Assessing The Underworld

An Integrated Performance Model of City Infrastructures

Changes to the ATU/MTU Landscape
Overview

• Technological developments
• National and International standards
• Industry best Practice
Technology Developments

• Equipment has been designed to appeal as far as possible to the widest market possible .... Transformed the capability and its productivity

• More multi channel, multi antenna GPRs on the market .... Allowing large areas to be covered in a shorter time scale
Technology Developments

- Introduction of GPS to CAT & Genny Cable Locators
  .... This has resulted in an increase use of the Genny to induce a signal
  .... Leading to more detection of cables which have no current running through them
• Subsurface Engineering Practice (SUE) was developed as an engineering practice in the USA in the 1990s/2000s

• ASCE38 (Standard Guidelines for the Collection and Detection of Existing Subsurface Utility Data) was published in 2002
  … currently updated – soon out for public consultation
  … First standard which introduced 4 quality levels

• Malaysian Standard released 2007

• Canadian CSA S250 released into industry 2011

• Australian (AS 5488-2013 Classification of Subsurface Utility Information) published in 2013 – currently being updated
Reminder – Geophysical Survey in 2000

UKWIR carried out a trial assessing utility detection.

Result: 80% location ... at best
National and International Standards

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- Malaysian Standard released 2007
- Canadian CSA S250 released into industry 2011
- Australian (AS 5488-2013 Classification of Subsurface Utility Information) published in 2013 – currently been updated
- UK PAS128 (Specification for underground utility detection, verification and location) released in 2014 – currently being updated (NOTE: TSA guidelines existed prior to PAS128)
# National and International Standards

## Table 1 – Quality level of survey outputs (normative)

<table>
<thead>
<tr>
<th>Survey type (Establish with client prior to survey)</th>
<th>Quality level (Practitioner to determine post survey)</th>
<th>Post-processing</th>
<th>Location accuracy</th>
<th>Supporting data</th>
</tr>
</thead>
<tbody>
<tr>
<td>D Desktop utility records search</td>
<td>QL-D</td>
<td>—</td>
<td>Undefined</td>
<td>—</td>
</tr>
<tr>
<td>C Site reconnaissance</td>
<td>QL-C</td>
<td>—</td>
<td>Undefined</td>
<td>A segment of utility whose location is demonstrated by visual reference to street furniture, topographical features or evidence of previous street works (reinstatement scar).</td>
</tr>
<tr>
<td>B Detection 5)</td>
<td>QL-B4</td>
<td>No</td>
<td>Undefined</td>
<td>A utility segment which is suspected to exist but has not been detected and is therefore shown as an assumed route.</td>
</tr>
<tr>
<td></td>
<td>QL-B3</td>
<td>No</td>
<td>±500 mm</td>
<td>Horizontal location only of the utility detected by one of the geophysical techniques used.</td>
</tr>
<tr>
<td></td>
<td>QL-B3P</td>
<td>Yes</td>
<td>Undefined (No reliable depth measurement possible)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QL-B2</td>
<td>No</td>
<td>±250 mm or ±40% of detected depth whichever is greater</td>
<td>Horizontal and vertical location of the utility detected by one of the geophysical techniques used.</td>
</tr>
<tr>
<td></td>
<td>QL-B2P</td>
<td>Yes</td>
<td>±40% of detected depth</td>
<td></td>
</tr>
<tr>
<td></td>
<td>QL-B1</td>
<td>No</td>
<td>±150 mm or ±15% of detected depth whichever is greater</td>
<td>Horizontal and vertical location of the utility detected by multiple 4 geophysical techniques used.</td>
</tr>
<tr>
<td></td>
<td>QL-B1P</td>
<td>Yes</td>
<td>±15% of detected depth</td>
<td></td>
</tr>
<tr>
<td>A Verification</td>
<td>QL-A</td>
<td>—</td>
<td>±50 mm</td>
<td>Horizontal and vertical location of the top and/or bottom of the utility. Additional attribution is recorded as specified in 8.2.5.</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>±25 mm</td>
<td></td>
</tr>
</tbody>
</table>

**UK PAS128**
Assessment of Impact/Success of PAS128
National and International Standards

Assessment of Impact/Success of PAS128

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Graph showing geometric length for different utility types:

- **Drainage**: 120 geometric length [m]
- **Electricity**: 160 geometric length [m]
- **Telecoms**: 80 geometric length [m]
- **Unknown linear anomaly**: 10 geometric length [m]
- **Water**: 40 geometric length [m]

Legend:
- A: Drainage
- B: Electricity
- C: Telecoms
- E: Unknown linear anomaly
- Water

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Training Facilities

- Mapping the Underworld Centre of Excellence built by JK Guest in 2011
  ... to allow testing of the research projects findings and equipment.
  ... this is now part of the Construction Skills Training Academy
  ... trained well around 6000 people (~1500 per year)

- Construction Skills Training Academy introduces the idea of formal qualifications for UK Utilities Mapping Surveyors (NVQs) in 2011
• Awareness that utilities mapping needs to be addressed at the beginning of projects,

• More projects delivered in 3D,

• Increase in introduction to utilities in US university undergrad programs,

• Increased emphasis on training for utility conflict identification and mitigation

• Increased use of a single consultant to handle utility issues on projects

• Establishment of the ASCE Utility Engineering & Surveying Institute (UESI), began operation in 2015

• [Hong Kong Institute of Utility Specialists, founded in 2002]
• The Customer is key – Utility Providers are keen for their customers (and others) not to be impacted/inconvenienced ... respective Regulators (OFGEM & OFWAT) and also clients to assess our performance.

• Permits to Work – tighter regulation on possession of roads.

• Drive by Tier 1 contractors to improve their safety records, productivity & remove wastage

• Improved stakeholder collaboration ... e.g. USAG established in 2012;

• Raised awareness of the issues/problems ... MTU/ATU
  ... USAG utility strike reports
  ... Mock Utility Strike Trials held in collaboration with TfL, ICE, MTU

Industry Best Practice – some comments from the UK
Ongoing Activities

- Company Accreditation / Individual competency assessment for utility surveyors
- Updates of Standards & Guidelines
- Creation of a Client guide to sit alongside PAS128
• A lot has happened in the industry (and in research) in the last 20 years

• MTU/ATU acted as a catalyst in some developments

• Industry is making significant advances and pushing the agendas

• More is still needed…. Watch this space