Subsurface Utility Engineering (SUE)

James Lewis

UK Development Manager

James Lewis

- 22 Years GPR & Mapping
  - International GPR Support Manager
    - 2 Yrs US Vacuum Excavation
      - 10 Yrs UK Survey Manager
        - Now with Subscan *(PAS 128)*

Who are Subscan?

- Founded in 1992
  - 13 Survey Teams in UK
    - Rugby, Doncaster, Yeovil
      - PAS 128 Drafting Member

Today's Overview

- Need for PAS128
- What is PAS128
- How Does PAS 128 Work
- Vacuum Excavation Intro
- The Value of SUE
- Q & A's

Why Use PAS128?

- Existing records are often inaccurate/incomplete.

- Risks become extremely difficult to manage.

SUBSCAN TECHNOLOGY

Desktop Surveys - Land Surveys - Utility Detection & Mapping - Vacuum Excavation - Subsurface Utility Engineering - PAS 128 Compliant

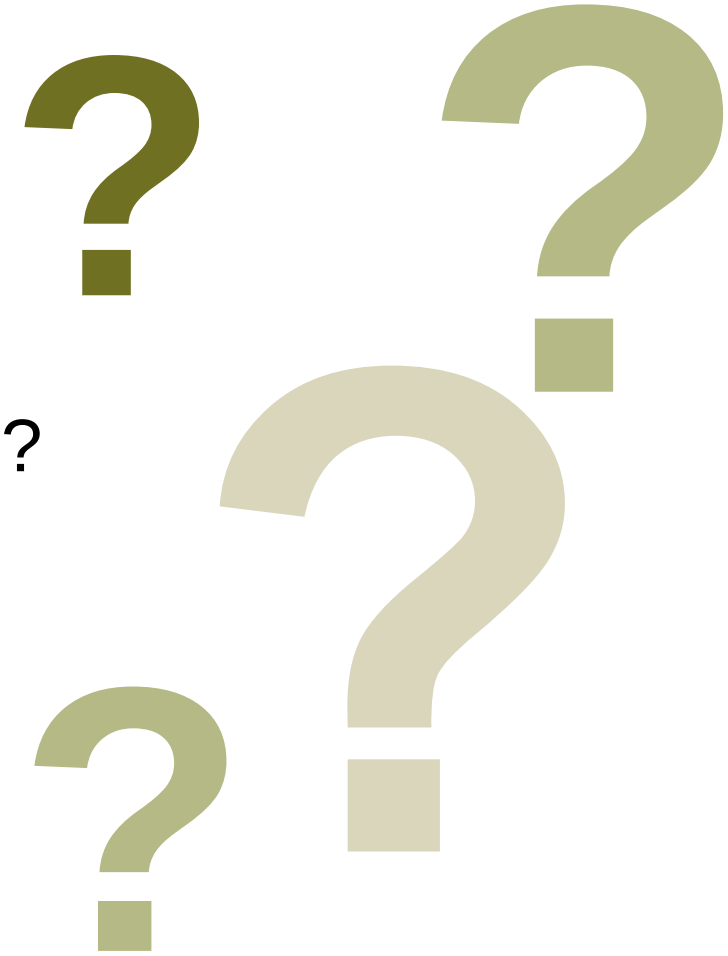
Why a British Specification

What type of Survey?

Why such a price spread?

What do we expect?

What do we get?



The formation of PAS 128 Specification for underground utility detection, verification and location

Jan 2012
- **BSI** Symposium

Apr 2012
- **ICE** appointed as lead

Jun 2012
- **Elections**
- Steering team
- Drafting team

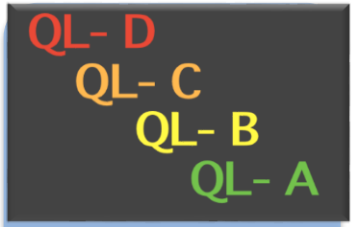
Dec 2012
- First draft complete
- Steering Group review

Jul 2013
- Second draft complete
- Public Consultation

Jun 2014
- PAS 128 Launch

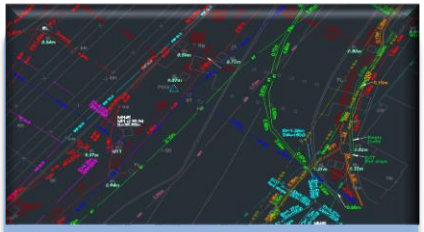
PAS 128 process

Provides scope for **Project Planning**



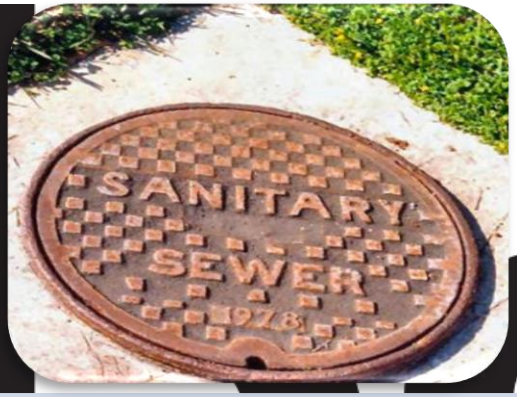
Defines **Quality Levels** for gathering utility data

Defines **Detection** methods & Effort



Sets out process for **Deliverables**

PAS 128 Quality Levels



Desktop Utility Record Search **(QL-D)**

Site Reconnaissance **(QL-C)**

Detection **(QL-B)**

Verification **(QL-A)**

Quality Level "D"

- Records Research
- STATS Compilation
- As Built Drawings

Quality Level "C"

Visible Features

Street Furniture

Covers

Valves

Scars

Quality Level "B"

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Table 1 – Quality levels of survey outputs (normative)

Survey category (Establish with client prior to survey)	Quality level designation (Practitioner to determine post survey)	Post-processing	Positional accuracy		Criteria used in the determination of quality level
			Horizontal	Vertical	
Desktop utility record search	QL-D	N/A	Undefined	Undefined	Information provided by a utility record search.
Site reconnaissance	QL-C	N/A	Undefined	Undefined	A segment of utility whose positioned is confirmed by visual reference to street furniture, topographical features or evidence of previous road works (reinstatement scar).
Detection	QL–B4	No	Undefined	Undefined	A utility segment which is suspected to exist but has not been detected and is therefore shown as an assumed route.
	QL–B4P	Yes			
	QL-B3	No	±500 mm	Undefined (No reliable depth measurement possible)	Position of the utility detected by one of the geophysical techniques.
	QL-B3P	Yes			
	QL-B2	No	±250 mm or ±40% of detected depth whichever is greater	±40% of detected depth	Position and depth of the utility detected by one of the geophysical techniques. [1)]
	QL–B2P	Yes			
	QL-B1	No	±150 mm or ±15% of detected depth whichever is greater	±15% of detected depth	Position and depth of the utility detected by multiple [2)] geophysical techniques.
	QL–B1P	Yes			
Verification	QL-A	N/A	±25 mm	±35 mm	Horizontal and vertical position of the top and/or bottom of the utility. Additional attribution is recorded as specified in **9.2.5**.

NOTE Quality and confidence level: D = lowest, A = highest.

[1)] Electronic depth readings using EML equipment are not normally sufficient to achieve a B2 or higher.

[2)] Some utilities can only be detected by one of the existing detection techniques . As a consequence, such utilities can not be designated QL-B1.

Method type	Minimum equipment types to be used	Survey grid/search resolution				Quality levels achievable	Typical application
		EML (passive)	GPR		Other techniques [A)]		
			General	Post-processing			
M1	Geophysical technique with no depth estimation	5 m orthogonal transect centres	*Use as applicable*	N/A	5 m survey grid	B3, B4	*The density of services is typical of an undeveloped area*
M2	Passive and active EML and single/multi channel GPR	2 m orthogonal transect centres	Either: a) 2 m orthogonal; or b) high density array	No	2 m survey grid	B1, B2, B3, B4	*The density of services is typical of a suburban area or where used to detect utility services crossing a survey boundary*
M2P				Yes			
M3	Passive and active EML and single/multi channel GPR	1 m orthogonal transect centres	Either: a) 1 m orthogonal; or b) high density array	No	1 m survey grid	B1, B2, B3, B4	*The density of services is typical of busy urban area or where used for clearance surveys prior to operations such as borehole / drilling / fencing /tree planting*
M3P				Yes			
M4	Passive and active EML and single/multi channel GPR	0.5 m orthogonal transect centres	Either: a) 0.5 m orthogonal; or b) high density array	No	0.5 m survey grid	B1, B2, B3, B4	*The density of services is typical of a congested city area*
M4P				Yes			

NOTE In general, the confidence, but also effort, increases from M1 through to M4 and with the addition of post-processing. For areas with a greater density of services or areas considered high risk by the client, a detection method that has a higher level of effort should be selected.

[A)] Transect centres dependent on technique used

Quality Level “A”

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Video.wmv

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Vacuum Excavation

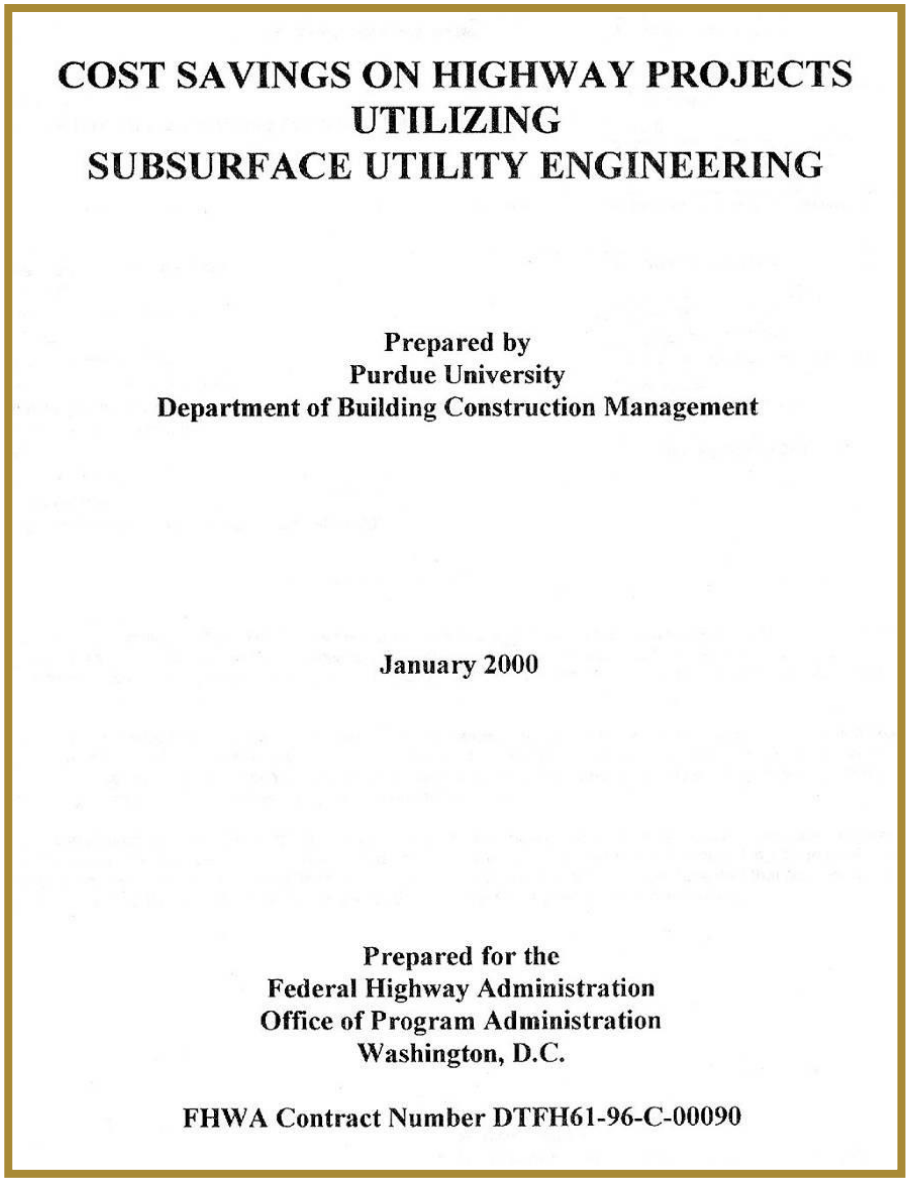
Advantages

- **Smaller Excavations**
- **Can not break BT 2 Pair**
- **Greater Stability of Re-instatement**
- **No “Man in a hole”**
- **No Shoring up**
- **Faster Validations**
- **Lower Environmental Impact**

Value of SUE

FHWA Study (71 Projects)

- **4.62:1 Savings**
- **Biggest Savings:**
  - **Reduced Construction Days**
  - **Fewer Delay Claims**



COST SAVINGS ON HIGHWAY PROJECTS
UTILIZING
SUBSURFACE UTILITY ENGINEERING

Prepared by
Purdue University
Department of Building Construction Management

January 2000

Prepared for the
Federal Highway Administration
Office of Program Administration
Washington, D.C.

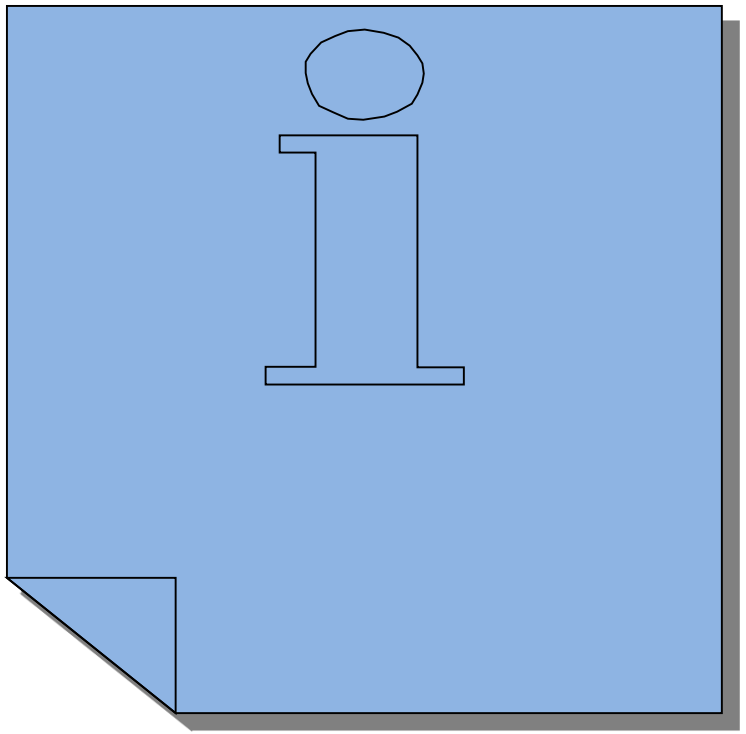
FHWA Contract Number DTFH61-96-C-00090

Value of SUE

- **University of Toronto Study** ***(10 Projects)***
- **3.41:1 Savings**
- **Biggest Savings:**
  - **Fewer Delay Claims**
  - **Relocations Avoided**

SUBSURFACE UTILITY ENGINEERING IN ONTARIO: CHALLENGES & OPPORTUNITIES

Centre for Information Systems in Infrastructure & Construction (I2C)
Department of Civil Engineering,
University of Toronto
October 2005



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Remember to look up!!!