GEOSPATIAL ENGINEERING COMPETENCIES

Specialist Land Surveying

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.

GELS01		Competency	Ability to undertake topographic surveys				
				Date of assessment			
	Optimum Standard		Activity Details	A	K	E	B
ITEM	TECHNICAL MEMBER	MEMBER					
A	K	B	Site reconnaissance, survey methodology and risk assessment (see also GEN11B)				
B	E	B	Use of appropriate survey control stations and measurements e.g. closed, well-conditioned traverse				
C	E	B	Use and understanding of GNSS surveying techniques: - Modes of GNSS positioning (static, post-processed kinematic, local base station RTK, Network RTK, Precise Point Positioning) and their application e.g. survey control, detailing, setting out - Role of base stations, baseline lengths, session durations - Error sources and mitigation: orbits and clocks, ionosphere, troposphere, multipath, antenna phase centres, geometry effects, interference - Post-processing and analysis of GNSS data - Quality control of GNSS-based positions - Multi-GNSS: benefits and limitations				
D	E	B	Height control – use of different methods of establishing heights e.g. levelling, GNSS				
E	E	B	Use of a variety of methods of capturing topographic survey information				

GELS01 continued		**Competency**	**Ability to undertake topographic surveys**				
				Date of assessment			
	Optimum Standard		**Activity Details**	A	K	E	B
ITEM	**TECHNICAL MEMBER**	**MEMBER**					
F	E	B	Data capture and feature coding. Recording of survey information				
G	K	K	Electronic tapes/handheld measuring devices				
H	E	B	Appropriate on-going checking procedures e.g. levels, total stations, EDMs and tapes				

GELS01: Ability to carry out topographic surveys	
Name of Supervisor	Name of Applicant
Supervisor's signature	Date

GELS02		**Competency**	**Use and understanding of surveying instruments**				
				Date of assessment			
	Optimum Standard		**Activity Details**				
ITEM	**TECHNICAL MEMBER**	**MEMBER**		A	K	E	B
A	E	B	Total Stations				
B	E	B	GNSS - Static – Kinematic				
C	A	K	Theodolites				
D	E	B	Levels: Optical, Electronic, Digital				
E	E	B	Instrument checking				
F	E	B	Instrument adjustment within the boundaries and limitations of the equipment in use along with associated checking and procedures				
G	E	B	Accessories; checking and adjustment				
H	E	B	Other methods of measuring distance				

GELS02: Use and understanding of surveying instruments	
Name of Supervisor	Name of Applicant
Supervisor’s signature	Date

GELS03		**Competency**	**Application of geometric principles**				
				Date of assessment			
	Optimum Standard		**Activity Details**	A	K	E	B
ITEM	**TECHNICAL MEMBER**	**MEMBER**					
A	E	B	Calculating 3 dimensional coordinate geometry using manual or computerised methods				
B	E	B	2D and 3D Survey control. Intersections, resections, free station, traverse, network and geometric configurations				
C	E	B	Adjustment of survey measurements. Redundant observations. Principles of least squares, residuals, standard errors, error ellipses				
D	E	B	Measurement of heights, use of height datum, datum transformations, geoid/spheroid separations				
E	E	B	Error propagation				

GELS03: Application of geometric principles	
Name of Supervisor	Name of Applicant

GELS04	Competency		Ability to use ICT in surveying				
				Date of assessment			
	Optimum Standard		Activity Details	A	K	E	B
ITEM	TECHNICAL MEMBER	MEMBER					
A	E	B	Transfer of survey data between instrument and computer				
B	E	B	Electronic processing of coordinate geometry data including geometric networks				
C	E	B	Use and manipulation of digital ground models				
D	E	B	CAD - general principles, structure, layering, UCS				

GELS04: Ability to use ICT in surveying

Name of Supervisor	Name of Applicant
Supervisor’s signature	Date