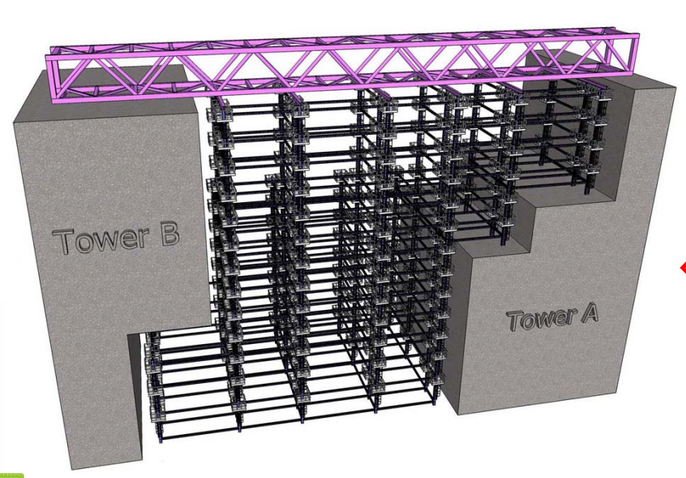
- Pre-Fabricate the steel working platform in factory
- Integrate the working platform with the “Megashor” on ground level
- Assemble “Megashor” with platform as segments on ground level
- Erect 1st layer of “Megashor” with platform
- Connect 2nd layer of “Megashor” to 1st layer segments by segments
- Repeat the steps until the “Megashor” falsework reaches the required height

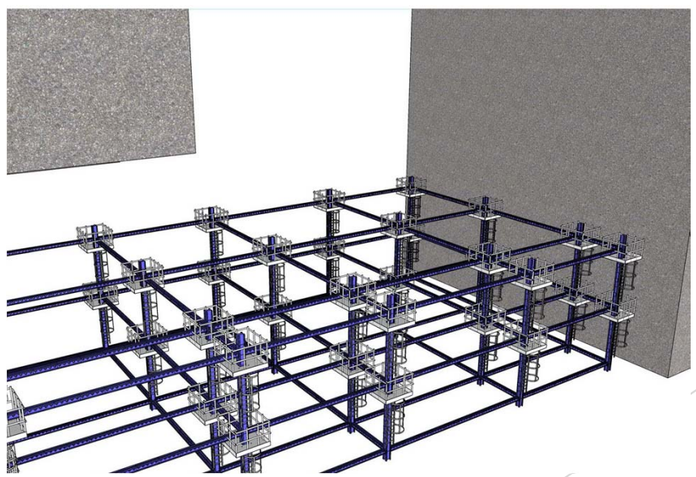
## Potential Hazard

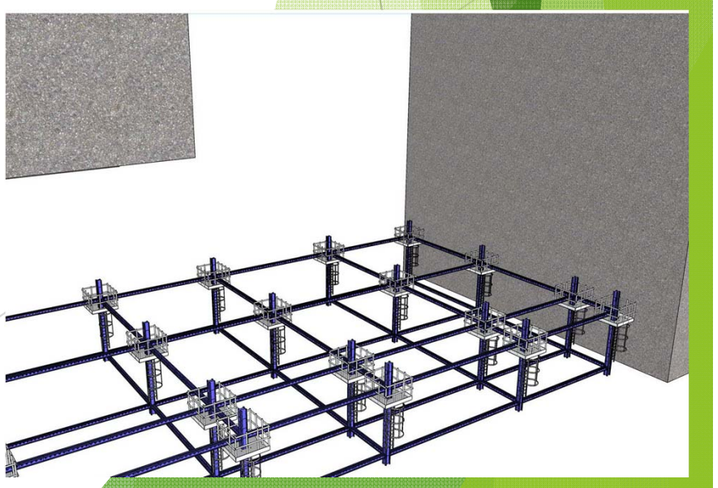
- Workers expose to high risk of work at height when connect 2 layers of Megashor together
- Total high risk exposure = 4 workers x 12 working days x 2 hrs / day = 96 man-hour



**High Risk Exposure = 96 man-hour**
**96% of Risk Exposure Reduced**
**Acceptable**

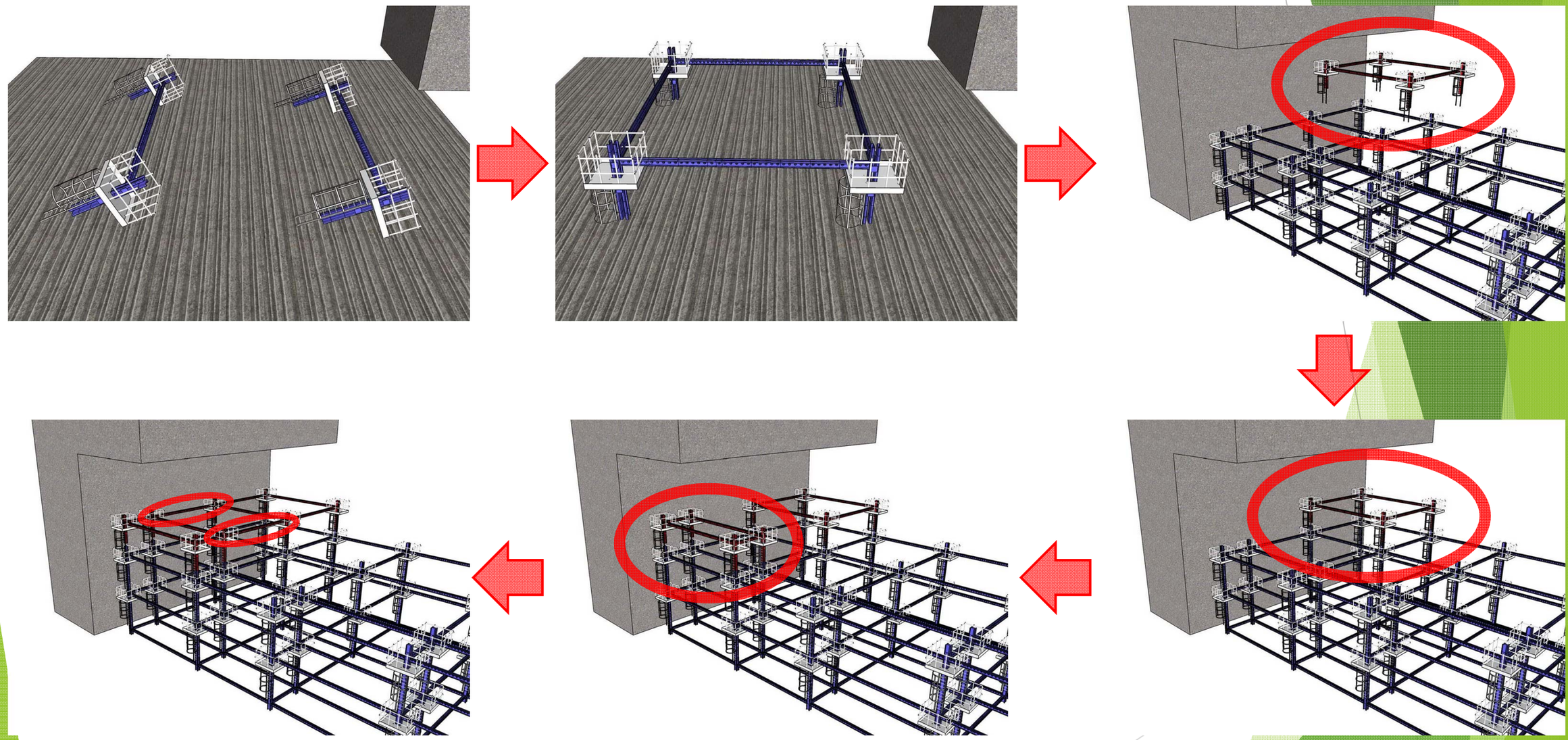




# Safe Deign for Heavy Duty Falsework

## Erection Method – By Integrated Working Platform



# Safe Deign for Heavy Duty Falsework

## Detailed Design Review

| Design Requirements | Design Solution |
|---|---|
| Attach pre-fabricated steel working platform to the Megashor system | ● Check the structural sufficiency of the Megashor casued by additional loading from integrated working platform<br>● Provide fixing details between Megashor and integrated working platform |
| Megashor to be installed as segments | ● Check the structural integrity of the Megashor during hoisting stage<br>● Provide hoisting / lifting details of Megashor segments |
| Provide temporary hoisting for removal of I-beam | ● Check the structural sufficiency of the link bridge for the removal of I-beams<br>● Provide anchor points details on the bottom of the link bridge |

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# Safe Deign for Heavy Duty Falsework

## Photo Records for Megashor Falsework with Integrated Working Platform