TIMMINS ECONOMIC DEVELOPMENT CORPORATION

REQUEST FOR BIDS

ON A

HIGH RESOLUTION AIRBORNE MAGNETONETER SURVEYING

IN THE

TIMMINS - KIRKLAND LAKE REGION OF NORTHERN ONTARIO

FOR

DISCOVER ABITIBI INITIATIVE

A project of innovation, cooperation and revitalization in the Abitibi region of Northern Ontario

FedNor Canada

Ontario
Northern Ontario Heritage Fund
Fonds du patrimoine du Nord de l'Ontario

JULY 2003

TIMMINS ECONOMIC DEVELOPMENT CORPORATION
REQUEST FOR BIDS

Timmins Economic Development Corporation (known hereafter as TEDC), on behalf of Discover Abitibi Initiative, is requesting bids for High Resolution Airborne Magnetometer surveying in the Timmins - Kirkland Lake Region of Northeastern Ontario. The areas to be surveyed, data required, technical specifications and proposal and cost formats are outlined on the attached annexes.

The Annexes are:

Four areas of surveying are to be addressed. A total of about 81,445 line km of surveying is indicated. This total includes survey lines, tie lines and survey boundary lines as identified in ANNEX A. One of these areas (Round Lake Batholith) will be surveyed with a relatively wide line pacing of 150 metres. The remaining three will be surveyed with close line separations of 50 metres. All areas are to be flown using a terraine clearance of 50 metres, where safety permits.

Annexes attached to this bid request identify detailed elements that should become part of the contract between the Contractor and TEDC. Elements of these annexes that are not in accordance with the Contractor's ability to deliver will need to be identified in discussion with TEDC and if necessary in the Contractor's formal bid.

Four geo-referenced TIF image files outlining the survey areas, and images at the end of Annex F are an integral part of this bid request. These are:

Round Lake Batholith - Survey Area map – p. 39
Lake Abitibi Survey Area map – p. 39
Porcupine Destor - Pipestone Survey Area map – p.40
Kirkland-Larder Lake Survey Area map (parts A and B) – p. 40

The ownership of the intellectual property will rest with the TEDC on behalf of Discover Abitibi.

ANNEX A

1. SURVEY PARTICULARS

To conduct an airborne magnetometer digitally-recorded high sensitivity magnetic surveying in the Timmins - Kirkland Lake Region, Ontario, consisting of approximately 81,445 line km in four areas and to compile the acquired data in accordance with the technical specifications given in ANNEX C.

1.1 Delineation of Survey Area:

The following UTM coordinates (NAD83) define the areas.

ROUND LAKE BATHOLITH - AREA

The attached Located TIF Image File: round_lake_survey.tif, (and the image attached to this document in Word) provides a general outline of the survey.

CoordinateSystem="NAD83 / UTM zone 17N"
Datum=NAD83,6378137,0.08181919104,0
Projection="Transverse Mercator",0,-81,0.9996,500000,0
Units=m,1
Local Datum="NAD83 to WGS 84 (1)",0,0,0,0,0,0,0
Closed polygon boundary follows:

poly 1

525000	5306200
556830	5318813
566061	5314420
581000	5313863
581000	5302352
564000	5293232
564000	5284058
584500	5265000
584500	5261100
525000	5261100
525000	5288000
508000	5288000
508000	5292500
525000	5306200

LAKE ABITIBI AREA

The attached Located TIF Image File: lake_Abitibi_survey.tif, (and the image attached to this document in Word) provides a general outline of the survey.

/#CoordinateSystem="NAD83 / UTM zone 17N"
/#Datum=NAD83,6378137,0.08181919104,0
/#Projection="Transverse Mercator",0,-81,0.9996,500000,0
/#Units=m,1
/#LocalDatum="NAD83 to WGS 84 (1)",0,0,0,0,0,0,0
closed polygon boundary follows:

Poly 1

533500	5402500
533500	5417500
560000	5417500
590000	5428000
590000	5413000
560000	5402500
533500	5402500

PORCUPINE DESTOR-PIPESTONE AREA

The attached Located TIF Image File: porcupine_destor_pipestone.tif (and the image attached to this document in Word) provides a general outline of the survey.

Coordinate System="NAD83 / UTM zone 17N"
Datum=NAD83,6378137,0.08181919104,0
Projection="Transverse Mercator",0,-81,0.9996,500000,0
Units=m,1
Local Datum="NAD83 to WGS 84 (1)",0,0,0,0,0,0,0
Closed polygon boundary follows:

poly 1

504100	5394400
547800	5394400
547800	5369800
533260	5369800
533260	5366500
504100	5366500
504100	5394400

KIRKLAND-LARDER LAKE AREA

The attached Located TIF Image File: Kirkland_larder_lake.tif (and the image attached to this document in Word) provides a general outline of the survey.

Coordinate System="NAD83 / UTM zone 17N"
/#CoordinateSystem="NAD83 / UTM zone 17N"
/#Datum=NAD83,6378137,0.08181919104,0
/#Projection="Transverse Mercator",0,-81,0.9996,500000,0
/#Units=m,1
/#LocalDatum="NAD83 to WGS 84 (1)",0,0,0,0,0,0,0
closed polygon boundaries follow:

Block A

517000	5313686
544564	5322845
572370	5337945
575400	5328800
572042	5328079
556830	5318785
521012	5304500
517000	5313686

Block B

572370	5337945
581768	5338242
601875	5338198
610126	5343750
610126	5332750
602750	5328600
591232	5328428
582073	5329737
572370	5328285
572370	5337945

1.2 Flying Specifications:

The data quality control must be done in the field on a daily basis.

Flight lines must be flown in consecutive order. Race-track pattern flying however is not acceptable. Perimeter lines must be flown along the survey boundary for each block. Parts of traverse lines re-flown to complete a traverse line must cross control lines at either end and join the original traverse line at a low angle at a point where the data is acceptable. All segments of a

traverse line must begin and end by crossing control lines or a perimeter line. Conversely, segments of a control line must start and end by crossing a common traverse line. All traverse lines must intersect a minimum of two (2) control lines. No gaps will be accepted in the final products. The contractor must re-fly lines or portions of lines where the following specifications are not met at their own cost.

1.2.1 Sensor and Aircraft Height: To maximize the high-resolution component of these surveys, it is desired to optimise the sensor height to a 1:1 relationship between the survey height and line spacing. In the case of Round lake with a line spacing of 150 metres, a sensor height of 75 metres is required (not 150metres). (Apparent oversampling by sensors even closer to the ground would be acceptable). The 1:1 line spacing vs. sensor height rule for the remaining surveys would place a sensor at 50 metres terrain clearance. Certain systems (helicopter, towed-bird), would have a special advantage in achieving this value. Bids for fixed wing, on-board sensors flown at 75 metres MTC would be acceptable. The overlying exception is in areas where MOT regulations prevent flying at these heights and in areas of severe topography where the pilot's judgement shall prevail. Survey areas where special Transport Canada approval is needed will be obtained by the contractor. The bidder is referred to section 10 in Annex E

1.2.2 Traverse Lines:

Round Lake Batholith Area

-survey lines bearing: 0° azimuth
-survey line spacing: 150 m
-allowed min. separation between survey lines: 100 m
-allowed max. separation between survey lines: 200 m
-tie line bearing: 90° azimuth
-tie line spacing: 5000m
-Estimated survey length = 21,615 line km

Lake Abitibi Area

-survey lines bearing: 0° azimuth
-survey line spacing: 50 m
-allowed min. separation between survey lines: 25 m
-allowed max. separation between survey lines: 75 m
-tie line bearing: 90° azimuth
-tie line spacing: 2000m
-Estimated survey length = 17,440 line km

Porcupine Destor - Pipestone Area

-bearing: 0° azimuth
-survey line spacing: 50 m
-allowed min. separation between survey lines: 25 m
-allowed max. separation between survey lines: 75 m
-tie line bearing: 90° azimuth

-tie line spacing: 2000m
-Estimated survey length = 23,500 line km

Kirkland-Larder Lake Area

- Block A, survey lines bearing: 140° azimuth
- Block B, survey lines bearing: 0° azimuth
-survey line spacing: 50 m
-allowed min. separation between survey lines: 25 m
-allowed max. separation between survey lines: 75 m
-tie line bearing: 90° azimuth
-tie line spacing: 2000m
-Estimated survey length = 18,890 line km.

1.2.3 Traverse lines and control lines: must be flown at the same altitude at points of intersection. In addition, the altitude tolerances are limited to no more than 15 m difference between traverse lines and control lines. Exceptions for local terrain conditions must be discussed with the TEDC Technical Manager.

1.2.4 Diurnal Specifications: A maximum tolerance of 3 nT (peak to peak) deviation from a long chord equivalent to a period of one minute for the magnetic base station.

1.3 Calibration Requirements:
Calibration and testing of the geophysical instrumentation are an important component of the project, so that the data is accurate and of high quality, and so that instrument problems are quickly detected and corrected. These include the following:

- Timmins Anomaly test
- Lag test
- Radar altimeter test
- Electronic navigation test
- Magnetic base station sensor calibration

See details in ANNEX C.

1.4 Specific Equipment Requirements:

1.5 Magnetometer:

The sensor may be mounted in a bird towed under the aircraft, or fixed on a tail stinger or wing tip installation. Opportunities for gradiometer measurements will be considered.

Aircraft mounted magnetometers will require compensation.

Radar Altimeter:

Minimum range: 0 - 2500 feet
Accuracy (minimal) 2%

Barometric Altimeter:
Accuracy (minimal) 2%

GPS:

Real time differential system for navigation: Required

GPS ground base station: Required

Recording of the raw GPS data on board the aircraft.

Post-flight differential correction of the raw GPS data is also required using ground GPS base station data for all flights. This post flight differentially corrected flight path (x,y,z) will be the basis of the final product.

Video Camera:

Recording speed may be set to Extended Play (EP) mode, with image overlay showing time to tenths of seconds, position and image centre cross-hair.

Analogue Chart Recorder:

Chart records must be created either in the aircraft during flight or post flight no later

than one day after acquisition of the data.

Ground Magnetometer Stations:

Base station: Required

1.5 Compilation Specifics:

Map Scales, projection: 1:20,000 and 1:50,000 (NAD83, Universal Transverse Mercator)

Grid cell size: 30 metres

1.6 Final Products: (See Annex C, 3.5, for line data archive details.

Line data archives	Magnetic and Ancillary Data	ASCII, Montaj GDB
Anomaly databases	Keating Coefficients	ASCII, Montaj GDB
Grid files	DTM	ASCII, Montaj .grd NAD83
	TF Mag, leveled to Ontario Master Magnetic Datum (see attached file, magnetic_leveling.doc)	ASCII, Montaj .grd NAD83
	Mag 2VD	ASCII, Montaj .grd NAD83
TIF files	TF mag grd + planimetric base	GeoTIFF, NAD83
	Shaded mag 2VD grid + planimetric base	GeoTIFF, NAD83
Vector files	Flight path	DXF, NAD83
	Keating coefficients	DXF, NAD83
	Magnetic contours	DXF, NAD83
Report	Logistics, processing and product documentation	WORD97 and
	Logistics, processing and product documentation	Adobie PDF
1:50,000 Maps	Colour TF mag grid + contours + base	NAD83 UTM Long/Lat
	Shaded mag 2VD grid + Keating coefficients + base	NAD83 UTM Long/Lat
1:20,000 Maps	Colour TF mag grid + contours + base	NAD83 UTM Long/Lat
	Shaded mag 2VD grid + Keating coefficients + base	NAD83 UTM Long/Lat

ANNEX B

2. DELIVERABLES

The Contractor's Project Manager shall be responsible for signing off all reports and all products being delivered/submitted for inspection prior to invoicing, thereby certifying that the work was carried out in accordance with the Technical Specifications in ANNEX C.

2.1 Weekly Progress Report (Acquisition):

During the data acquisition phase, written production figures must be communicated to the TEDC designated QA/QC representative (Technical Manager) on a weekly basis, each Monday morning by hand, fax or e-mail.

2.2 Weekly Progress Report (Compilation):

The Contractor's Project Manager shall submit weekly reports each Monday morning describing the state of progress of the various aspects of the work as well as projections as to the completion of the work. These reports will be faxed of e-mailed and addressed to the TEDC Technical Manager at locations or addresses to be designated.

Included in the reports will be:

- Base of operations utilized;
- Description of each flight
  - The number of survey hours … total to report date.
  - Field crew list and any changes in personnel.
- A statement of diurnal and weather; downtime due to unserviceability;
- Visits by the TEDC QA/QC representative or other authorized persons;
- A sketch map (letter size) showing the area of data acquisition data.

NOTE: Supporting documents, such as chart records or digital listings, must be supplied with any documented test results.

2.3 Digital Data

The digital data are to be delivered as itemized in ANNEX A section 1.6 also in section 2.5 of ANNEX B and described in detail in section 3.5 of ANNEX C. These digital data include survey acquisition data, calibration data, geophysical and navigational processed data. The digital data must be accompanied by supporting preliminary paper plots at each processing step and by proof plots for the final products, as required. Positional data together with the magnetic data must be provided on a regular basis.

2.4 Other Deliverables

2.4.1 Chart Records (see ANNEX A Survey Particulars, and Annex C, 3.3.2 for comment):

All chart records must be stamped to show the survey area, job numbers, flight line numbers corresponding to those used on the published maps, vertical and horizontal calibrations and/or scales. Video cassettes will be labelled showing area name, date, flight number, line number, time ranges, etc.

2.4.2 Equipment Log Book:

As described under Airborne and Ground Instrumentation in ANNEX C - 3.1.

2.4.3 Levelling Documents

The final levelling network and final flight path data (compilation listings or digital files and plots) must be submitted. All flight logs and quality control sheets must be properly labelled and submitted for data evaluation.

2.4.4 Project Report:

A technical report must be prepared by the Project Manager of the Contractor which presents (i) a reasonably comprehensive account of the field operations, (ii) a description of compilation of the data and (iii) an inventory of the resultant end products which will be useful to users of the data. The specifics to be included in the project report are described in further detail in section 3.5 of ANNEX C.

2.4.5 Handling and Storage of Digital Data

Copies of all digital data must be stored by the Contractor for 1 year after the safe delivery of the same data to TEDC. During this time the data may not be erased except by explicit written authorization of the TEDC.

After delivery of all final maps, any related materials used to produce the final products will be delivered to TEDC in acceptable containers which have labels identifying their contents. The Contractor must prepare a catalogue (as part of the Project Report) for all of these data and will submit it to TEDC.

2.5 Payment Schedule of Products Required

The Contractor's Project Manager shall be responsible for signing off all reports and all products being delivered/submitted for inspection prior to invoicing, thereby certifying that the work was carried out in accordance with the Technical Specifications in ANNEX C.

The Contractor must make available to the TEDC Technical Manager any digital data requested for checking purposes, to facilitate timely approval of map products.

2.5.1 Following completion and submission of:

- documented results of all required calibration and test flights
- mobilization and positioning of the survey aircraft, personnel, equipment and supplies at the base of operations
- completion and acceptance by the TEDC Technical Manager of an initial 500 line-kms of digitally-recorded survey data
- delivery and acceptance by the TEDC Technical Manager of an initial 500 line kilometres of raw GPS digitally recorded fight path data prepared in RINEX2.1 (ASCII) format (see sect. 3.4.3), archived by flight with the corresponding GPS base station data.

15% of the firm rate per line-kilometre times the total number of line-kilometres estimated for the contract will be paid.

2.5.2 After completion of data acquisition, the following must be submitted:

- delivery and acceptance of the edited acquisition data (including electronic navigation)
- delivery and acceptance of all raw GPS digitally recorded fight path data archived by flight and corresponding GPS base station data archived by data, prepared in RINEX2 .1 (ASCII) format.
- a copy of the preliminary flight path map

60% of the firm rate per line-kilometre times the total number of line-kilometres flown and accepted of each block will be paid. (See ANNEX A and TIF s of survey area maps)

2.5.3 Following completion of the survey, delivery and acceptance of:

- All final deliverables as listed in ANNEX A.

25% of the firm rate per line-kilometre times the total number of line-kilometres flown and accepted, will be paid.

ANNEX C

3. TECHNICAL SPECIFICATIONS

These Technical Specifications are designed as a guide to contents in the eventual contract developed between the successful bidder and TEDC. Should any of the elements herein be at variance with the Contractor's system, these should be discussed with TEDC and if necessary identified in the Contractor's bid.

A copy of the Technical Specifications will be made readily available to or be in the possession of each of the Contractor's personnel who have a responsibility in the execution of the contract. The Contractor must obtain and have available in the field and office all relevant charts, maps, etc. pertaining to navigation and flight path recovery.

3.1 **AIRBORNE AND GROUND INSTRUMENTATION:**

The instrument operator must maintain and update an Equipment Log Book noting all equipment replacement and repairs throughout the survey and the results of calibration tests carried out on the equipment.

3.1.1 Airborne Magnetometers:

The recording of the magnetic field values must be without filtering except that imposed by the sampling interval itself. Turbulent survey conditions must be avoided. In instances of higher noise levels caused by air turbulence, flights must be terminated or that portion of the survey line re-flown.

The following define what is minimally acceptable:

	Total Field
Sensitivity	0.01 nT
Absolute accuracy	± 10 nT
Noise envelope	0.10 nT
Ambient range	20 000 to 100 000nT
Sampling interval	0.1 sec
Heading effect	< 2.0 nT

Timmins Magnetic Anomaly Test Site

The contractor must carry out a calibration survey over the Timmins Magnetic Test Site. (See 3.2.1 following). The calibration survey is mandatory. The site will be flown in a double cloverleaf pattern, flying North-South, South-North; East-West, West-East, at a constant terraine clearance each pass over the anomaly.

The contractor must provide copies of all data collected at the Timmins Magnetic Anomaly Airborne Geophysical Test Site to the TEDC Technical Manager, prior to starting the main surveys.

Altimeters:

Radar altimeter and barometric altimeters with digital output and a precise radar display, must form part of the ancillary equipment for the survey aircraft.
Accuracy (minimum) 2%.

Electronic navigation:

The use of real time differential GPS is required for the accurate navigation of the survey aircraft (see ANNEX A, Survey Particulars). Complete GPS coverage must be obtained. A ten channel receiver is minimally acceptable.

The recording of the electronic navigation system must be synchronized with the aeromagnetic data acquisition system in real time.

Flight Path Video Camera:

A vertically-mounted, continuous-recording video camera, with a wide angle lens to maximize ground coverage at survey altitude, must be operating at all times while the aircraft is surveying. Clearly visible time stamp updates (seconds after midnight, with tenths of seconds) are to be displayed on the video image along with real time GPS positional information. The combined navigation system (electronic and video imaging) must be capable of providing the required accuracy over the entire survey area. Video recording may be set to EP mode.

Ground Magnetic Monitoring Station:

Digitally-recorded total field magnetometer ground station(s) must be calibrated and operated continuously throughout the survey production. Ground station(s) must be set up at magnetic noise-free location(s), away from moving steel objects, vehicles and DC electrical power lines, which could interfere with the recording of the magnetic field diurnal variation. The contractor must make simultaneous records with the airborne and ground station magnetometers while the aircraft is motionless on the ground and in the vicinity of the ground station(s). These records must be annotated for comparison and submitted to the Discover Abitibi Technical Manager.

GPS clock time must be used to record the time of the ground magnetometer readings for the main base station. The time readings of the base station(s) must be synchronized with the time reading on board the aircraft. Ground and airborne clocks will be run on UTC (Co-ordinared

Universal Time). The ground monitoring magnetometer(s) must be approved by the Discover Abitibi Technical Manager.

	Ground Magnetometer
Sensitivity	0.01 nT
Recording interval	1 second
Noise level	0.10 nT

Field Data Verification System:

The digital data must be verified on a daily basis with an in-field verification system to ensure the recorded parameters meet the contract specifications.

The field verification system must consist of microcomputers, printer, plotter and a video player plus software to apply differential GPS corrections and to evaluate the flight path data quality (see ANNEX A, Survey Particulars). The system is to be capable of plotting a paper copy of the data at the compilation scale, to ensure all data are within specifications. Preliminary levelled grids of the magnetic total field data will be required and must be produced in the field during the survey.

3.2 CALIBRATION FLIGHTS:

Prior to the initial commencement of the survey and If the contractor installs new equipment in its aircraft prior to mobilization or during the survey, then the contractor will test fly its system to ensure that the equipment is working properly and make any required compensation adjustments. The contractor must guarantee that its system is fully functional for the entire survey.

3.2.1 Magnetometer:

Calibration of the aircraft magnetometer system must be carried out using the test site in the Timmins area at the start and end of survey operations. The TEDC Technical Manager must be notified of the scheduling of these test flights prior to their execution. This calibration must include a measurement of the heading error. A Cloverleaf of two (2) passes in each of the north, south, east and west directions must be flown to obtain sufficient statistical data. A suitable site has been located approximately 30 km east of the Timmins airport. The centre of this area of relatively subdued magnetics is at UTM NAD83 500344E, 5381796N

NOTE: The results of these tests must be presented in the chart format which will be used during survey production and in the digital format that will be used for archiving the data. The same decimal accuracy is required. Test results plus video coverage of flight path, must be

submitted to the TEDC Technical Manager for approval before the Contractor proceeds to the survey area.

Ground station total field values covering the duration of these calibration flights will be acquired.

3.2.2 Lag tests:

Prior to the initial commencement of survey production and with any major survey equipment alteration or replacement on the aircraft, the Contractor must perform a lag test to ascertain the time difference between the magnetometer readings and the operation of the positioning devices. The results of these test flights, which must be flown in opposite directions at the normal survey height across a distinct anomaly, must submitted to the TEDC Technical Manager with the next weekly report. Lag tests must also be performed in the survey area by flying over a known point in opposite directions. This will determine lag in the digitally-recorded navigational data. Lag tests may be carried out while performing the calibration flights.

A railroad bridge 32.5km east of the Timmins airport over the Fredrick House River at the south end of FredrickHouse Lake, at UTM NAD83 504854E, 5384684N provides an appropriate site for the lag test.

3.2.3 Radar altimeter:

Pre- and post-survey calibrations must be performed by flying a range of altitudes, representative of the survey area conditions, above and below the designated survey altitude. These altitudes must cover the minimum and maximum range at 5 altitudes of equal increments. Typically, these levels must be determined by the real time GPSZ and barometric altimeter above the elevation of the base air strip or a large lake of known altitude. A recalibration must be performed if equipment is changed. All calibration results must be submitted to the TEDC Technical Manager in tabulated form and graphed, showing radar altitude vs. GPS altitude and radar altitude vs. barometric altitude.

3.2.4 Electronic navigation, Lag and Accuracy Check:

A calibration check on the lag and accuracy of the electronic navigation system must be carried out, plotted at 1:5,000 scale and made available to the Technical Inspector prior to the commencement of survey operations. This should be carries out by cloverleaf test flying over the GPS base station, with a minimum of 2 passes in each of north, south, east and west, with video flight path operating. This can be accomplished by flying over the VOR beacon at the Timmins Airport.

3.2.6 Daily barometric calibration:

The data recorded during these calibrations are considered to be part of the raw data and must be properly labelled and given to the TEDC Technical Manager at the end of the survey flying. The barometric altimeter pressure readings At a specific location at the airport must be noted pre- and post flight on flight logs in order to determine any barometric drift. Drift corrections must be applied in the processing stage. The corrected barometric altimeter data must be verified against the differentially corrected GPS altitude data which must also be corrected to the orthometric height.

3.3 Data Records:

3.3.1 Digital:

Isolated errors or spikes and short non-sequential gaps, which can be edited, are acceptable with the approval of the TEDC Technical Manager.

NOTE: Plots of the corrected digital data may be required to accompany the field charts with corrections shown at the same scale as the original charts.

3.3.1.1 Airborne:

Information such as aircraft registration, date, line number with segment number, direction, flight number, start time of line and any relevant scale factors or datum levels must be noted. They must be indicated on the chart records and tabulated on the flight log, maintained by the Instrument Operator.

NOTE: All digital data, video, chart records and map products must be referenced to time of day as seconds after midnight, Co-ordinated Universal Time, (UTC) rather than fiducials.

Recording specifications:

	Recording Interval	**Sensitivity**
Time	0.1 second	0.01 sec
Magnetic total field	0.1 second	0.01 nT
Radar altimeter	0.2 second	3 m
GPS	1.0 second	3 m
Barometric altimeter	1.0 second	3 m

3.3.1.2 Ground:

Recording specifications:

	Recording Interval	**Sensitivity**
Time	1.0 second	0.01 sec
Magnetic total field	1.0 second	0.01 nT
GPS base station	1.0 second	n/a

3.3.2 Chart Records: (See ANNEX A - Survey Particulars)

All chart records must show time marks as seconds after midnight (UTC) synchronized with the flight path video camera. Chart records must be created either in real time with the airborne recording system or post-flight in the field no later than one day after acquisition of the data.

All charts must be clearly annotated with the relevant survey information, date, line number, and vertical scales. Charts may be presented as rolls or as individual line segments.

3.3.2.1 Airborne chart specifications:

To be established in consultation with the TEDC Technical Manager.

The primary reason for chart output is to evaluate the operation of survey equipment during or immediately following flight. All chart trace values must be visually accessible per line, labelled two (2) per minute. Flexibility to change vertical scales in the field will exist. All chart data must be visually examined, annotated and evaluated by qualified personnel. Scales should be consistent.

3.4 COMPILATION OF THE SURVEY DATA

3.4.0 Material Provided by TEDC to the Contractor

{Certain materials may be made available to TEDC by the Ministry of Northern Development and Mines (MNDM) (map products). Where appropriate, these materials would then be made available from TEDC to the Contractor for application and completion of their survey responsibilities.}

1) layout design of the 1:20,000-scale map tiles, optimized to make best use of the paper sizes for HP plotters, thereby minimizing the number of tiles;
2) layout design of the 1:50,000-scale map tiles, optimized to make best use of the paper sizes for HP plotters, thereby minimizing the number of tiles;
3) completed base maps and map surrounds for each tile, in Montaj MAP formats, as defined by TEDC at the outset of the project, to use to construct the 1:20,000-scale hardcopy maps;
4) completed base maps and map surrounds for each tile, in Montaj MAP formats, as defined by TEDC at the outset of the project, to use to construct the 1:50,000-scale hardcopy maps;
5) comprehensive instructions for preparing the digital and hardcopy maps;
6) packaging (labels, shrink wrap, envelopes) of the CD-ROMs for publication;

3.4.1 Base Maps

The Contractor must acquire the necessary navigational charts and topographic maps at its own expense, for the purpose of flight path verification and processing (see ANNEX A). These base maps may be available in digital format.

3.4.2 Field data verification procedure

After each day's flying, the Contractor's field data quality controller must maintain an up-to-date log of the survey progress and production. A list of planned re-flights must be prepared with annotations of flight data quality with specific details on any problems which would potentially have adverse effects on data quality.

The field quality controller must demonstrate that all survey calibrations have been completed as required according to specifications. All digital flight data and magnetic base station data, video recordings, flight analogue charts, must be systematically annotated and verified to be complete.

The field quality controller must demonstrate that all airborne magnetic data and ground magnetic diurnal data, collected since the start of the survey, have been evaluated; that all data that do not meet specifications have been identified, noted and available for review by the TEDC Technical Manager.

The field quality controller must demonstrate that all digital flight path data has been processed, differentially corrected and plotted at the compilation scale on a regular basis. Further verification of the positioning must be completed by calculating a digital elevation model (DEM) using the differentially corrected GPS altitude (corrected to the orthometric height) and radar data. The difference, producing the DEM, must be gridded and plotted at a convenient scale.

3.4.3 Flight path

Post flight differentially corrected GPS data must be utilized to position the flight lines throughout the entire survey area. It is the primary positional system. A plot of the flight path shall be made from the digital electronic flight path data with appropriate latitude and longitude labelled registration markers to permit verification relative to NTS map coordinates.

In the field, checks must also be performed to verify the accuracy of the differentially corrected flight path positions independent of base maps. To accomplish this verification, an intersection file must be calculated from the database containing the GPS data and tabled. This table must show the traverses and control lines intersection times together with the flight number. The following procedure must be followed to complete the verification:

- An intersection point must be selected, noting the flight number and time of the traverse and control line pair;
- The videos containing the traverse and control lines are viewed and the video image frames identified by the traverse and control times (noted above) must be compared (The use of a video capture board is suggested for this purpose to permit viewing, rotation and comparison of still images).
- Comparison of the two images should show an agreement of ground features. Any discrepancy will be an indication of a problem in the electronic navigation. The extent of the delay in time (intersection time from table minus video time) required for an image match will indicate the approximate extent of the displacement error.

Once evidence of an error between the electronic position data and the video is identified, a decision must be made between the Contractor and the Discover Abitibi Technical Manager. They will, in writing, report the problem and on a procedure to be followed to reconcile the difference.

All of the raw GPS acquisition data which provides a position fix for the aircraft and GPS base station data during survey flight must be recorded and archived. The airborne GPS data is to be archived as separate flights. The base station GPS data is to be archived by day. This data in its raw form must be converted into RINEX2.10 format (see www page at: http://igscb.jpl.nasa.gov/igscb/data/format/rinex210.txt for format definition) and delivered to the TEDC Technical Manager as part of the required deliverables (refer to ANNEX B – 2 - Deliverables and Payment Schedule).

3.4.4 Magnetic data

All magnetic data recorded in flight must be checked for noise by an inspection of the fourth difference trace.

Base station data will be reviewed to identify any diurnal variations beyond specifications stated in ANNEX A.

Any lines or section of lines not meeting the specifications must be noted and re-flown.

3.4.5 Altitude data

Proper altitude control is necessary throughout the survey to optimize the quality of the magnetic levelling.

All radar altimeter data must be checked to ensure that the full height range is being recorded.

The survey must be flown at the correct altitude with respect to the conditions stated in the ANNEX A.

Line segments that exceed maximum altitude difference tolerance at intersections will be identified and the location plotted on a flight path map to be used in determining re-flights.

3.4.6 Format

Each traverse/control line must have a unique line number with the segment number incorporated as the last digit of the line number. Control line numbers must have a different range than the traverse lines.

Example: Traverse lines: 10000 to 79001; Control lines: 80000 to 99000. The last digit of these line numbers being the segment number. Traverse line 79001 is indicating a line segment.

3.4.7 Plotting flight path

Labelled traverse lines and control lines must be plotted on a layer separate from the contour information. Each line must be labelled with a minimum of 2 time labels per map sheet, or a minimum of 1 label if the line direction is noted in the line label.

Line weights and labelling will be discussed with the Contractor and should be similar to that shown on the sample maps. Traverse line numbers and control line numbers must be positioned inside the west and south boundaries of each map. Final labelling of flight line data must have a unique line number for each segment presented on the flight line map as well as in the corresponding digital archive data.

3.4.9. Magnetic Total Field Levelling

Levelling of magnetic total field will be essentially based on control and traverse line intersections. Diurnal subtraction may be applied if diurnal data is properly processed and low pass filtered, and correction for diurnal by subtraction reduces the level errors, but only with the written authorization of the TEDC Technical Manager.

Intersection total field values, altitudes and gradients must be determined for both line and control line. The differences at the intersection points must be tabulated by a printed output from the computer program in a readily comprehensible form. Movement of the intersection within limits established by the positioning error will be allowed in order to permit smoother compensation adjustments.

Any modifications to these specifications must be approved by the TEDC Project Manager in writing.

Differences at intersections must be carefully analyzed and distributed along the control lines and/or the traverse lines to yield an identical final total field value for both lines at a given intersection. Corrections must be made to reconcile differences due to altitude. The Contractor should utilize electronic positional information (GPS) to ensure that these differences are minimal.

Final values must then be assigned to the traverse profiles at the appropriate intersections and used as corrections to the digitally-recorded values along the traverse lines. In areas of steep magnetic gradient and/or of rugged topographic relief, the intersection adjustments may be deleted or an appropriate adjustment assigned to the traverse line.

NOTE: The Contractor may employ a manual, computer or combined method for determining the levelling adjustments. Whatever method is used, the Contractor must provide a detailed description of the methodology applied to the TEDC Technical Manager.

A graphical plot of the final total field level adjustments along the traverse lines and control lines, must be plotted at the compilation scale to determine any levelling problems. This map must be submitted along with the preliminary contour maps to the TEDC Technical Manager.

Final level survey to the master magnetic datum

The magnetic data are to be leveled to a master magnetic datum. Either a 200m Single Master Aeromagnetic grid or an 812.8m reference magnetic grid (to be provided to the Contractor by the Discover Abitibi Technical Manager or the MNDM), covering the entire Province, shall be used as the master magnetic datum. The Contractor will evaluate which grid provides the best results.

Reference should be made to the following papers for the procedure of leveling the data sets to the master magnetic datum. These may be obtained if necessary from the GSC.

> Reford, S.W., Gupta, V.K., Paterson, N.R., Kwan, K.C.H., and MacLeod, I.N., 1990. The Ontario master aeromagnetic grid: a blueprint for detailed compilation of magnetic data on a regional scale: in Expanded Abstracts, Society of Exploration Geophysicists, 60th Annual International Meeting, San Francisco, v.1, p. 617-619.
>
> Miles, W., Pilkington, M., Dumont, R. Levelling aeromagnetic surveys to a common datum.

Grids of the final leveled magnetic data are to be provided as the total magnetic field and as a second vertical derivative of the total magnetic field for each of the survey areas.

3.4.10 Gridding

A square grid will be calculated from the levelled traverse and control line data. Contour maps must be produced from this grid by a contouring program. The grid used for the compilation maps must be used for the final maps.

3.4.11 Contouring

3.4.11.1 Magnetic Total field

The contour interval for total field must be 2 nT or as the gradient dictates. Absolute total field magnetic values must appear on these maps (not relative values above some arbitrary datum). Contour intervals 2, 10, 50 and 100 nT must be shown using different line weights in consultation with the Discover Abitibi Technical Manager. Magnetic depressions must be indicated by "tick-marks" placed around the inside of the contours expressing the locally low areas in total field magnetic values. Magnetic highs will not require any special identification. The line weights and contour labelling for the final contour maps must be similar to the sample supplied. The direction of the contour labelling must face up gradient.

NOTE: Contour intervals must be discussed with the TEDC Technical Manager and final decisions must be in writing.

3.4.12 Technical inspection of final compilation

The Contractor must prepare a working scale preliminary map consisting of isomagnetic contours and flight path for the approval of the TEDC Technical Manager before preparing final maps.

Each map submitted for approval must be accompanied by all the pertinent analogue records, videos, flight logs, computer listings, levelling information, etc. necessary to verify the

compilation. Digital data and a preliminary step-by-step compilation report must also be submitted at this time.

The following are some of the criteria for the acceptance of aeromagnetic maps:

- flight path must be verified to be accurately positioned
- contour values and time values labelled in a legible manner
- magnetic depressions properly identified
- consistency of line weights within each map and in relation to adjacent maps
- identification of traverse and control lines
- validity of the contours along the traverse lines with respect to position and intensity
- valid interpolation of contours between flight lines
- absence of "herringbone" effect due to levelling or flight line position
- appropriate contour suppression and proper label placement
- traverse lines must tie in between adjoining maps, where applicable

On completion of the inspection by the Discover Abitibi Technical Manager, one copy of each map must be returned to the Contractor indicating corrections, if any, to be carried out. When these corrections have been completed by the Contractor, the Discover Abitibi Technical Manager must approve the compilation by signature on the accepted copy.

Each manuscript submitted for approval must be properly identified as to survey area, map number and the proper geographic coordinates.

3.5 FINAL PRODUCTS

See ANNEX A for list of Final Products

Final Products Delivered to TEDC – Contractor Responsibility

The contractor is responsible to deliver to TEDC:

1) Ten master copies of each CD-ROM suitable for duplication and publication.
2) One copy of the analogue records and flight videos (VHS format).
3) Ten master copies on CD-ROM of the digital plot files for the published 1:20,000 and 1:50,000 scale maps, in three formats:
    a) HP-Windows plot files at 300 dpi
    b) GeoTIFF files at 300 dpi.
    c) Oasis Montaj MAP files (packed)
4) Ten copies of all 1:20,000 and 1:50,000 maps in final publication-ready form.

3.5.1 Final Product Details

The items listed in this section provide a guideline to the preparation of the final products. These general descriptions are extracted from OTH (Ontario Treasure Hunt) surveys delivered during the first fiscal year of that program. *The channel names are provided as a sample only, and do not imply predisposition towards any particular respondent.*

Magnetometer Line Data Archive

Note that the primary geographic database is to be in NAD83, There is an opportunity however to include NAD 27 co-ordinates in addition to NAD 83 in the archive without causing confusion. This is recommended.

Channel Name	Description	Units
gps_x_real	real-time GPS X (NAD83)	metres
gps_y_real	real-time GPS Y (NAD83)	metres
gps_z_real	real-time GPS Z (NAD83)	metres
gps_x_final	differentially corrected GPS X (NAD83 datum)	decimal-degrees
gps_y_final	differentially corrected GPS Y (NAD83 datum)	decimal-degrees
gps_z_final	differentially corrected GPS Z (NAD83 datum)	metres above sea level
long_nad83	longitude using NAD83 datum	decimal-degrees
lat_nad83	latitude using NAD83 datum	decimal-degrees
x_nad83	easting in UTM co-ordinates using NAD83 datum	metres
y_nad83	northing in UTM co-ordinates using NAD83 datum	metres
long_nad27	longitude using NAD27 datum	decimal-degrees
lat_nad27	latitude using NAD27 datum	decimal-degrees
x_nad27	easting in UTM co-ordinates using NAD27 datum	metres
y_nad27	northing in UTM co-ordinates using NAD27 datum	metres
radar_raw	raw radar altimeter	metres above terrain
radar_final	corrected radar altimeter	metres above terrain
baro_raw	raw barometric altimeter	metres above sea level
baro_final	corrected barometric altimeter	metres above sea level
dem	digital elevation model	metres above sea level
fiducial	fiducial	
flight	flight number	
line_number	full flightline number (flightline and part numbers)	
line	flightline number	
line_part	flightline part number	
time_utc	UTC time	seconds
time_local	local time	seconds after midnight
date	local date	YYYYMMDD
height_mag	magnetometer height	metres above terrain
mag_base_raw	raw magnetic base station data	nanoteslas
mag_base_final	corrected magnetic base station data	nanoteslas

mag_raw	raw magnetic field	nanoteslas
mag_edit	edited magnetic field	nanoteslas
mag_diurn	diurnally-corrected magnetic field	nanoteslas
igrf	local IGRF field	nanoteslas
mag_igrf	IGRF-corrected magnetic field, to magnetic master	nanoteslas
mag_lev	levelled magnetic field	nanoteslas
mag_final	micro-levelled magnetic field, to magnetic master	nanoteslas
power	60 Hz power line monitor	microvolts

1) Notes:
Any micro-levelling corrections must be applied to the profile data prior to generation of corresponding grids.

Keating Correlation Coefficient Archive

Channel Name	Description	Units
x_nad83	easting in UTM co-ordinates using NAD83 datum	metres
y_nad83	northing in UTM co-ordinates using NAD83 datum	metres
long_nad83	longitude using NAD83 datum	decimal-degrees
lat_nad83	latitude using NAD83 datum	decimal-degrees
x_nad27	easting in UTM co-ordinates using NAD27 datum	meters
y_nad27	northing in UTM co-ordinates using NAD27 datum	meters
long_nad27	longitude using NAD27 datum	decimal-degrees
lat_nad27	latitude using NAD27 datum	decimal-degrees
corr_coeff	correlation coefficient	percent x 10
pos_coeff	positive correlation coefficient	percent
neg_coeff	negative correlation coefficient	percent
norm_error	standard error normalized to amplitude	percent
amplitude	peak-to-peak anomaly amplitude within window	nanoteslas

3.5.2 Gridded Data

The following grids will be derived directly from the corresponding profile archive channels, unless otherwise noted. The minimum curvature gridding algorithm is recommended, but other gridding methods will be authorized only with prior approval of the TEDC Technical Manager. Tie line data must not be incorporated in the gridding.

The micro-levelling procedure(s) proposed by the respondent must incorporate corrections applied to the profile data, from which grids are then generated.
The grid archive must include three grids, as follows:

a) digital elevation model (metres above sea level);
b) total magnetic intensity leveled to the Ontario Master Magnetic Datum (nanoteslas);

c) second vertical derivative of the total magnetic intensity, derived from grid b) (nanoteslas per metre-squared);

3.5.3 Map Data

A series of map products must be prepared in digital and hard copy form.

Hardcopy Map:

a) 1:20,000 scale contours of total magnetic intensity, Keating (1995) kimberlite pipe correlation coefficients, flight path and MNDM-supplied planimetric base and map surrounds.

Digital Format, Print-on-demand:

a) 1:50,000 scale colour-filled contours of total magnetic intensity, and MNDM-supplied planimetric base and map surrounds;
b) 1:50,000 scale shaded colour of the second vertical derivative of the total magnetic intensity with Keating (1995) kimberlite pipe correlation coefficients, and MNDM - supplied planimetric base and map surrounds;

Reference – Keating, Pierre, 1995, A simple technique to identify magnetic anomalies due to kimberlite pipes, Exploration and Mining Geology, vol. 4, no. 2, p. 121-125.

Map Layout:

The map tile layout at 1:20,000 and 1:50,000-scale will be optimized by Discover Abitibi and the MNDM to make best use of E-size (and longer) map sheets. The maps must incorporate relevant geographic references (i.e. UTM co-ordinates {NAD83}, latitude/longitude co-ordinates, township boundaries), index maps, titles, technical descriptions, scale bars, descriptive notes, and other map face elements determined by the MNDM. The digital copies of the maps must incorporate elements of the relevant OBM or NTS base maps. The MNDM Data Manager will prepare, in consultation with the contractor, the planimetric base map and the map surrounds for each map product and each tile, as a Montaj MAP file). The contractor shall incorporate the relevant geophysical image and vector data while maintaining the integrity of the vector data supplied by MNDM. MNDM will provide a comprehensive set of instructions and review process to ensure that the final maps meet MNDM's map production standards.

The hardcopy, 1:20,000-scale and 1:50,000 maps shall be prepared using 26 lb. HP Design Jet coated paper or equivalent.

Copies of Final Products

MNDM will distribute copies of all final products. This is accomplished by copying the master CD's containing the digital data and survey reports, and plotting maps from the master map files.

3.5.4 Technical Report and Documentation

The technical report must incorporate all relevant information regarding the survey, including:

a) the aircraft and equipment used;
b) all calibration and test data;
c) survey methodology and logistics;
d) problems encountered during data acquisition and their solutions;
e) all data processing procedures including algorithms, equations, filters, coefficients, parameters, etc.;
f) all QA/QC procedures; and
g) preparation of final products.

Complete documentation of all digital data and products is required, forming an appendix to the survey report. The document must describe the content, units and co-ordinate systems for all profile archive channels, grids, digital maps and other data. TEDC will provide to the contractor a template for the report prior to the completion of the production data collection.

Final Technical report (5 copies) accompanied by digital ASCII file in MS Word and Adobie PDF.

ANNEX D

4. RESPONSIBILITIES OF THE CONTRACTOR:

For the field operations, the selected Contractor will be responsible for the following:

4.1 Aircraft:

The supply, maintenance and operation of a fixed-wing or helicopter aircraft, suitably equipped and Transport Canada approved to carry out this particular type of survey, including the supply of required fuel, oil and lubricants.

All technical equipment and instrumentation, with spares, necessary to execute the airborne geophysical survey in an expeditious manner (see Technical Specifications, ANNEX C).

Provision of the necessary qualified personnel and their office accommodation required to complete the project work including:

Project Manager (Office or Field)
Electronic Engineer (Field or Office)
Aircraft Mechanic (or contract) (Office or Field)
Field Manager (Field) (may also be one of the following:)
Pilot (Field)
Field Quality Controller (Field)
Instrument Operator or Co-pilot (Field)

A minimum of 3 field members excluding the aircraft Mechanic are required.
A minimum of 2 aircraft crew members excluding the aircraft Mechanic are required.

Transportation, mobilization, demobilization, and subsistence, while in transit, as well as shipping between company headquarters and the respective points of arrival and departure of the aircraft, personnel, technical equipment, materials and supplies necessary for the effective performance of the work, including aviation fuel and lubricants.

Compliance with all provisions of the National Transportation Act and directives, orders, rules and or regulations pursuant to those Acts and any applicable federal/provincial and municipal laws.

The contractor must not commit the use of the proposed aircraft, or systems specified for this project to another project until the completion of the data acquisition stage without approval of TEDC.

Arranging and paying for its own accommodation, meals and incidental expenses such as airport fees.
Ensuring that all compilation, drafting and reproduction is carried out in Canada.

4.1.1 Adherence to Regulations

Complete all work in a good and workmanlike manner to the satisfaction of TEDC, adhere to rules and Safety Regulations in force on such properties as may be entered. In addition to the above noted Acts and regulations, comply with the Public Commercial Vehicles Act, Employment Standards Act of Ontario, Labour Relations Act, Construction Lein Act, Worker's Compensation Act, Canada Pension Act, Unemployment Insurance Act, Income tax Act of Canada, The Highway Traffic Act, the Mining Act of Ontario, Occupational Health and Safety Act, The transportation of Dangerous Goods Act, be responsible for the training of all employees, and generally all Federal and Provincial Acts and Regulations applicable to the Contractor's operations.

4.1.2 Insurance

Maintain and pay for Comprehensive General Liability Insurance with a limit of not less than Five Million Dollars ($5,000,000), Umbrella Liability and Third Party Automobile Liability, to not less than Two Million Dollars ($2,000,000), for any occurrence in a form satisfactory to TEDC, and provide TEDC with satisfactory proof thereof, as will protect the Contractor and TEDC for claims for damages for personal injury including death and/or for property damage which may arise from operations of the Contractor, its servants, agents and sub-contractors under any agreement developed as a result of a successful bid. Such insurance is to be continued in full force and effect during the term of any agreement and while the Contractor is in the project area.

Indemnify and save harmless TEDC in respect of any and all claims, actions, causes of action and demands of every kind for injuries and/or damages caused to the persons or property of third parties arising during the performance of the Contract due to any acts or omissions on the part of the Contractor. In the event of a claim being made or action brought against TEDC before completion of the contract, or thereafter, the Contractor will be immediately notified.

4.1.3 Work Area Maintenance

A high standard of housekeeping must be maintained to prevent any accumulation of rubbish or debris developed by the Contractor in the Contractor's work area.

Allow TEDC Technical Manager or representative adequate time to inspect the work installations, equipment, supplies, on any work area at any time. Due concern will be given to Contractor's need for operational efficiency.

4.1.4 Environment

The Contractor will take all necessary measures to avoid damage to the environment, including but not limited to pollution and damage to flora. The Contractor will remove all refuse and garbage resulting from the survey and its machinery, equipment and materials through the course of the survey.

4.2 MAINTENANCE OF SURVEY STANDARDS:

4.2.1 Technical Inspection:

All work is to be performed to the satisfaction and subject to the acceptance of TEDC. Technical Inspectors delegated by TEDC will make periodic trips to the survey site to monitor field operations to observe whether operations are being carried out in accordance with the contract specifications. Copies of ANNEX A, B, C and D must be in the possession of the Field Operations Manager during the field operations and the Chief Compiler during the compilation phase.

Officers authorized by the TEDC may visit the field office of the selected Contractor.

The TEDC Technical Manager will be available for consultation on technical problems that may arise during the course of the field work and have the authority to approve, in writing, changes to the Technical Specifications that will not affect the general scope of the work to be performed. Any changes which might entail reductions or additional charges to TEDC must be referred to the TEDC Project Manager for review and agreement.

Notwithstanding the foregoing provisions, the selected Contractor shall be solely responsible for the quality of the work. The Contractor's Project Manager must ensure that adequate quality control procedures are in place and are being strictly followed, so as to ensure such quality of work. He/She must in turn sign off each report and each product submitted for inspection, thereby certifying that the work was carried out in accordance with the Technical Specifications in ANNEX C.

4.2.2 Field Verification

Initial flight path recovery and full inspection of all data will be done in the field. At the end of field operations, a hard copy of (1) preliminary contoured magnetic anomaly map, (2) contoured differentially-corrected Digital Elevation Model (GPS altitude minus radar) map, (3) differentially-corrected flight path map, will be produced at an appropriate scale in the field. These products will be used in the final field verification of the data.

4.2.3 Verification of In-Flight Data:

All digital data will be verified after each flight by a suitable process using equipment at the operations flying base (see Technical Specifications, ANNEX C). Bidders must describe in detail the process intended to be used. Payments for line-kms flown cannot be made until the digital recordings have been verified for all the required parameters, certified by the Project Manager and delivered to the TEDC Technical Manager and accepted by TEDC.

4.2.4 Incomplete Survey Data:

The Contractor will re-survey, free of charges, lines or segments of lines for which the required digital data are missing or are not in accordance with the Technical Specifications (ANNEX C). Isolated errors or spikes and short, non-sequential gaps consisting of a few points which can be corrected by interpolation are acceptable.

4.2.5 Re-flights - Lost Data:

Digital data which are lost in transit or in processing (if no digital copies have been made) or are rejected by the TEDC Technical Manager shall be re-acquired under the same conditions as set out in the Technical Specifications, ANNEX C, including flying services, at no cost to TEDC. Any re-flights to replace lost digital data will be at the Contractor's sole expense, subject to the discretion of TEDC.

ANNEX E

5. TECHNICAL PROPOSAL and SURVEY COST

The proposal must be structured in two parts (Part 1 and Part 2) to be bound separately, as follows:

PART 1: **TECHNICAL PROPOSAL** (with no reference to price) - 5 copies
PART 2: **SURVEY COST** - 1 copy

Bidders shall prepare a proposal addressing all the requirements of this RFP.
- The proposal should be concise,
- Do not use filler pages and unnecessary attachments.
- Each proposal will be evaluated solely on its own content.
- Use of the details presented in the Annexes presented here for development of the bid and/or an eventual contract should be accomplished with due care to the contents of those details. A bidder will be making a commitment to those details in the execution of any subsequent contract.

General Information:

It is understood that any visits to the survey area to assess the requirements for the airborne geophysical survey will be at the bidder's sole expense.

If a company proposes to sub-contract with others for the purpose of presenting a proposal, the division of work and delineation of responsibilities between the companies must be described in detail. Only one of the companies shall be the prime Contractor and shall negotiate, sign all contracts and take full responsibility for the project. For all sub-contracts, an acknowledgement letter from the sub-contractor, with details of the proposed arrangement, must accompany the proposal.

PART 1: Technical Proposal

The Technical and Management Proposal should address, but not necessarily be limited to, the following. Substantiating documentation should be appended with the page location indicated in the main text.

1. Information on the Company:

    - Address, registration and ownership
    - Management, with organization chart
    - Company facilities, including:
        - floor area
        - electronic and mechanical shop and test equipment

- computer facilities - hardware & software (or details of subcontracting arrangements)
- drafting facilities (or subcontracting arrangements)

2. Qualified Personnel:

- An organization chart for this project (with names and functions), showing the actual reporting responsibilities of personnel. All personnel must be registered geoscientists or equivalent licenced to practice in Ontario

- Personnel list and resumes for each of proposed personnel. Resumes should contain full name, citizenship, education and/or professional qualifications - degrees or licenses, years and granting institution, languages spoken, employment record including employers, years and places of employment with type of work performed and the extent of experience in the function delegated on this project. If the bidder is offering personnel to be obtained under contract, evidence must be provided in the proposal (i.e. written acknowledgement from these people) to the effect that they have been approached by the bidder and are willing and available to work for the firm, should it be awarded a contract as a result of this Request for Proposal. Resumes are not required for individual mechanics who may be provided under a sub-contract.

3. Systems

Aircraft offered:

- Type, registration, number of engine hours remaining after mobilization, before overhaul, range, cruising speed in knots, climb/descent gradient performance, aviation fuel used, hourly consumption for aviation fuel and oil.

Airborne and base station magnetometers:

- Manufacturer, type and model number, number of units, serial number, range in nT, sensitivity in nT, sampling rate.

Digital acquisition systems:

The respondent must describe their proposed data acquisition system, including:
a) recording and archiving all digital data, including sampling rates;
b) synchronization of geophysical data with navigation data and base station data;
c) real-time monitoring of data acquisition; and
d) display of data in analogue form (in-flight and/or post-flight).

Positioning cameras, navigation and flight path recovery systems:

- manufacturers, model numbers, altimeter, gyrocompass, electronic positioning system(s) including serial number, displays, resolution, accuracy, number of GPS channels. Describe the video camera lens and the image (ground distance) at survey altitude.

Field data plotting and verification system:

- Manufacturer and model number of all components including hardware and software

4. Survey Experience, Current Workload, Capacity:

Similar projects recently undertaken, including:

- Location, size, client, date, contact name & telephone number with 3 references

Additional details of work in progress are required, including:

- Size, work remaining, expected completion date

Capacity, particularly in terms of current work:

- Flexibility in terms of being able to cope with workload variations, overlapping capabilities of personnel

5. Reconnaissance of Project

Description of operational details specific to project, including:

(a) regional facts:

- weather, terrain, protected areas, mileages, specific operating licences etc.

(b) base of operations:

- airport plus alternatives, fuel availability, flight planning, base station locations, data transfer and frequency of transfer between remote and field office, field office location

c) timing:

- Time required by the bidder between date of notification of contract award and date of commencement of survey operations.

- weeks or calendar days

- Bar chart showing detailed scheduling which demonstrates how all activities will be co-ordinated to ensure achievement of required delivery date

6. Quality Control

A plan of action outlining the detailed approach and technique to be followed in carrying out the work involved in completing all aspects of this project.

Measures to be taken and the quality control procedures to be implemented and followed to ensure a consistent quality of work. A detailed description for:

- the field

- the office

Digital compilation procedure including flight path recovery, editing with speed checks, levelling, gridding, contouring, detailed procedure to produce final digital maps, and checking of maps.

- description

- Annex & Page of Data Reduction Flow Chart

7. FOM

Bidders are required to provide Figure of Merit for their aircraft magnetometer installation, or provide an explanation if such does not apply.

8. Relevant certification

Annex & Page of relevant certifications

9. Line Kilometres and Survey Map

Bidders are required to calculate and provide the total number of line kilometres for each survey area from the coordinates provided in ANNEX A and the index maps (Figures attached) with separate traverse, control and perimeter lines totals, including the overfly. A new flight line and control line map for the each survey area must be submitted as part of the proposal.

Traverse Lines Kilometres =	Lkm
Control Lines Kilometres =	Lkm
Perimeter Lines =	Lkm
Total Line Kilometres =	LKm

10. Safety

Bidders will submit safety plans and requirements.

- risk analysis – suggest using the IAGSA matrix.
- Plan of safety meetings and reporting.
- Safety procedures.
- Transport Canada exemptions and requirements.

PART II: Survey Cost

Bidder's survey cost must be based on the total line kilometres estimated in the preceding paragraph 9. Consequently, the selected Contractor will be bound by its calculation. TEDC will pay only for line-kilometres actually flown and accepted to a maximum of 81,445 line kilometres as identified on page 1 of this RFP. The selected Contractor will also be obligated to provide complete coverage of the entire survey area as stipulated in Annex A.

$_____Total All Inclusive Survey Costs (excluding GST/HST) in Canadian dollars

Fuel, Oil and Lubricants:

The Bidder will be responsible for supplying and paying for all fuel, oil and lubricants. These costs are to be included in the Total All Inclusive Survey Costs above.

Ground Transportation - Base of Operations:

The Bidder will be responsible for making provision for and paying for all ground transportation costs pertaining to the survey operation. These costs are to be included in the Total All Inclusive Survey Costs above.

Accommodation and Living Expenses:

The Bidder will be responsible for arranging and paying for all accommodation, living and miscellaneous crew expenses. Costs are to be included in the Total All Inclusive Survey Costs specified above.

Bidder must bear in mind that no payments other than the Total All Inclusive Survey Costs stated herein shall be made to the Bidder. It is therefore essential that this Total All Inclusive Survey Costs include all elements of cost and profit related to the execution of this project.

LEGAL ENTITY AND CORPORATE NAME

The Bidder should provide a statement as to whether he is a sole proprietorship, partnership or corporate entity, indicating the laws under which the partnership or corporate entity was registered or formed, together with the registered or corporate name. Also, the Bidder should provide a statement identifying the country where the controlling interest/ownership (name if applicable) of its organization is located.

INSURANCE

The bidder must provide a statement of insurance coverage, saving harmless TEDC from any event held to be in the Contractor's area of responsibility during the period of any contract developing out of a bid made by the contractor.

?? The successful consultant will submit proof of liability insurance coverage of a minimum of $5,000,000.00 (job specific coverage) and that the firm is in good standing with the W.S.I.B;

MISCELLANEOUS ELEMENTS

?? A complete copy of the proposal should be delivered to the project manager on or before 4:00pm, July 25, 2003 at the following location:
Robert Calhoun, Project Manager
54 Spruce Street South
Timmins, Ontario P4N 2M5

?? A full description should be provided of any omissions or deviations from the requirements set forth in this RFP. Any additional elements should be clearly outlined and cost estimates presented separately so that the subcommittee may consider the value added and distinguish such elements from the required elements of the RFP. The effect of any omission on the total cost shall also be included. If there are no omissions or deviations from this RFP, the respondent shall state the following: "This proposal contains no omissions or deviations from the RFP."

?? No payment will be made to a consultant for the preparation and submission of a proposal.

?? The lowest or any tender will not necessarily be accepted.

?? A detailed outline of the firm's per diem rates and a breakdown of subcontractor rates shall be provided.

?? All prices must be quoted in Canadian dollars, to include all applicable taxes

?? Conditional bids will not be accepted

?? Adjustments to the proposal by telephone, fax, telegram, e-mail will not be accepted

?? Erasures, overwriting or strikeouts must be initialled by the person signing on behalf of the organization submitting a proposal

?? Proposal submissions constitute a firm offer and if successful will constitute part of the agreement

?? The consultant must have a clause in their proposal that indicates that prices are open for ninety (90) days from the proposal closing date

?? All consultants shall comply with all the legislation and regulations which may be applicable to completing this proposal

?? All proposals must be complete, legible and signed in ink by an authorized official

?? The survey length of 81,445 line kilometres is a maximum in this contract

Should a consultant find discrepancies or omissions from the RFP prior to the closing date, the Project Manager is to be contacted as soon as possible in order that a written instruction or an addendum can be issued

Any proposals received after the above referenced deadline or received by facsimile or by email will not be considered for this project and will be returned to the consultant unopened.

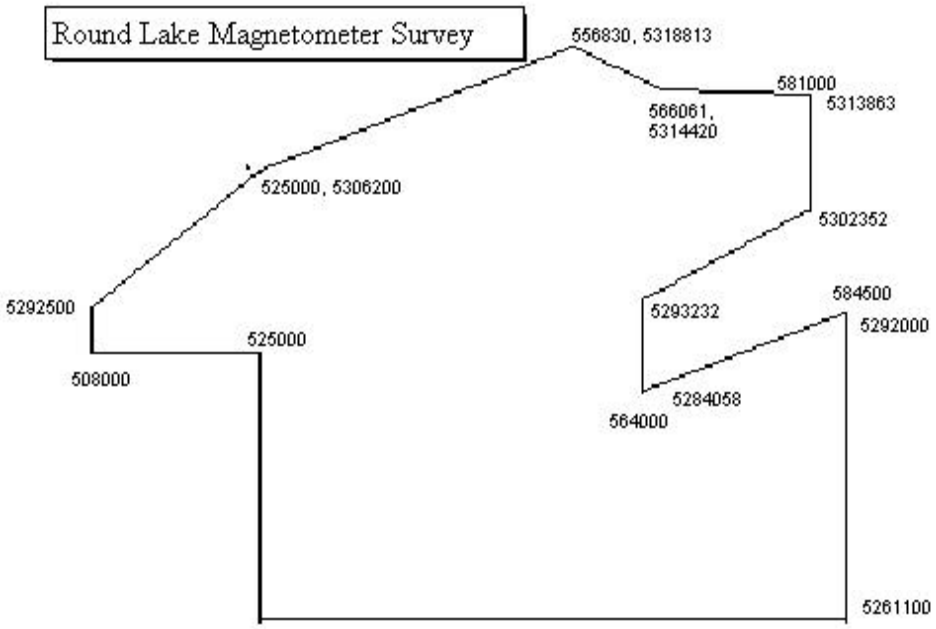
Qualifying proposals will be reviewed by the Project Management Team. The preferred candidate for this project will then be recommended to the TEDC Board for engagement of services. A formal contract will then be entered into between the TEDC and the successful firm as per the Request for Proposal to the satisfaction of the TEDC and executed as required.

The TEDC reserves the right to ultimately select, in its own best judgment, which firm it deems most qualified to undertake this project. The TEDC may select any proposal or reject all proposals and is not bound to accept the proposal with the lowest price. **In addition, firms are advised that the awarding of any contract relating to this project is contingent upon confirmation of partnership funding in support of this project.**

Consultants wishing to respond to the RFP must register by e-mail no later than 4:00 pm July 18, 2003. A brief e-mail confirming your intentions to submit a response and a key contact should be identified. We require complete mailing address, telephone and e-mail address. Questions regarding the project will be answered via e-mail and sent to all firms.

Please register with: Mr. Robert Calhoun
Project Manager
Timmins Economic Development Corporation
54 Spruce Street South
Timmins, ON
P4N 2M5

Tel: 705-360-8485
Fax: 705-360-1394
E-Mail: rcalhoun@city.timmins.on.ca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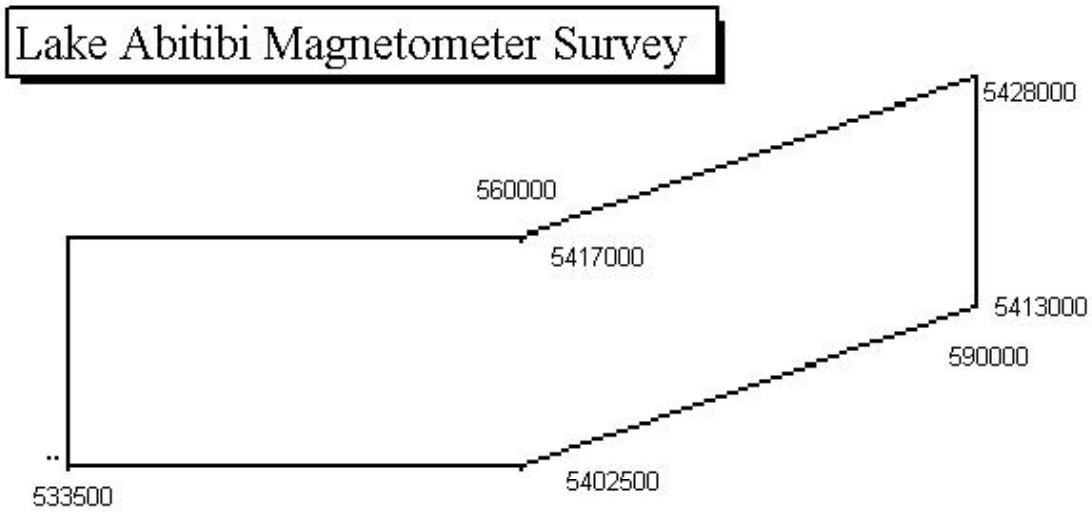
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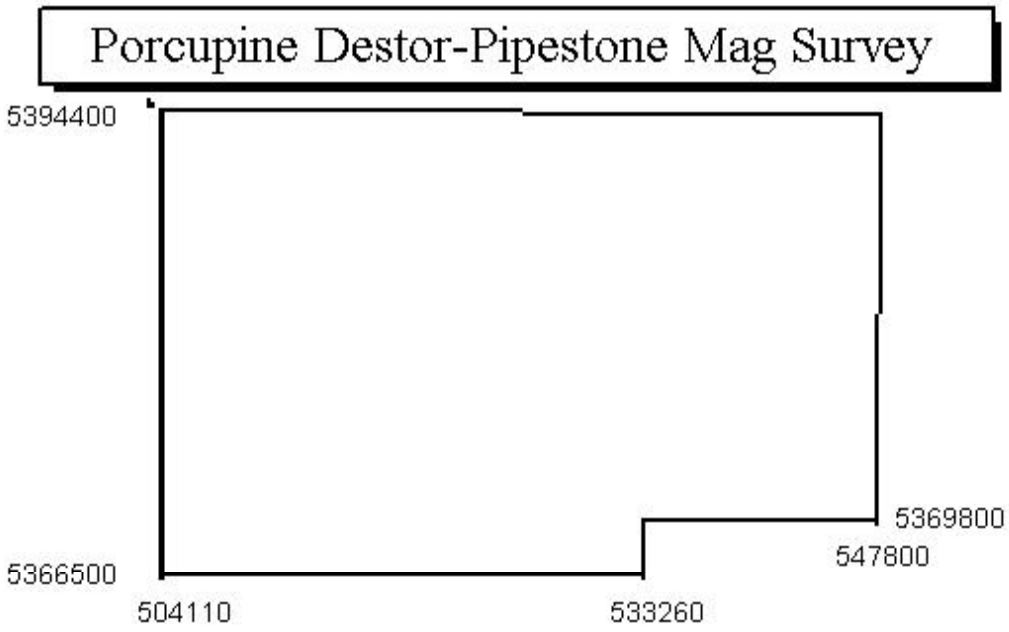
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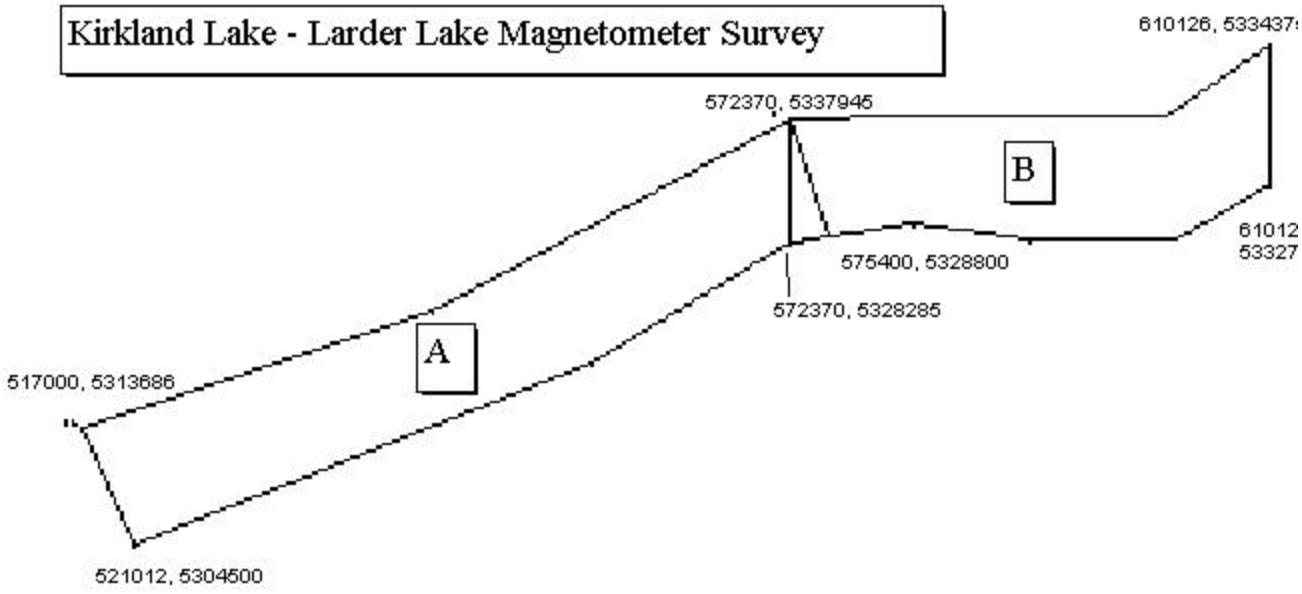
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