

# Worksite Safety Update

## Promoting safety in roadwork

No 125 April - May 2013

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### M80 Ring Road Upgrade Project - Beam Lifting

#### Leighton Contractors Finalist in Best solution to a workplace health and safety issue - 2012 WorkSafe Awards

Leighton Contractors' Construction Safety Essentials (CSE) program provided the safety procedures used in the installation of the precast Super-T beams on the widening of the Western Highway overpass over the M80 Ring Road. These are believed to be the largest precast Super-T beams ever manufactured in Victoria.

Leighton Contractors when constructing the Tilburn Road to Furlong Road section of the M80 Ring Road Upgrade for VicRoads required oversized Super-T beams to be installed on the Western Highway overpass. Measuring 2m deep and weighing up to 100 tonnes, the 45m long beams were 5m longer than the standard largest beam. Extensive innovation was required to design, manufacture and transport the beams, position them and post-tension them together. The main safety concern was to ensure personnel were not exposed to live edges and potential for falls from height.

During beam manufacture, Leighton Contractors installed handrails at the beam ends and a new proprietary wire rope loop lifting system cast into the concrete. On site, the riggers used an elevated work platform to access the protected beam end to hook up the crane sling. **This eliminated riggers having to stretch from the elevated work platform and risk manual handling injury while carrying heavy clutches or climbing onto unprotected edges.**

To further eliminate live edges, a proprietary mobile gangway with handrails was used to bring staff to the beams. Metcalf Cranes eliminated live edges on the cranes by placing handrails on the cranes and counterweights.

Before work started, the foreman held a 30 minute toolbox briefing on the Safe Work Method Statements for that night's activities. This included an assessment of each step of every activity of the shift, responsibilities, the risks involved, and the control measures to be used. To ensure effective communication, two radio channels were operated. The crane crew had one channel controlling loads and lifts and the Project Engineer and the Foreman used the second channel for direct communication with other staff. They also had direct communication with the traffic management team to inform them as the beams arrived.

### What was the outcome? How is the workplace better now?

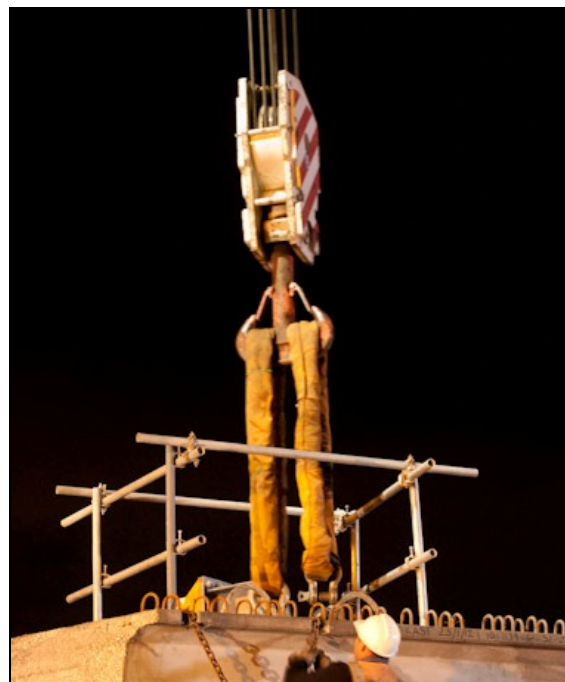
Following a comprehensive risk assessment, Leighton Contractors chose a strategy to eliminate all exposure to a live edge and falls from height, as it was the safest, most cost effective and streamlined approach. Harnesses were not permitted as a primary safety control, which freed up the movement of all staff while the critical activity was being undertaken. (Harnesses were only used as a secondary control in the elevated work platform as per regulatory requirements).

The safety controls reduced the risk of the work, made activities easier and quicker to complete, reduced an hour from each night program and saved \$500,000.

The following photographs illustrate the concept:



**The erection of one of the 100 tonne 45 metre long beams.**



**Lifting arrangement with the wire rope lifting loops cast into the beam and handrails.**

Leighton were not successful in receiving the award this time but are to be congratulated on their innovation in this area and for being a finalist in the WorkSafe Awards for 2012.

Leighton was also awarded a VicRoads Safety Innovation Award for their development of Pedestrian No Go Zones on the M80 Project used separate pedestrian workers and mobile plant.

### Hydro Excavation for Service Proving of Underground Services – Telstra High Pressure Water Jetting Test Results

The use of high pressure water jetting or hydro excavation has been successfully used on road construction works for a number of years to prove the location of underground services. Today it is standard practice to contact the Dial Before You Dig service, locate services and positively locate them before excavation permits are issued prior to works commencing. The use of hydro excavation and various detection devices has almost eliminated service strikes. These devices are often referred to as Non Destructive Excavation / Testing but as described in the article below tests have shown that if the water pressure is too high then damage to asset insulation can occur and this could also present a safety risk for power cables. The following article has been approved by Telstra in the interest of asset safety in the road construction industry:

#### Introduction

The Network Integrity (NI) area of Telstra delivers customer solutions for Asset Relocations and Commercial Works. We work with our stakeholders to minimise damage to our network including working closely with "Dial Before You Dig" service. We survey the Inter Exchange Network (IEN) cable routes which link all major capital cities in Australia to identify potential risks to Telstra Assets. We also provision HFC (Foxtel / Bigpond) network to new and existing Multi Dwelling Unit developments, Commercial and Corporate services.

Network Integrity proactively promotes damage minimisation strategies, together with Dial Before You Dig, to raise what we call "cable awareness" in Australia. We frequently conduct cable awareness presentations to councils, developers, utility companies, etc. We are also involved in the monitoring and accreditation of Telstra Accredited Plant locators (APL). As part of our proactive measure we would like to ensure that after an APL has been engaged by the industry, the below guidelines on High Pressure Water Jetting (HPWJ) are to be adhered too. Below is an article that was distributed to our APLs that carry out (HPWJ) to locate the Telstra underground network:

#### Telstra - High Pressure Water Jetting - test results

High Pressure Water Jetting (HPWJ) is becoming more and more popular in the industry to help aid in the location of underground networks. The use of HPWJ plant has provided a convenient means of positively identifying the underground networks. HPWJ has become very popular amongst the civil and construction industries, as there is no requirement for large and dangerous excavations used to pothole the services.

***Telstra sees fit to endorse the usage of the HPWJ plant to locate its underground networks. However, this endorsement comes with the recommendations set out below. Notwithstanding this, damages have occurred in the past to the Telstra network as a result of using very high pressures with the HPWJ plant.***

The recommendations below are to help contribute towards a new set of guidelines (National) in the HPWJ industry so as to avoid damages to underground networks in the process of potholing for them. It should also be noted that ongoing learning's continue to be made from the HPWJ industry trials and that unforeseen situations, such as damage, may still occur.

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## Telstra's duty of Care and the (4Ps)

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### ✓ **PLAN**

- Networks plans via the Dial Before You Dig service (www.1100.com.au)
- Plans onsite (Hard copy and readable or digitised on a tablet)
- Plans are all current
- Contact any Telstra for additional help

### ✓ **POTHOLE**

- Mark out Telstra networks using an APL with a locator machine
- Pothole to locate all networks shown on plans using a HPWJ plant

### ✓ **PROTECT**

- Networks must be protected , once they have been exposed with the aid of HPWJ plant (sand back fill or a board )
- Access identification pipes must be placed offset to the potholed networks and never directly on top of a network

### ✓ **PROCEED**

- Once all the Telstra underground networks (shown on plans) are positively identified
- All staff working in close proximity are made aware of the presence and importance of the Telstra network
- Work method statements, Job safety analysis, permits to excavate, etc are signed and issued.

## Plant Operator Guidelines

### • **Abide by all State / Territory, health and safety standards**

- ✓ Use of appropriate PPE
- ✓ Securing all statutory clearances such as footpath/road opening permits
- ✓ Vehicle / Pedestrian traffic management were necessary
- ✓ Waste disposal management

### • **Work method statements for potholing works must be submitted to the client**

- ✓ Detail the type of plant that is been potholed (power, water, gas, communications, etc)
- ✓ Configuration and volume of network to be potholed
- ✓ Characteristics of the network (asbestos, clay, PVC, direct buried, etc)

### • **Ensure that all DBYD members plans are onsite with client when potholing**

### • **An APL has already been used to identify the alignment of networks**

### • **Operators performing HPWJ should be a competent Person in accordance with the relevant requirements**

## Testing by DBYD Qld, (Paul Newman)

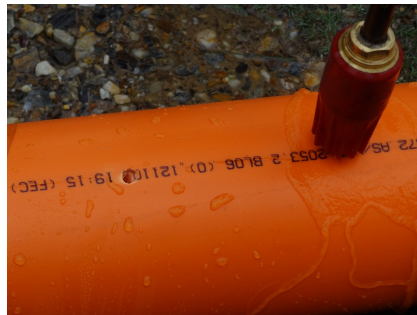
On the 26th February 2013, there was testing of Non Destructive Excavation (HPWJ) carried at Yatala Qld. It was organised by the Manager of DBYD Qld, (Paul Newman). Paul explained below the purpose behind the test:

*"In recent times we are starting to hear of a number of occasions where our member's underground assets are being put at jeopardy by activities associated with vacuum excavation. To DBYD's knowledge, currently there is no legislation or standards associated with vacuum excavation; this is a real concern given that the majority of people would consider this application as a fail-safe measure to exposure a buried asset. The wording itself "Non Destructive Excavation"*

certainly promotes this is a very safe means of locating buried assets.

What has been brought to our attention is that there are operators who have their machines pumping out pressures at the nozzle anywhere between 2,000 psi to 5,000 psi this is a very wide margin & certainly would be a concern for the owners of the buried assets.

The tests were carried out on varied assets at a controlled environment. The assets tested were copper cables, optical fibre cables, power cables and power conduits. These samples were subjected to a range of pressures to determine at what point the asset becomes vulnerable. The testings were recorded and at a later stage will be made accessible on the DBYD website.



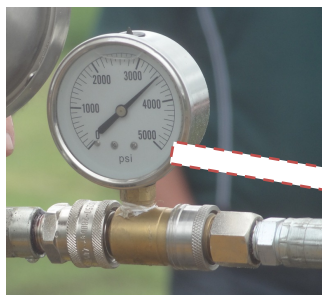
- Probing for the networks at pressure >2000PSI can cause major damage to cables and conduits. The above are two examples of probing tests carried out on the day

You can watch the full test on You Tube at:  
[DBYD Water Jetting pressure testing Feb-13](#)

### Observation Results

Some of the site observations using a rotary nozzle:

A direct buried Telstra copper cable was subject to 3500psi, sheath damaged occurred. At higher pressures the actual copper wire was exposed.



Below are photos showing networking damage using HPWJ >2000PSI



Copper cable damage



Copper cable damage



Power Cable Damage



Optical Fibre damage

### Summary and Recommendations

For Operators of non-destructive plant that use high pressure jetting (HPWJ) to physically locate underground networks, it is recommended that:

Prior to undertaking the HPWJ potholing that a detailed site analysis has been carried out by an approved cable locator

The non-destructive HPWJ plant can be used with a maximum operating pressure of 2000psi or 138bars to locate the network in question

It is highly recommended that only a rotary nozzle head to be used

Vacuum hose to be located in the pothole being extracted to ensure the removal of all fine slurry. This is to give a clear visual sight of the excavation bottom and the distance to the networks

Never drive the lance into any substance in order to dislodge stiff strata

The nozzle head (lance) should never be used to probe for a network

The nozzle head should be at least 100mm above the asset when operating at 2000psi.

Pothole all networks including minor and major networks

Issue the client a copy of your Site Record sheet

Report any network damage to asset owners (including sheath damage)

For more information or help please contact Mr Otre Moussa at [c732841@telstra.com](mailto:c732841@telstra.com) or

Network Integrity is contactable on **1800 810 443** or email:

[F1102490@team.telstra.com](mailto:F1102490@team.telstra.com)

### Rebar-caps do not prevent impalement

This article is to advise employers and employees of the dangers of falling against exposed reinforcement bars, even if they have plastic protective covers (known as rebar-caps) attached. It also provides advice to suppliers of rebar-caps. More recently a Christchurch New Zealand worker barely escaped with his life after being impaled on a steel rod that skewered three vital organs and narrowly missed his heart.

#### Background

An incident occurred in New South Wales in which a person stumbled and fell, impaling himself on an exposed reinforcement bar. The bar had a rebar-cap on it, but the cap offered no protection against impalement as the weight of the worker against the rebar-cap was sufficient for it to be pierced by the bar.

Research carried out following the incident included tests that involved dropping a 20 kg bag of sand one metre onto a vertical reinforcement bar. This showed that standard rebar-caps provide little, if any, protection against impalement on reinforcement bars should a person fall against them, even for a fall on the same level. Any protection offered by the rebar-caps, no matter how slight, was greatly reduced if they were the wrong size for the bar or were incorrectly fitted (see Figures 1 and 2 below).

These findings were supported by information obtained from a number of suppliers who stated that the rebar-caps are only intended to provide visual warning of a hazard and protection against brush contact with burred ends of the bars. They are not a means to control the risk of impalement.



Figure 1: Typical example of a correctly fitted rebar-cap.



Figure 2: Typical example of an incorrectly fitted rebar-cap.

### What WorkSafe NSW Expects

Where possible, working adjacent to exposed reinforcement bars should be eliminated. For example, work activities should be relocated away from areas with exposed reinforcement bars.

Where this is not possible, workers should be effectively separated from the exposed reinforcement bars by guardrails, screens or other means. Where workers are on scaffolds adjacent to exposed reinforcement bars, the scaffolds should be fitted with edge protection regardless of their height.

Where it is necessary for work to be done adjacent to exposed reinforcement bars, rebar-caps should be fitted on top of the bars, taking into account the following:

- use rebar-caps offering some level of protection from impalement
- use the correct rebar-cap for the size of the bar
- fit rebar-caps properly in accordance with the supplier's instructions
- check the condition of the rebar-caps, especially for deterioration from exposure to ultra violet light, and
- regularly check that the rebar-caps are still in place and correctly fitted.

### Product Information

Suppliers of rebar-caps must ensure that relevant information is provided so that they can be properly used for their intended purpose. This information should include:

- whether the rebar-caps are simply intended to be visual warnings and offer protection against brush contact, or if they are intended to offer any degree of protection against impalement
- their correct fitting to the bars
- the size or range of reinforcement bars to which the rebar-cap can be fitted, and
- possible degradation under exposure to direct sunlight, and means to detect this.

## Acknowledgement

This Alert is based on an Industry Safety Alert (Risks from exposed reinforcement bars, April 2006). It was published by the NSW Industry Plant Consultative Committee that includes WorkCover NSW, MBA NSW & the NSW Branch of the CFMEU Construction & General Division.

## Another Road Worker Reversing Fatality

Another roadworker reversing fatality has occurred this, time when reversed into by a grader. The man had been conducting traffic management when the incident occurred at a road construction site in Bunbury, Western Australia.

WorkSafe Western Australia has issued a Frequently Asked Questions for Mobile Plant. In respect to pedestrians and mobile plant the following information is provided on their web site at:

[http://www.commerce.wa.gov.au/WorkSafe/Content/Safety\\_Topics/Plant\\_and\\_machines/Additional\\_information/Mobile\\_Plant-Frequently\\_asked\\_q.html#1. What is mobile plant](http://www.commerce.wa.gov.au/WorkSafe/Content/Safety_Topics/Plant_and_machines/Additional_information/Mobile_Plant-Frequently_asked_q.html#1. What_is_mobile_plant)

**In respect to pedestrians and plant the following advice is provided by WorkSafe WA:**

### How can I prevent mobile plant from running over pedestrians?

There are a number of methods that can be used to control the risk of pedestrian injuries:

- Separating pedestrians from mobile plant by preventing access to areas where mobile plant is operating
- Traffic management systems that control the movement of plant and pedestrians, for instance providing separate walkways for pedestrians and pedestrian barriers at building entrances
- Communication systems between plant operators and pedestrians
- Flagmen/spotters may be useful for controlling traffic in localised areas; and
- Personal protective equipment such as high visibility vests.

### Do we need to fit reversing alarms to mobile plant?

Reversing mobile plant is a dangerous activity, because there is a risk that people including other workers in the vicinity may be hit or run over. If there is a potential for a pedestrian to be injured, then a suitable control measure is fitting a warning device, such as a reversing alarm and/or flashing light that can effectively warn pedestrians of the vehicle's reversing movement.

In 2003 WorkSafe WA issued the following Safety and Health Alert 03/03:

### Incident

Two separate incidents in recent months have resulted in the deaths of two people working on the ground near mobile plant.

### Factors

- Operators of mobile plant often have severely restricted visibility of ground workers, particularly those close to the plant.
- There is a need to establish an effective means of communication between mobile plant operators and ground personnel.
- Noise and other environmental conditions.
- Whether it is practicable to separate ground personnel from areas crossed by mobile plant.
- The need to limit movements of site visitors with barricades and appropriate signage.



## Recommendations

1. Employers must ensure there is a system of work in place that provides adequate protection for employees who have to work on the ground near mobile plant.
2. When mobile plant is being used, pedestrian movements in that area should be prohibited, if possible.
3. Pedestrian movement around mobile plant that is being manoeuvred (i.e. where reversing is involved) should be prohibited.
4. An effective system of communications between mobile plant operators and ground personnel should be established before work commences. Relevant staff should be trained in the procedures involved with the selected system.

The system should stop ground workers approaching mobile plant until the operator has agreed to their request to approach.

Similarly the system should stop operators from moving their plant closer than a given distance from ground personnel until the operator has received acknowledgement that the ground personnel are aware of the proposed movement.

5. Mobile plant operators and ground workers must be trained and familiar with the blind spots of plant working around them. They should be supervised adequately when working near mobile plant.
6. Mobile plant that works near persons on the ground should be equipped with a revolving light and reversing alarm.

There is increasing use of reversing /rear view cameras and plant/pedestrian worker proximity warning devices. There is even an automatic sensing and braking system under development.

However, the hierarchy of safety controls should be applied, so far as is reasonably practicable, utilising the higher level controls such as removal of pedestrians from mobile plant movement areas or effective isolation of pedestrians from the plant, etc. Behavioural or administrative controls are still the most common control and are unreliable.

Spotters are used but the experience in the United States of America is that they are often run over by the plant they are protecting.

**Worksite Site Safety Update is produced to communicate industry safety information and initiatives within VicRoads and to our contractors. It is also circulated via the WorkSafe Safety Soapbox to industry. The content reflects civil road construction and maintenance safety and includes works conducted on or beside operational roads. The editor may be contacted at: [michael.rose@roads.vic.gov.au](mailto:michael.rose@roads.vic.gov.au)**