BRITISH COLUMBIA

Circular Letter No. 399

December 16, 1997

CIRCULAR LETTER TO ALL BRITISH COLUMBIA LAND SURVEYORS

Re: Integrated Survey Area (ISA) Monument Replacement, Extension Process and Section 42 Applications

Our August "Report to Stakeholders" briefly outlined the modified process regarding integrated survey area monument maintenance and extensions. Attached is a more detailed list of the new process entitled "Integrated Survey Area Maintenance - Replacement Survey Procedures" outlining the steps and responsibilities of each party involved and a copy of the ISA control survey instructions to be issued by this office at the time of survey. The instructions outline the detailed control survey and submission requirements.

Integrated Survey Area Plans

This office recently completed a pilot project to test an automated process of creating digital ISA plans. The test results indicate that the automated plans will meet our requirements and we will be proceeding with the production of updated plans for all ISAs. This process will continue over the next number of months with the new mylar ISA plans being distributed to the appropriate municipality and Land Title Office.

A plan is underway to have the new digital ISA plans and new certificate listings posted on the Crown Land Registry Services Web site. A user will be able to view and print the new plan and listing information online.

MASCOT Survey Control Database

Geographic Data BC is in the final stages of performing a refresh block adjustment of all provincial survey control on the MASCOT database. Some outstanding replacement survey projects, awaiting the refresh, will be completed after the block adjustment and will be updated on a case by case basis. It is expected that the new published coordinates for all projects will be issued by June 30, 1998. Each new consolidated listing will be scheduled to coincide with the release of the updated integrated survey area plan.

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Ministry of Environment, Lands and Parks

Crown Land Registry Services

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The result of the refresh block adjustment will change coordinates up to ten centimetres in ISAs, however, relative positions will be very similar to what they were prior to the new adjustment. Municipalities and other users are expected to be able to apply a linear two parameter translation to GIS type data sets already converted to NAD83 using the National Transformation (NTv2) to become compatible with the refresh coordinates. The published refresh coordinates are expected to remain unchanged for many years.

General Survey Instructions - Section (42)

As stated in the last Stakeholders Report distributed in August 1997:

"There are a number of ISAs that have new and replacement monuments that have been published by Geographic Data BC, however, the official plans and certificates have not yet been published by the OSG and forwarded to the appropriate municipality. Users may access the information directly at GDBC's Web site at "http://www.clbc.com/gsru/. Land surveyors should integrate their survey plans to the published values."

If one of your project plans requires a Section 42 certificate under the General Survey Instructions, you must submit an application for exemption to the Office of the Surveyor General **prior** to forwarding the plans for signature. Applications for a Section 42 certificate may be considered where:

- More than three traverse hubs would be required for each tie to the integrated control monument; and
- The distance to the nearest integrated control monument exceeds 1000 metres; or
- A new right of way, easement, posting or reference plan is wholly within a plan previously integrated under section (41), and the bearings for the present survey are derived from grid bearings.

Applications should be forwarded to this office for adjudication.

Yours sincerely,

Chuck Salmon
Surveyor General

CHS:np

"ISA Control Survey Instructions"

CONVENTIONAL FIELD WORK

Angles must be measured with a theodolite having a least count of one second or better with a maximum standard deviation of three seconds according to DIN 18723 testing. The method of directions shall be used, with all adjacent intervisible stations included in every round. A minimum of three sets must be observed with the maximum allowable spread of any set not greater than 3" from the mean of the three sets. Sufficient numbers of tripods and tribrachs are required so that a complete set of directions can be completed without changing setups. Horizontal angle and length measurements shall be made by the method of forced centering. Angular closure must be $\pm 6"\sqrt{N}$ or less where N is the number of angles in the loop or traverse. Any requirement for independent double occupation of angular measurements will be noted on exhibit "A".

Distances must be measured with an electronic distance measuring system having a standard deviation no greater than 5 millimetres plus 5 parts per million. Validation of all EDM systems must be performed on one of the following baselines: (primary) Royal Oak, West Vancouver, Vernon, Cranbrook, Prince George, Surrey **or** on a five point secondary baseline established by the contractor. Primary baseline validations, for the EDM systems to be used on this project, must be forwarded to Geographic Data BC for approval prior to commencing the project measurements. All secondary baseline validation reports (example attached) must be forwarded to the Office of the Surveyor General for review and approval prior to commencing the project measurements.

Distances must be measured from both ends of a line with a validated EDM (including height of instrument and prism). The one way forward or reverse distance shall be taken as the mean of two or more measurements. An agreement of 1:10 000 or better must be obtained for the mean of forward and reverse distance measurements.

Differential Levels: All level rods used on this project must have graduations accurate to 1 millimetre or better. Rods that meet the DIN 18703 German Industrial Standard are acceptable. Invar rods and digital levelling system rods are also acceptable. Levels must be run with an instrument whose standard deviation for a one kilometre double run line is two millimetres or less.

The allowable closure between existing controlling bench marks and loop closures must be less than 16 millimetres $\sqrt{K}$, where K is the one way distance in kilometres between bench marks or the length of loop measures along the levelling route.

Traverse hubs set by the contractor should not be placed on line between monuments. Traverse hubs must be surveyed with the same accuracy as monuments.

Closures: Where acceptable closure is not obtained due to damage or disturbance of the closing control monument, the surveyor shall verify his measurements and/or expand his survey to connect to control monuments that will provide an acceptable closure. The surveyor must contact the branch regarding any network changes and horizontal and vertical closure problems to ensure the network reliability is maintained. The surveyor should inform the municipality regarding any additional costs associated with any extra work required prior to commencing the work.

CONTROL SURVEY SUBMISSION

- Primary or secondary EDM validation report submitted and approved prior to commencing the project survey.
- Sketch plan of final horizontal and vertical control survey network including means of measured angles, forward and reverse distances, elevation differences and number of turning points.
- Control survey report summarising the control survey results including:
  - ⇒ comparison of forward and reverse distances
  - ⇒ differential level closures
  - ⇒ angular closures
  - ⇒ constrained horizontal and vertical least square adjustment. Vertical measurements must be weighted according to the number of setups. Angular observations must be weighted according to the standard deviation for measuring three sets using the direction method. Distances must be weighted according to the standard deviation for two measurements for the same line.
  - ⇒ comments and analysis on the least square adjustment
  - ⇒ comma delimited final ASCII coordinate text file for new control monuments (*field 1* - Tablet marking (any letter in uppercase), *field two* - UTM Northing, *field three* - UTM Easting, *field four* - elevation, *field five* - station ellipsoid factor, *field six* - station combined factor, *field seven* - station condition ("good", "anomalous", "destroyed" in lowercase). The text file must be submitted on a 3 ½ inch diskette or e-mailed as an attachment.
  - ⇒ location descriptions and diagrams for integrated control monuments and hubs on form ENV 2052 (included)

Integrated Survey Area Maintenance
Replacement Survey Procedures

The integrated control survey networks support mapping, engineering and other positional related activities within British Columbia. In order for the existing monumented reference system to remain functional, destroyed monuments must be reestablished. The basic steps performed in the replacement survey process are updating monument condition reports, network design, monument installation, issuing final replacement survey instructions, EDM/GPS validation, control survey, data editing/reduction, data processing, quality control measurements, updating official plan, issuing supplementary certificates and project tracking. This process involves the coordination of activities within various organizations.

GDBC - Geographic Data BC
OSG - Office of the Surveyor General
LTO - Land Title Office
CA - Corporate Area
BCLS - British Columbia Land Surveyor

The following integrated survey area (ISA) maintenance steps should be performed in order to ensure that the project is properly managed and tracked throughout replacement process.

MONUMENT CONDITION REPORTING/INSTALLATION PROCESS

1. **BCLS or CA**

   - Performs a field inspection to verify the condition of the Control Monument(s).
   - Sends "Monument Condition Report" to OSG.
   - Field checks monuments (including backsights) and rays of new survey network needed for the replacement survey.
   - Sends proposal of new network to OSG for review.

2. **OSG**

   - Forwards monument condition report to GDBC to update MASCOT.
   - Reviews new network to ensure compatability with existing networks.
   - Initiates project file number.
   - Informs CA that the network is acceptable, otherwise return proposed new network changes to CA for field verification.
   - Repeat part of steps 1 and 2 until network finalized.
   - Issues tablet numbers to supplier to stamp on brass bolts.
   - Carbon copy to municipality and/or BCLS.

3. **SUPPLIER** bolts stamped and forwarded to BCLS or municipality

4. **BCLS or CA**

   - CA executes agreement with BCLS for control monument installation and control survey.
   - Installs survey monument(s).
   - Verifies final network by field check and notifies OSG.
   - Requests survey instructions from OSG.

DATA COLLECTION AND PROCESSING

5. OSG

- Completes final survey network exhibits (conventional and/or GPS) and survey instructions. Exhibits show: title (Area and ISA number), date, scale, north arrow, legend, survey stations, network measurements required, tablet markings.
- Issue instructions to BCLS with carbon copy to CA, instructions include: Exhibits, coordinate listing, diagrams, ENV2052 sketch forms.
- Complete replacement survey project summary form and spreadsheet.
- Monitor replacement survey progress.

6. BCLS

- Performs EDM/GPS validation and obtains approval from OSG to proceed with the production survey.
- Performs project measurements.
- Completes project processing:
  - ⇒ Perform distance reductions
  - ⇒ Perform least square adjustment
  - ⇒ Analyze internal and external survey results - report problems to OSG for clarification.
- Prepares survey submission according to OSG instructions.

7. OSG

- Review project returns.
- If project meets requirements notify BCLS and CA that returns have been accepted.
- If project returns do not meet requirements then request and monitor resubmission of returns until complete.
- Complete submission of returns report.
- Update tracking form.

DATA DISTRIBUTION

8. OSG

- Forward one copy of the new supplementary certificates and monument diagrams to the appropriate Land Title Office and municipality.
- File one copy of diagrams and supplementary certificate listing in OSG vault.
- Create new official plan plot and forward copy to municipality and LTO for major network changes.
- Post supplementary certificates on OSG Web site.