

Lessons learned from one of New Zealand's most challenging civil engineering projects: rebuilding the earthquake damaged pipes, roads, bridges and retaining walls in the city of Christchurch 2011 - 2016.

Examples of SCIRT Safety Alerts – Critical Risk 1 – Service Strikes

Story: Utilities Location and Protection

Theme: Programme Management

A document which contains several examples of SCIRT Safety Alerts, which were documents sent out to inform and educate all site staff after an incident.

This document has been provided as an example of a tool that might be useful for other organisations undertaking complex disaster recovery or infrastructure rebuild programmes.

For more information about this document, visit www.scirtlearninglegacy.org.nz













This work is licensed under a Creative Commons Attribution 3.0 New Zealand License.

The authors, and Stronger Christchurch Infrastructure Rebuild Team (SCIRT) have taken all reasonable care to ensure the accuracy of the information supplied in this legacy document. However, neither the authors nor SCIRT, warrant that the information contained in this legacy document will be complete or free of errors or inaccuracies. By using this legacy document you accept all liability arising from your use of it. Neither the authors nor SCIRT, will be liable for any loss or damage suffered by any person arising from the use of this legacy document, however caused.



Programme funded by
New Zealand Government







Fulton Hogan





SCIRT CRITICAL RISK 1: "Working around Live Services"

Working around fragile pipes

WHAT HAPPENED?

A Service strike causing power outage (flash/minor explosion/sparks/smoke) when breaking underneath an exposed and clearly marked 11kv underground cable. As the excavator worked beneath the exposed cable, the crew hand dug around the cable. Tree roots were in the direct vicinity and an Arborist was on hand.



WHY DID THIS HAPPEN?

- PILCA (paper insulated leaded cable armoured), generally 40-50 years old and in a fragile condition
- Hard ground condition and tree roots close to cable may have diverted crew's attention.

- May have done better by supporting any exposed length over 1.0m?
- Crew may not have been fully aware of the dangerous nature of 11kv cable-particularly in a fragile condition.
- No extra precautions taken.



PREVENTIVE ACTIONS:

Hydrovac is acceptable for pipes of this nature.

We are getting Orion to speak to crews and encouraging PM/SE to call in lines company representatives.

We are looking to introduce fragile infrastructure (pipes of this nature) into the risk assessment from design stage when age of pipes should be known.

LESSONS LEARNT:

We need to assess aged pipes of this nature carefully before digging and if we come across unexpectedly, stop work, talk with the crew and reassess!





SCIRT CRITICAL RISK 1. "Working around Live Services"

When Re-positioning your digger near overhead lines-Always Use your spotter!

WHAT HAPPENED?

Shifting an excavator, spun around, thought he had enough room between boom and overhead cables. Spotter was 'busy' and operator thought he could do the shift with-out him. Clipped overhead 400v power line, twisted cables, broke one and shorted the power.

Poles

WHY DID THIS HAPPEN?

- SOP not followed regarding use of a spotter
- Human error-used own judgement!
- No warning flags (pole/lines)



LESSONS LEARNT:

- 1. It is almost impossible for operators to accurately judge the exact distance from the end of their boom to an overhead line-especially when repositioning.
- 2. People have limitations in their ability to perceive distance and depth of objects under various conditions.
- 3. Overhead lines can be very difficult to identify.
- 4. You must have a spotter to tell you the limits of your approach distance.



Difficult to see overheads! Keep safe and always use your Spotter!



USE THE RIGHT TOOL

We only ever use the right tools and equipment for the job. If we are not trained or authorised to use it, we don't!



age 🖌



SCIRT CRITICAL RISK #1: "Service strikes"

Water Main Service Strike

WHAT HAPPENED?

On the 8th of July an excavator came into contact with an underground water main causing it to break. The crew had discussed services crossing the trench line during the daily pre-start and had signed off on the service drawings. The road markings were swept



away in the morning and were not re-marked resulting in a loss of demarcation on the service. This event was very unfortunate for the crew involved as they had not had a service strike for over 2 years.

WHY DID THIS HAPPEN?

Contributing Factors;

- Human error
- Failure to re-mark services in the ground.

<u>Hazard Identified:</u> Working in close proximity to underground services. This service strike proves the importance of demarcation of known services in the ground and maintaining the visibility of the markings at all times.



PREVENTIVE ACTIONS:

- Ensure service markings are maintained and re-marked at all times.
- A good idea have a "service marking paint only" box situated in the site office for when re-marking is required

LESSONS LEARNT:

"DO WHAT WE SAY WE WILL DO" Follow the

process, as failure to follow well established process will result in a service strike







SCIRT CRITICAL RISK #1: SERVICE STRIKES



WHAT HAPPENED?

On October 29, 2014 a crew were excavating to install a SW man hole on the corner of Barbadoes St and Moorhouse Ave. The spotter heard a hissing sound and saw a yellow duct as the excavator bucket came into contact with a 150 mm PE gas main. The excavator was turned off and the crew evacuated site whilst calling the fire brigade. No one was injured but the incident prompted the evacuation of nearby CPIT and schools, and had a considerable impact on traffic as both avenues were shut until the site was secured.

WHY DID THIS HAPPEN?

The investigation has shown that:

- The design drawings did not confirm the position of the services accurate to a minimum of Level B

- The Contact Energy as built Service Plans were misinterpreted as they lacked a legend and inaccurately represented the PE gas main
- There was no debrief against the service plans between the GPR operative, the Site Engineer and Operator/ Foreman.
- The Operator had not signed on to Part B of the Excavation Permit, Excavation Permit Part A and Part B were incomplete;

PREVENTIVE ACTIONS:

- Ensure training for issuing, completing, signing on to Excavation Permit is rolled out to all personnel involved in the process.
- Ensure personnel are trained to reading service plans through SCIRT or equivalent module
- Streamline administrative process for sourcing service plans
- Communicate critical findings with SCIRT ECI and Design Leads
- Communicate with Contact Energy the critical findings, so they can be considered by Contact Energy for future issuing of Service Plans.
- Formally suggest use of tracer wire in PE drilled pipes

OUR ADVICE: If you have any doubt when reading a Service plan, contact the Asset owner. They will come out and mark it or provide a stand over!



NO BULL

We don't accept excuses from our work mates for not working safely or taking short cuts.



SCIRT CRITICAL RISK #1: "SERVICE STRIKES" 11kv Cable Strike

WHAT HAPPENED?

A sub-contractor working for the SCIRT Delivery team was laying a pressure main. The operator first struck a Chorus cable, and then whilst trying to make the work area more accessible for the service provider to fix, struck an 11kVA with the excavator bucket.



WHY DID THIS HAPPEN?

- The Service mark out was 4 months old, faded, and covered in soil.
- The Hydro excavation was completed and back filled in Jan/Feb 2016 for a previous drilling methodology. This was not done with the current crew, so the crew was not able to visually identify the services prior to excavating the trench line.
- The crew were supplied an inaccurate As-Build service document prepared from the information gained in the service location. The 11kva and Chorus cables were shown in this document in different locations to their actual locations.
- The crew used this As-Build document as a guide, rather than using the service provider plans, which would have shown the correct location on the services and was in line with the dig procedure.
- There was inconsistent leadership on site from both the delivery team and the subcontractor. Site Engineer and Foreman were away from site for a number of days, and the Section Engineer did not take over management of the site. The crew was young and inexperienced.

SA 2016-008 Issued 28 July 2016, by Mandy Bertie, SCIRT Safety Advisor

PREVENTIVE ACTIONS:

- The Delivery team will revise the current pre-start form to act more as a daily permit to work. This will engage the site staff more in the excavation permit and require the constant management of risk, such as underground services.
- A formal Site Handover process will be developed for when Site Engineers are absent from site. This will ensure that the communication and risk management on site will be consistent from as the lead contractor.
- Coaching and training will be made available to Contractor Foremen or Leading Hands across the SCIRT Delivery Teams, to help develop their site leadership and management skills.
- The Project Engineers will now be involved in the sections of successful contractors to tenders. This will help to ensure that the contracting crew that is selected are able to meet their safety and quality requirements. This will be complimented with the current Health and Safety pre-qualification system.

LESSONS LEARNT:

Areas of potential risk on site need to communicate up the chain of command. In the case of this incident, the risks around inconsistent on site leadership should have escalated so that the risk could have been addressed and managed when it first came apparent.

The risks around the management of change needs to be addressed and assessed when a project methodology changes. Ensuring that all staff involved is aware of the change, the new risks and the control measures.

When attending sites, the Delivery Team leadership will actively request information and assurance that the onsite staff is following the excavation permit, that they are visually identifying service, and that the Foreman is competent. This with show contactors that all levels of the SCIRT delivery team leadership are consistent and expect the same high standards.



Flash Marks from the strike on the excavator bucket



SPEAK UP

If we don't feel safe, we speak up and stop work (we always look after our mates).

