

Lessons Learnt from a Significant Event



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Title: London Bridge Station Redevelopment – Ground Failure beneath Piling Mat

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Overview of Event

- On 20th July the ground beneath a piling mat failed causing the piling rig to sink into the piling mat.
- The piling rig had drilled down to a depth of approx. 27m and the team had commenced pumping the concrete whilst withdrawing the auger. As the auger reached a depth of approx 22m, the piling mat beneath the piling rig stabilising foot failed.
- The foot of the rig sunk approximately 300-400mm causing the rig mast to lean.

Underlying Causes:

There are a number of underlying facts that contributed to the accident: -

- The vertical load from the piling rig foot was too great for the ground below the piling mat and caused the rig to go out of plumb
- There was no site investigation carried out specific to the design of the piling mat. The soil parameters were taken from soil investigations earlier in the project and from a different part of the site.
- A similar incident (but less severe) had occurred the previous day. By the time the temporary work manager (CRE) attended, the piling rig had moved and hence there was no clarity into how serious the incident was. This was an opportunity to review the calculations used for the piling mat.
- The ground below the piling mat was reduced by approximately 1 metre and agreed through email, post Form 3. The calculations were not rechecked independently although this would not have changed the soil parameters, it was an opportunity to review the design.
- The undrained shear strength of the existing ground below the piling mat was deemed to be 35kPa. Investigation subsequent to the incident using SPT testing has shown this to be inadequate.

The Photographs below show the tracks of the rig lifting and the foot of the rig sinking into the piling mat



Key Message:

- The London Bridge team now stipulate that the Cat 3 checker will independently review design assumptions for their suitability (rather than just confirm the calculations)
- For London Bridge station works the permanent works designer will be consulted on the ground strength assumptions through written correspondence for all temporary works
- Information to inform designs should be valid and specific to the area
- Changes to design should go through the correct temporary works sign off process
- All close calls should be reported and acted upon as near real time as possible to learn and take action quickly