

## Intermediate Rigging Study Notes

- You have **60 days** to apply for your licence.
- Your licence will be cancelled **12 months** after your high risk licence expiry date.
- You can carry out high risk work if you are **enrolled & supervised** by someone licensed.
- You have a **Duty of Care** to protect yourself and others from harm.
- If you work unsafely your licence will be **cancelled or suspended**
- You must provide **HRWL** upon request to your employer etc.
- Some tasks an intermediate rigger can legally do are:
  - All work basic riggers can do, Erect cranes, Erect tilt slabs, Erect hoist with jibs and self-climbers, Demolition & Dual lifts.
- By consulting with these people, you can find out:
  - **Safety** officers Site-specific hazards, policies & procedures
  - **Engineers** plans, drawings & load bearings
  - **Supervisor** Job specifics & Work area arrangements
- Hierarchy of control
  - E\_\_\_\_\_ Every
  - S\_\_\_\_\_ Saturday
  - I\_\_\_\_\_ I
  - E\_\_\_\_\_ Eat
  - A\_\_\_\_\_ Apple
  - P\_\_\_\_\_ Pie
- Some Dual crane lift hazards & controls
  - Weather Work to wind ratings & SWMS
  - Electrical lines States safe distances, spotters.
  - Pedestrians Exclusion zones, barriers & signage.
  - Lighting Adequate lighting across entire work place
  - Excavations Maintain 1:1 distance from excavations
  - Buildings SWMS, lift pains, equipment & clearance from structures

- Planning considerations are:
  - **Permits** P
  - **Locations** L
  - **Access** A
  - **Communication** C
  - **Equipment** E

Dual Lift:

- S\_\_\_\_\_ Spotters, Doggers, assistant
- L\_\_\_\_\_ Luff up or in
- A\_\_\_\_\_ Axis of cranes for pick & carry are the same where possible
- M\_\_\_\_\_ Monitor conditions in case new risks arise.
- R\_\_\_\_\_ Rope on all cranes to stay vertical

Directing a multi-crane lift:

- W\_\_\_\_\_ Weather needs to be monitored
- O\_\_\_\_\_ One motion at a time
- R\_\_\_\_\_ Rope Remains vertical
- M\_\_\_\_\_ Move luff up where possible
- S\_\_\_\_\_ Slow movements

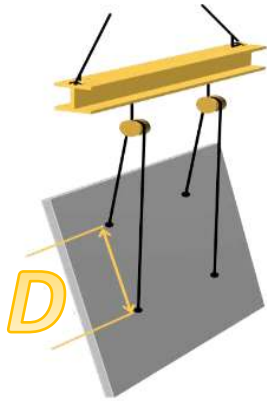
- PPE & communications must be inspected **before & after** use.
- Hazard controls need to be in place before work and as they **arise**.
- Safe minimum distance from power lines for QLD 3m, 4.5m, 5m, 6m. To work closer than that you need to isolate, insulate lines or employ spotters
- Find out **voltage** contact electrical authority.
- **Tiger tails** are a visual aid only to highlight powerlines.
- Consult with **engineer** to find out ground stability.
- Forces and loads to consider
  - Live load: Workers in workbox, tilt slab on single crane
  - Static load: Consistently applied load
  - Dead load: Weight of crane or hoist itself before loaded
- Choose the appropriate communication in **planning** stages and check its working correctly before use

- Some rigging & equipment used for tilt slab erection are:
  - Crane-, bracing, EWP, lifting clutches, lifting equipment, communications devices, PPE, barricades & signage
- Methods of communications used for tilt slabs:
  - Fixed channel 2-way radio, hand signals & whistles
- In an emergency you must communicate **W**hat & **W**here the emergency is & **W**ho is involved. (**WWW**) Alert everyone.
- Before erecting a tower crane you would find out weights of components by checking manufactures specs & labels on sections to determine number of free-standing sections. Refer to manual or manufacture. Lifting boom or jib sections must be done from **top cords** or lifting lugs on cords
- Crane counterweights must be installed or removed as per manufactures specs to maintain crane stability. Turnbuckles are used for counterweight rope tensioning & must be locked out with locking plate to prevent coming loose
- Internal tower cranes are supported by a series of **beams** according to design
- Climbing internal tower crane:
  - Tower guys are placed apart according to manufactures specs or engineer & must be released to **minimum** measurement before climbing.
  - For tower crane to reach **equilibrium** you must luff out at minimal speed to required radius for balance.
  - Communication between pontoon operator (bottom tower) & Ram operator (upper machine deck) is needed to ensure **correct** climbing procedure
  - To lock or disconnect travelling counterweights boom must be at **minimum** radius
  - Before climbing ensure sections are free of **obstructions** so tower can climb without jamming
- Climbing external tower crane
  - Tie distances are determined by **manufacturer** specs or engineer as are wind ratings for climbing. Never **release** bolts connecting crane to climbing frame during climbing
  - A **monorail** is used to support incoming sections for climbing
  - **intermediate** or advanced rigger is responsible for communication with crane operator

- Mobile crane max cantilevered boom length support from butt section is found in manufactures specs or operator's **manual**
- When dismantling lattice boom crane with cantilevered boom & butt section is supported by the bridle you must remove the **Bottom** pins first. Don't remove bottom pins while inside or from under boom possibility of being **crush/ struck** from sudden collapse. Connecting sections fit pins from **inside** to the **outside**.
- When doing multiple crane lifts each crane needs to have additional capacity over its share of the load.
  - 2 Cranes 20%
  - 3 Cranes 33%
  - 4 or more Cranes 50%
- Equalising gear should be used when lifting large items e.g. columns when cranes are close together.
- Multiple crane lifts luffing down increases radius, decreases -load capacity.
- Tilt-up panels minimum safety factor for lifting & bracing inserts is 2.5x. Maximum load for expansion anchors for brace fixing is 60% of first slip load. Each panel needs a minimum of 2 braces of equal capacity at right angle to face. Maximum tolerance for alignment of panels is 5mm & if using chemical anchors to fix braces 100% must be proof-tested.
- Adjustable braces must be fitted with locking pins & **retaining** device. Adjustable braces must have rated capacity at 0 & full extension.
- Minimum shim/packer width under panel is 100mm or panel thickness, whichever is less.
- Lifting clutches need proof testing every 6 months.
- Cranes used for multi-crane lifts must have load mass indicator.
- Lifting panels from cast bed will have suction loading added the dead load of panel. All rigging configurations for panels will be from shop drawings, manufacture or engineer.
- Snatching load on crane will induce excessive dynamic forces & could exceed capacity of crane
- Minimum diameter of FSWR felling rope 12mm, felling chain 8mm, winches, cranes & rigging gear used for demolishing members or felling must be rated 1.5x the weight of the member or 50% added to weight

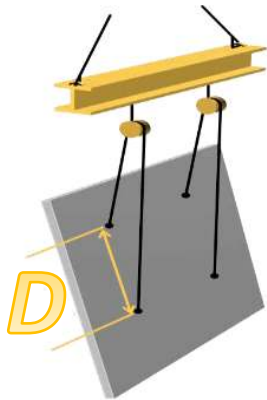
- Minimum horizontal height between structure & pulling mechanism for felling is **1.5x** height of structure. Minimum distance any person may to side of rope/chain is **0.75x** distance mechanism & structure.
- When demolishing structures, you follow everything in person conducting business or undertaking's **demolition** plan
- It's dangerous for pre-cast or pre-stressed beam to be turned on its side as it could **collapse**, cause damage to plant & equipment & safety issues.
- Before demolishing post-tension transfer beams consult with structural **engineer** or supplier.
- To control springing or sudden shifting from level of beam being freed in demolition use temporary **guys**. Monitor the surrounding structure for signs of overstressing or unexpected movement. If this occurs, you must stop immediately, remove all personnel & report immediately to demolition **supervisor**.
- Replacing FSWR on crane you would find info in manufactures **specifications** or load chart,  
FSWR needs to be tightly laid on multi-layered hoist drum so as not to cause crushing or fatigue as lead rope **pulls in** between layers.

**Maths Revision Show All Workings**



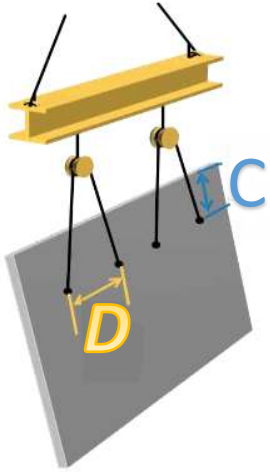
1.

*D is 2.7m show workings*

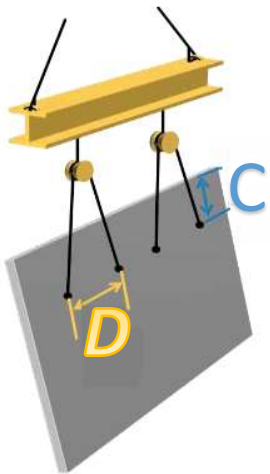


2.

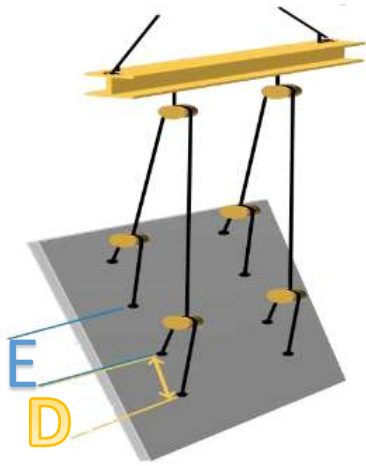
*D is 3.1m show workings*



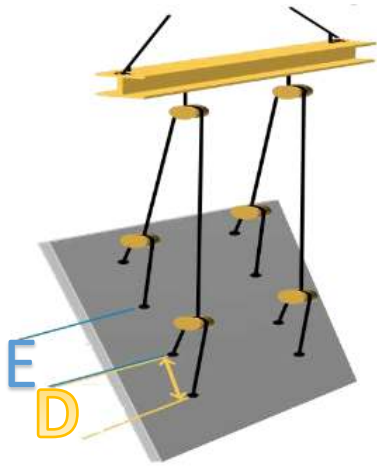
3.  
*D is 2.3m C is 3.1m show workings*



4.  
*D is 2.9m C is 2.5m show workings*



5.  
*E is 2.1 D is 2.7m show workings*



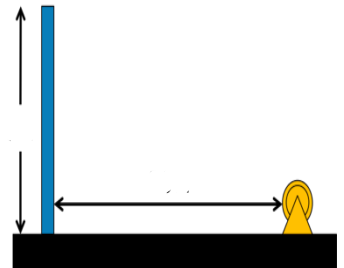
6.  
*E is 2.9m D is 2.4m show workings*



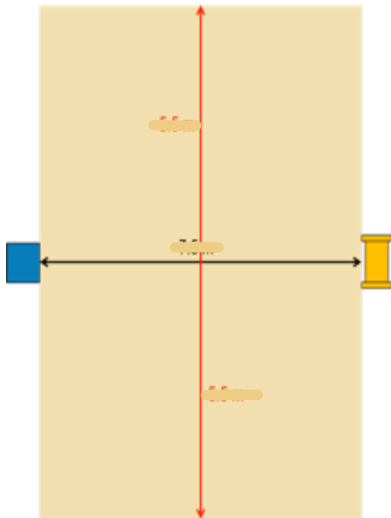
7. The column is concrete calculate the total weight Show workings

Column is 600mm x 600mm & 6m high

8. Calculate the minimum horizontal distance between structure and pulling mechanism for Show workings.



9. What must the winch be capable of supporting Show workings

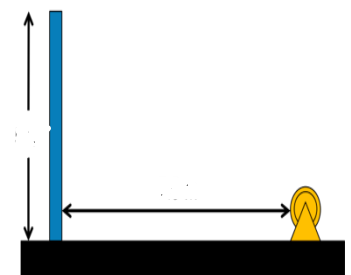


10. Using answers from question 8 how close to the sides of the rope or chain can a person stand Show workings

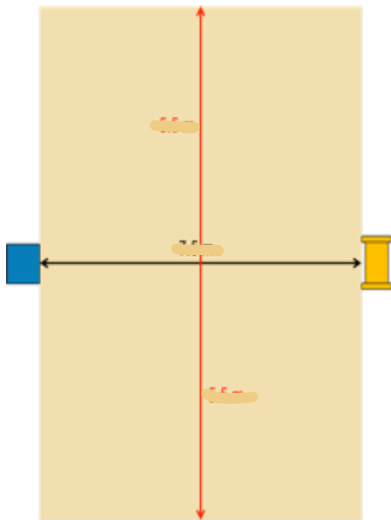
11. The column is concrete calculate the total weight Show workings

Column is 500mm x 300mm 4.5m high

12. Calculate the minimum horizontal distance between structure and pulling mechanism Show workings.



13. What must the winch be capable of supporting Show workings



14. Using answers from question 12 how close to the sides of the rope or chain can a person stand Show workings

15. You are doing a dual crane lift the load share is 8tonne calculate the load share weight

16. You are doing a dual crane lift the load share is 15tonne calculate the load share weight

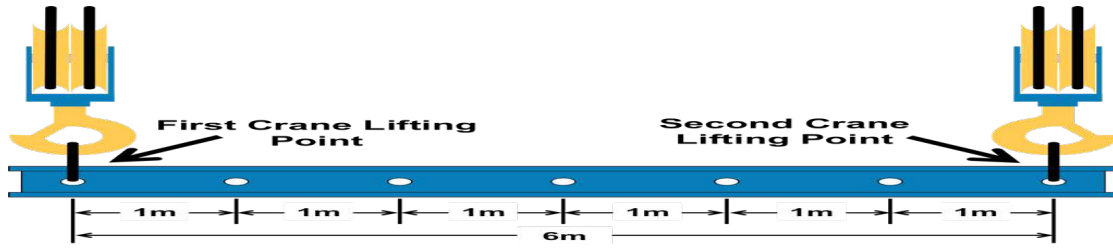
17. You are doing a 3 crane lift the load share is 20tonne calculate the load share weight

18. You are doing a 3 crane lift the load share is 32tonne calculate the load share weight

19. You are doing a 5 crane lift the load shares are 35tonne calculate the load share weight

20. You are doing a 5 crane lift the load shares are 52tonne calculate the load share weight

21.



**First Lift:-**

- Weight of pre-stressed concrete beam 26tonne
- Weight of equalising beam and lifting gear 1.2tonne
- Alignment of pre-stressed concrete beam axis North/South
- Final position of Pre-stressed concrete beam #m to the East
- Capacity of first crane at maximum working radius 25Tonne
- Length of equalising beam = 6m

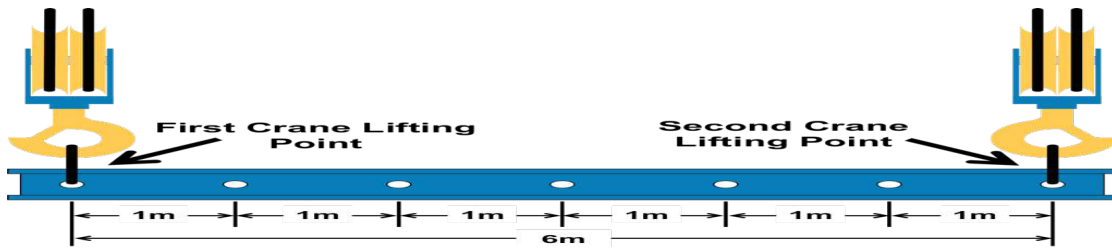
**Part 1:** How far along the equalising beam from the first crane's lifting point would you attach the pre-stressed concrete beam's lifting slings  
Show workings

**First Lift: -**

- The weight of the concrete beam is 26tonne
- The weight of the lifting gear is 1.2tonne
- The capacity of the first crane (at maximum working radius) is 25tonne

**Part 2:** What is the minimum capacity of the second crane at the required radius, where:

22.



**Second Lift:-**

- Weight of pre-stressed concrete beam 49tonne
- Weight of equalising beam and lifting gear 1tonne
- Alignment of pre-stressed concrete beam axis North/South
- Final position of Pre-stressed concrete beam #m to the East
- Capacity of first crane at maximum working radius 35Tonne
- Length of equalising beam = 6m

**Part 1:** How far along the equalising beam from the first crane's lifting point would you attach the pre-stressed concrete beam's lifting slings  
Show workings

**Second Lift:-**

- The weight of the concrete beam is 49tonne
- The weight of the lifting gear is 1tonne
- The capacity of the first crane (at maximum working radius) is 35tonne

**Part 2:** What is the minimum capacity of the second crane at the required radius, where: