



GEOSPATIAL ENGINEERING COMPETENCIES

Utilities and Subsurface Mapping Competencies

The measurement, definition and portrayal, either digitally or graphically in the form of maps or plans, of the physical features of, and the structures on, the earth's surface. The ability to understand engineering design information and from this provide dimensional control for all stages of construction work.

GEUS01		Competency	Ability to carry out utility/subsurface mapping surveys				
			Date of assessment				
		Optimum Standard		Activity Details			
ITEM	TECHNICAL MEMBER	MEMBER	A				
A	E	B					
B	E	B					
C	E	B					
D	K	B					
E	B	B					

GEUS01 continued		Competency	Ability to carry out utility/subsurface mapping surveys				
			Date of assessment				
Optimum Standard			Activity Details	A	K	E	B
ITEM	TECHNICAL MEMBER	MEMBER					
F	E	B	Effective use of ground probing radar (GPR) including post-processing of data. <ul style="list-style-type: none"> <i>i. Licensing requirements</i> <i>ii. Different GPR technologies</i> <i>iii. Methods of GPR Survey</i> <i>iv. Data collection</i> <i>v. Data interpretation</i> <i>vi. Data processing</i> <i>vii. Use of GPR in PAS128</i> 				
G	B	B	Drainage surveys. <ul style="list-style-type: none"> <i>i. Understanding of drainage networks and operations</i> <i>ii. Drainage recording e.g. STC 25</i> <i>iii. Line & level surveys</i> <i>iv. Methods of mapping drainage e.g. sonde, gyroscopic mapping, laser scanning.</i> <i>v. Presenting drainage on drawings</i> 				

GEUS01 continued		Competency	Ability to carry out utility/subsurface mapping surveys			
			Date of assessment			
Optimum Standard			Activity Details			
ITEM	TECHNICAL MEMBER	MEMBER				
H	E	B				
I	A	K				

Methods of permanent recording of utility locations according to requirements of relevant specifications e.g. PAS256.

Identify where use of alternative detection methods may be suitable or required, and how these techniques are applied. Other methodologies might include:

- i. *Geophysical methods:*
 - Electromagnetic conductivity,
 - Seismic,
 - Electrical resistivity,
 - Microgravity, etc.
- ii. *Acoustic pipe detection methods*
- iii. *Gyroscopic techniques*
- iv. *Drainage CCTV surveys*
- v. *See PAS128 / TSA guide for additional techniques*

GEUS01 continued		Competency	Ability to carry out utility surveys			
			Date of assessment			
Optimum Standard			Activity Details			
ITEM	TECHNICAL MEMBER	MEMBER				
J	A	K	Geotechnical investigations, including borehole, trial pit and window sampling operations. Appreciation of relationship of geotechnical investigations to PAS128 & PAS256.			
GEUS01: Ability to carry out utility surveys						
Name of supervisor			Name of applicant			
Supervisor's signature			Date			

GEUS02		Competency	Use and understanding of surveying instruments				
			Date of assessment				
	Optimum Standard		Activity Details	A	K	E	B
ITEM	TECHNICAL MEMBER	MEMBER					
A	K	E	Total Stations.				
B	K	E	GNSS - Static – Kinematic.				
C	K	E	Levels: Optical, Electronic, Digital.				
D	K	E	Instrument checking.				
E	K	E	Instrument adjustment within the boundaries and limitations of the equipment in use along with associated checking and procedures.				
F	K	E	Accessories; checking and adjustment.				
G	K	E	Other methods of measuring distance e.g. use of tape, Disto, measuring wheel.				
GEUS02: Use and understanding of surveying instruments							
Name of supervisor			Name of applicant				
Supervisor's signature			Date				

GEUS03		Competency	Application of geometric principles				
			Date of assessment				
		Optimum Standard		Activity Details			
ITEM	TECHNICAL MEMBER	MEMBER	A				
A	K	E					Calculating 3-dimensional co-ordinate geometry using manual or computerised methods.
B	K	E					2D and 3D survey control. Intersections, resections, free station, traverse, network and geometric configurations.
C	K	E					Adjustment of survey measurements. Redundant observations. Principles of least squares, residuals, standard errors, error ellipses.
D	K	E					Measurement of heights, use of height datum, datum transformations, geoid / spheroid separations.
E	K	E					Error propagation.
GEUS03: Application of geometric principles							
Name of supervisor				Name of applicant			
Supervisor's signature				Date			

GEUS04		Competency	Ability to use information and communication technologies (ICT) in surveying			
						Date of assessment
Optimum Standard			Activity Details			
ITEM	TECHNICAL MEMBER	MEMBER				
A	K	E	Transfer of utility survey and/or subsurface mapping data between instrument and computer.			
B	K	E	Electronic processing of utility survey data and/or subsurface mapping data including but not limited to geometric networks, GPR data, GNSS data.			
C	K	E	Use and manipulation of 3D utility data with digital ground models.			
D	K	E	CAD - general principles, structure, layering, UCS.			
GEUS04: Ability to use ICT in surveying						
Name of supervisor			Name of applicant			
Supervisor's signature			Date			