TRAC(K)-ING DOWN YOUR PROBLEM - A ROPE ACCESS SOLUTION

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ABSTRACT

In this day and age of OH&S we find ourselves seeking safe and cost effective methods to complete necessary projects. Work which is considered a high risk is often neglected or continuously put off, especially when heights and hard to reach areas are concerned. A safe, cost effective solution to this problem is to utilize industrial abseilers with Technical Rope Access Concept (TRAC) training.

In June 2011 Kempsey Shire Council staff approached Aqualift, seeking assistance with a leaking pipeline under the Pacific Highway Bridge in the middle of the Macleay river at Kempsey. The bridge is a steel truss type and the pipeline is some 15 metres above the river. The options for fixing the pipe included barges with scissor lifts, scaffolding, an inverted knuckle boom which would force the closure the Pacific Highway or the TRAC method.

The only practical solution was for an industrial rope access team to abseil beneath the bridge to fix the pipeline. The benefits of this solution over the other options were that it provided a safe and effective access to the area, did not interfere with traffic and enabled the operators to adapt to any changes as the work progressed. Abseiling into the job site proved to be a perfect solution and this has now been used for subsequent repairs under the bridge.

1.0 INTRODUCTION

In June 2011, Kempsey Shire Council (KSC) staff identified a number of issues regarding a leaking pipeline that was suspended below the Pacific Highway bridge in the middle of the Macleay river at Kempsey. Due to increased traffic loadings, the bridge is subjected to a lot of flexing as large vehicles and machinery continuously pass over. While this does not affect the bridge structurally, it has an adverse effect on the services which pass underneath.

Figure 1: ***Pacific Highway Bridge at Kempsey***

The 225mm ID pipe was constructed from fibre cement and is supported off the bridge through a series of clamps, which are slung back from the walkway. A blown or damaged pipe would have interrupted supply to the South Kempsey residents and due to the difficult location, any repair would not have been a quick or easy solution.

A closer inspection using binoculars showed that two separate gibault joints were failing to seal. On consultation between KSC and Aqualift, it was decided that a stainless steel repair sleeve system would be the best solution to rectify the leak. Replacing or rebuilding the gibaults would only have provided a temporary solution due to the ongoing movement that the pipe was being subjected to.

2.0 DISCUSSION

2.1 Access Options

Due to the pipes location, access to the site proved to be problematic as it could not be easily reached through access covers or other conventional means that are available to buried pipelines. Coupled with the need to keep the highway traffic and pedestrian access open at all times, plans were devised for different types of access and some of the following were suggested.

- **Inverted Knuckle Boom**
  An inverted knuckle boom (see Figure 2) would provide a stable work platform, however due to its size and the construction of the bridge, closure of the Pacific Highway would be required for the duration of the job. The knuckle boom also has limited inverted reach that may or may not have provided access to the site.

- **Barge equipped with a Scissor Lift**
  A barge would have provided easy access to the site however due to the height required by the scissor lift (see Figure 3), the risk of pinching or entrapment to the operator from even the smallest boat wake or wind borne wave was a real possibility. An exclusion zone would have been required in the surrounding area and the cost of a scissor lift, a suitable barge and several safety boats, along with all the necessary crew was going to be expensive.

Figure 2: ***Inverted knuckle boom***

Figure 3: ***Scissor lift***

- **Scaffold**
  Scaffolding would have provided a safe, stable platform to work from, however due to limited mobility and the requirement to access multiple sites in a short time frame it would not have been a time or cost effective solution.

- **TRAC**
  Rope access would enable an operator to descend over the side of the bridge on ropes and traverse underneath to the repair location. This stood out as the best option as it provided the maximum amount of mobility, the safest mode of entry/exit and was not only time effective but also cost efficient.

2.2 TRAC – Technical Rope Access Concept

TRAC was originally designed for industrial ropers as a safer system of working, utilizing twin ropes and a two point of contact protocol compared to single rope climbing techniques. It enables the operator to work safely by providing an additional rope to be attached to in the event that the primary rope is damaged or has failed. This technique also allows the operator to traverse from one rope to another, which gives the ability to move under suspended objects such as bridges and overhanging structures.

The basic TRAC layout consists of two ropes (one working rope and one safety rope). The ropes are anchored onto suitable fixed structures that may either be a rated anchor point or a fixture deemed suitable by a TRAC technician. Depending on the type of access required, multiple anchor points are used to decrease the chance of a single point of failure from occurring. Additional ropes can then be added to enable the operator to traverse and move horizontally.

Once the ropes are in place and checked, the operator dons a full body harness that will enable him to climb or abseil in a vertical position and avoid falling out in the case of an inversion occurring.

To access the work area the operator first clips on an ascender to the safety line. This piece of equipment will stop the operator falling in the event of rope breakage, an equipment malfunction or human error. The descender unit is then attached to the working line. Most TRAC type descenders are ‘fail safe’ and can only be operated by a conscience person – in the case of an incident, the unit will lock up and keep the operator safe until a rescue can be affected.

Before the operator begins to access the work area he is given an ABCDE (Anchors, Buckles, Carabiners, Descenders, & Everything else!) check by his ‘buddy’ to make sure ‘everything’ is in place.

2.3 TRAC – Access under Kempsey Bridge

The Kempsey bridge access required rigging for two operators plus additional ropes to traverse underneath the footbridge area. Two working ropes were positioned over the side and one safety line (shared by both operators) was positioned in the middle of the two working ropes. Traversing ropes for movement underneath the bridge were placed down through gaps in the structure and protected from any sharp edges.

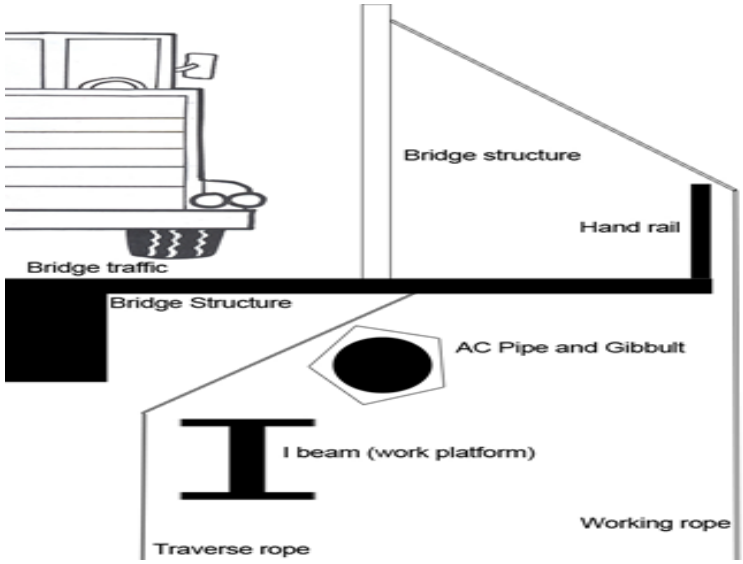
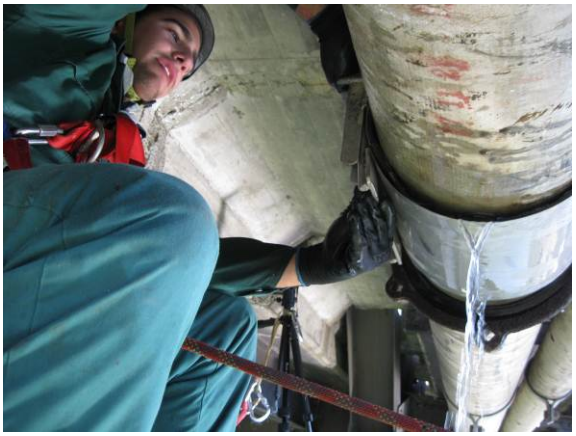


Figure 4: ***Kempsey bridge cross-section***

Once the safety check was completed by the third team member, the operator's abseiled off the side of the bridge. One operator positioned himself on the outside of the work area to pass in equipment whilst the other traversed under the bridge and climbed up inside the workspace.

The task required was relatively simple, however due to the age of the gibault, manual tools failed to loosen the retaining nuts. The solution was an air impact gun powered by a scuba tank - thirty odd years of resistance was quickly overcome!

The gibault was then slid out of the way and the pipe was assessed for any defects that would have affected a successful repair. Once the pipe had passed the inspection, the stainless steel repair clamp was attached and tightened up. The pipe was then pressurized and checked for leaks before the operators reversed the process, traversed out from under the bridge and climbed back up the working ropes to safety (and morning tea).



The process was repeated for a second repair and this took even less time, as the team was now 'underneath things' in a big way!

The entire task (removal of the gibaults and installation of repair sleeves) at two separate locations was completed in less than three hours (including morning tea!).

3.0 CONCLUSION

The decision to use TRAC as the method of entry under the bridge provided the best result. This was one time it was not good to be 'on top' of your problem. TRAC was cost effective, had no impact on traffic flow or pedestrian access, and enabled the work to be carried out safely and effectively. If future short-term repairs to the bridge were required, TRAC would be highly recommended as the entry method of choice. However, if long-term work was to be carried out, scaffolding may be a better option as it provides a more stable structure to work off, and requires less technical skills from the pipe repair workers involved.

4.0 ACKNOWLEDGMENTS

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