# ASSOCIATION OF CANADA LANDS SURVEYORS
# BOARD OF EXAMINERS

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## PROFESSIONAL EXAMINATION #1
## ACTS AND REGULATIONS RELATING TO SURVEYS OF CANADA LANDS

**March 2014**

**Notice to Candidates:**
**This examination is based on the *General Instructions for Surveys, e-Edition (GIS-e)* published by the Surveyor General of Canada Lands.**

This examination consists of 10 questions on 6 pages.

| Q. No | Time: 3 hours | Marks Value | Earned |
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| 1 | As a Canada Lands Surveyor employed by a corporation with an office in Yellowknife, Northwest Territories, you are retained by a sand and gravel supplier, Aggregates Inc. to locate a dredging lease pursuant to the Territorial Dredging Regulations. The lease area to be acquired is located on the Great Bear River approximately 75 km west of the community of Deline in the Sahtu Region. Deline is represented by the Deline First Nation which belongs to the Sahtu Dene Council. The Sahtu Dene and Metis concluded a Comprehensive Land Claim Agreement with the Government of Canada that came into effect in 1994. The area to be leased is surrounded by Crown land with the nearest Sahtu Settlement Land parcel being over 15 km distant.<br>a. What is the maximum length of a lease that can be staked under the Regulations, measured along the middle of the river following its sinuosities?<br>b. Under what statute is the Regulations created?<br>c. Does the holder of a lease under the Regulations have the exclusive right to dredge the river bed within the length of river leased to him?<br>d. List the four items of information that must be marked on the No. 2 location post for a lease.<br>e. Where must the No. 2 location post be situated relative to the No. 1 location post for the lease?<br>f. Prior to staking of the dredging lease area, the recorder designated by the Minister has issued a written decision that the proposed dredging location is located on a "river" as defined in the Regulations. What is the average minimum width of the river throughout the portion of it sought to be leased? | 2<br>1<br>2<br>2<br>1<br>2 | |
| 2 | With respect to the situation described in Question 1 preceding, what criteria must be in place for the surveyor to comply with requirements of the Association of Canada Lands Surveyors if his firm is retained in the future to make a legal survey of the lease under instructions of the Surveyor General? | 6 | |
| 3 | a. What meridian of longitude forms the eastern limit of UTM Zone 7? | 2 | |

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| | b. What effect does Daylight Saving Time have on the UTM zones in Canada? | 2 | |
| 4 | As instructed in specific survey instructions issued in 1943 for the legal survey of Lot 4, Group 1055, Yukon Territory, the Dominion Land Surveyor traversed the riverfront boundary of the approximately square parcel and made accurate and sufficient ties to the OHWM of the Stewart River to complete his plan and field notes of survey. The plan was confirmed by the Surveyor General in 1944 and had the heavy line delineating "lands dealt with" along the three rectilinear boundaries of the parcel and along the OHWM forming the fourth boundary. As directed in his instructions, the DLS showed the "Total Area of Lot 4", the "Less: Area Reserved to Crown" and "Net Area of Lot 4" with acreages for each. The letters patent from the Crown and the certificate of title raised by the Land Titles Office both made specific reference to the exclusion from the grant of the area reserved pursuant to section 11 of the *Territorial Lands Act*.<br><br>In 1981, a Canada Lands Surveyor was issued specific survey instructions for the legal survey of Lot 1001, Quad 115 A/7, Yukon Territory on the same side of the Stewart River approximately 2 km downstream from Lot 4 surveyed almost 40 years before. The CLS was instructed to monument one or more straight lines approximately paralleling the OHWM boundary of the river and no less than 100 feet perpendicularly distant from it. The rectilinear boundaries of the lease area being surveyed for title were similar in length to the Lot 4 boundaries previously surveyed nearby. The CLS made accurate and sufficient ties to the OHWM to establish three artificial boundaries to form the "front" boundary of the parcel being surveyed. The field notes and plan confirmed by the Surveyor General in 1982 showed the heavy line delineating "lands dealt with" bounding the parcel defined by the six monumented artificial boundaries and showed a single area value expressed in hectares. The letters patent made no specific mention of the waterfront reserve other than by the standard statement, among others, printed on the title form to the effect that "... this certificate is subject to any reservations contained in the original grant from the Crown ...".There was no specific mention of any reservations in the letters patent issued by the Crown.<br><br>In 2013, the owners of Lot 4 and Lot 1001 both decided to request permission to subdivide each of their parcels into three parcels of approximately equal size. In an attempt to reduce travel costs for a CLS and survey party from Whitehorse to make the subdivision surveys, the owners engaged a CLS who prepared the necessary sketch plans for approvals of the two subdivision schemes. With approvals in hand, the retracement surveys of each original parcel recovered all monuments in undisturbed condition but also discovered that the OHWM had been displaced approximately 9 metres (29 feet) upland by erosion from the strong river eddies on that outside curve of the Stewart River on which both parcels were situated. The two side boundary "line monuments" placed by the DLS 35 feet upland from the OHWM fronting Lot 4 were now only 6 feet from the OHWM. The CLS spoke with long-time residents in the area and was informed that the erosion had been gradual over their many years of residence and affected most of the land fronting that side of the river to varying extent.<br><br>a. Using two neatly drawn sketches, and assuming the two original parcels were nominally 400 feet and 120 metres square respectively, show the area the CLS will subdivide and the monuments he would place for each survey. Use a coloured line to indicate the outer boundary of the three lots in each case.<br><br>b. Using two additional neatly drawn sketches, show the area the CLS would subdivide and the monuments he would place for each survey if he had discovered an accretion of the same amount which was also confirmed to have occurred slowly and imperceptibly over time. Use a coloured line to indicate the outer boundary of the three lots in each case. | 8<br><br>6 | |

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| 5 | Canada's *Weights and Measures Act* prescribes basic units of measurement that apply to and are utilized by land surveyors nationwide.<br>a. Identify the system of units that Canada has adopted in its legislation.<br>b. What are the basic or supplementary units of measurement prescribed for:<br>• length<br>• plane angle<br>• mass<br>• time<br>and provide the standard abbreviation used for each. | <br><br><br><br>1<br>1<br>1<br>1<br>2 | |
| 6 | You are a Canada Lands Surveyor retained to make a survey of a 25 lot rural residential subdivision within and near the municipal boundary of the City of Yellowknife in the Northwest Territories. The subdivision has been planned and designed by the GNWT and is being constructed by a private contractor awarded the work after a public tender process. As no buried services are being installed, the only construction is clearing, grubbing, stripping and some rock excavation for the construction of the main roads in accordance with RTAC Design Standards. Poles for overhead electrical and communications cables will be installed once the roadway construction is complete.<br>As you make your survey of the lots, you find that approximately one-half of your CLS 77 pattern monuments being placed are encountering bedrock approximately 15 cm below ground level.<br>a. Describe how you would proceed to complete the monumentation of this subdivision.<br>b. What type of ancillary markers would be appropriate to use under the circumstances with a view to contractor and purchaser location notification? | <br><br><br><br><br><br><br>4<br><br>2 | |
| 7 | In 2009 a staking rush for quartz mining claims occurred in the Klondike, driven by the increasing price for gold and some spectacular diamond drill results over a large area. A number of companies conducted airborne magnetometer surveys and conducted induced polarization (IP) surveys along hastily cut grid lines, both in an attempt to locate geomagnetic anomalies that might indicate the presence of gold deposits in place.<br><br>Company A identified two large areas of promising potential approximately15 km apart and decided to stake the first area with standard quartz claims. Its first staker located a single long string of claims in an easterly direction from the west end of the area of interest. He staked claims of the full size both left and right of his common location line and marked his legal posts in accordance with the *Quartz Mining Act*. He commenced staking his long line of A1 to A60 claims on June 1, 2009 and completed the last claims on the line on June 3, 2009.<br><br>Company B had also identified the same geomagnetic anomaly as Company A and also started staking the area with a double line of claims in a northerly direction from the southerly end of the anomaly on June 4, 2009 and completed the final claims at the northerly end on June 6, 2009. As Company A's staker had done, B's staker also claimed claims of the full size both left and right of his location line and marked his posts correctly. B's staker did not notice A's staker's east-west location line when he crossed it with his north-south location line. | | |

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| | Company A learned on June 3 that Company B had also been staking the area and decided to avoid conflicting mineral claim and potential "valuable open fractions" and decided not to record the line of claims it had staked. It moved its focus to the second potential prospect 15 km distant where there was no sign of competing interests.<br><br>Company B finished its staking program and recorded its claims within the statutory time limit. Grants for the B1 to B64 claims were issued by the mining recorder in due course. Promising drilling results and surface trenching in the following two months gave an early indication of an economical gold ore body. The area of very high gold values corresponded almost exactly with where the A claims intersected the B claims. Company B had since found evidence of the A claims as it conducted its surface exploration work.<br><br>Company B was able to raise several million dollars for an accelerated pre-development program but the release of the first cash instalment was contingent on a location line survey being conducted by a Canada Lands Surveyor who would also be authorized by Company B to act as its agent to locate any fractional ground found by his survey.<br><br>The CLS from Dawson City, Yukon conducted the usual searches of records for the claims and received copies of the applications for each claim, the locator's sketch for the B claim group and copies of the grants issued by the mining recorder. He also contacted Company A and the staker whose name appeared on the A claim posts to confirm that the claims had not been recorded.<br><br>a. Draw a neat sketch to an appropriate scale to indicate the configuration of the two lines of claims as staked.<br>b. Draw a second neat sketch showing the area where the claims intersect and indicate by a coloured line the boundary of the area which the B claims will occupy, <u>prior to any fractional considerations</u>. Assume that none of the A or B claim location lines exceed 1,500 feet in length.<br>c. By what date would the locator of the June 4 claims have to make application to the mining recorder for the claims?<br>d. Company B opted to use milled lumber from a local lumberyard for its legal posts. What minimum dimension stock lumber, expressed in inches for face width and in feet for length could be used for these posts?<br>e. If the CLS anticipated from Company B's comments about the prospects for the property and the likely need for a further legal survey of many of the claims in the near future, what should the CLS do in the course of making his location line survey? | 6<br><br>7<br><br>2<br><br>2<br><br>3 | |
| 8 | You are a senior project manager of an integrated engineering and geomatics firm located in Brantford, Ontario. You have obtained your Canada Lands Surveyor and Ontario Land Surveyor commissions and are registered as a professional engineer with Professional Engineers Ontario within the Geomatics Engineering Discipline.<br>One of your firm's major clients for many years has been the Mississaugas of New Credit First Nation located close to Brantford. You have managed subdivision development, a major shopping mall with national anchor tenants and have provided design and site engineering services to support its many successful projects.<br>The executive director of the Mississaugas' development corporation ("DevCo") phoned you this morning to advise you that, subject to final due diligence by legal counsel over the next few days, DevCo has entered into a 20-year agreement with Cirque du Soleil ("CdS") to construct and fit up a major performance centre to be built on the New Credit | | |

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| | 40A Reserve nearby. DevCo will lease the project site from the First Nation under a side agreement that covers matters of liability, site servicing and related employment opportunities, among other things.<br>You are requested to attend a multi-party meeting in one week's time to discuss the details of the project. You are advised that your firm will play a major role in site layout and servicing and will work closely with the architects, the prime contractor (a joint venture consortium involving the First Nation's construction arm) and the CdS technical staff.<br>At the meeting that you attend along with a junior geomatics engineer from your firm, the routine aspects of legal surveys and building construction are dealt with quickly because of your past experience in this type of work.<br>The discussion then turns to the fitup of the reinforced concrete performance centre to meet CdS' detailed technical specifications. CdS' past experience in construction of the multi-level performance stages worldwide is that once the interior walls, ceiling and specific equipment mounting beams are in place, a detailed as-built plan and coordinate file to 0.003 metre accuracy for all of the principal corners and structural members must be prepared. From that data, CdS' mechanical and structural engineers will provide the detailed X,Y,Z coordinates of critical mounting and anchor sites which must be then marked on the various walls and beams by scribed crosses on painted white squares. The mechanical fitup will then be based on these marks and electrical feeds and staging anchor wires will be installed once their clearances from the moving parts are known.<br><br>The executive director invites participants to ask questions, informs the parties of the reporting structure for the project and the regular progress meetings that will be called with four business days' notice unless some unforeseen event requires one to be held on shorter notice. He asks you to prepare a technical procedures document ("TPD") for all the geomatics services that will be required in support of this project. He indicates that the TPD will be reviewed by the project team at the next regular meeting. He also asks you for an estimated cost for services which will be based on a fee-for-service hourly rate for personnel and specialized equipment for an estimated number of hours, plus other disbursement costs for vehicles, specialized computing requirements and plan preparation.<br><br>Your junior engineer is an experienced writer and will infill an outline that you will prepare for the TPD. You two and a company quality control team will review the resulting document prior to submitting it to DevCo prior to the discussion at your next meeting.<br><br>The total project cost is in the order of $10.9 million.<br><br>Write your outline for this TPD in clear and concise points, using numbers, letters and/or bullets as necessary. | 13 | |
| 9 | Provide the answers for the following statements or questions:<br>a. the maximum surveyed acreage of a mineral claim located pursuant to the *Quartz Mining Act*;<br>b. the basis of bearing derivation for official surveys in the Northwest Territories and Nunavut;<br>c. the maximum number of placer claims that may be grouped together by their owner or owners for the performance of work without approval of the Minister;<br>d. the number of Units in Section 15, Grid Area 70°00', 85°45'; | 1<br>1<br>1<br>1 | |

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| | e. the ideal number of bearing trees to be established with a CLS 77 monument where suitable timber is available;<br>f. the three types of transactions based on a registered or filed plan of subdivision in the Yukon Land Titles Office, one of which must occur before the plan or survey is binding on the person filing it or on any other person;<br>g. the datum to be used for tabulated geographic coordinates required on a plan of survey of a well made in accordance with the Canada Oil and Gas Land Regulations;<br>h. where a certificate of common dating in Form 8 of Schedule III of the Northwest Territories and Nunavut Mining Regulations has <u>not</u> been issued pursuant to section 39(1), the latest date on which the owner of a mineral claim may apply for a lease of the claim;<br>i. the period of time after a mineral claim in the Northwest Territories that has lapsed or been cancelled may not be relocated by the holder at the time of lapsing or cancelation or by a corporation controlled by him;<br>j. the responsibility for the appointment of special examiners pursuant to the Canada Lands Surveyors Regulations. | 1<br>1<br>1<br>2<br>1<br>1 | |
| 10 | The surveyed base line of the Klondike River in the Dawson mining district between angles 3 and 4 is almost exactly parallel to the west boundary of the now-abandoned Klondike Townsite, still listed in a Schedule to Regulations pursuant to the Yukon *Municipal Act*. The Klondike River has a history of claims and mining activities dating back to the Gold Rush in 1898.<br><br>This segment of base line has a bearing of 273° 05' in the upstream direction from angle 3 to angle 4 according to the official plan and is approximately 675 feet west of the west boundary of the Townsite.<br><br>Robert McCallum and six partners each locate a NEW creek claim of the full size, commencing at angle 3 and finishing approximately 350 feet south of angle 4. Two additional locators each locate adjoining First Tier Right Limit bench claims of the full size approximately flanking the NEW 4 and 5 creek claims. The three groups of legal posts for these two bench claims are subsequently found to be 660, 670 and 690 feet perpendicularly distant from the base line. None of the location lines for the creek or bench claims, projected perpendicularly to the base line, exceeds the maximum allowable length.<br><br>Draw a neatly labeled sketch at an appropriate scale to show the configuration of these creek and bench claims and show all known dimensions, expressed in feet. Outline in a distinct colour the area that would be surveyed for the NEW claims if such a survey were to be requested at some time in the future. | 10 | |
| | **Total Marks:** | 100 | |