C-INTECH 176 BULLOCK DRIVE, UNIT 10. MARKHAM, ON L3P 7N1 TEL.: 905-472-3949

ELECTROMAGNETIC FIELD, AND STRAY CURRENT STUDY

Pertaining to:

2280 DUNDAS STREET WEST
TORONTO, ON

Prepared for:

CHOICE PROPERTIES LIMITED PARTNERSHIP

MAY 15TH 2022

C-INTECH 176 BULLOCK DRIVE, UNIT 10. MARKHAM, ON L3P 7N1 905-472-3949

C-I PROJECTS/169932 2280 Dundas Street TTC/Report
Via email: Jennifer.michi@choicereit.ca

May 15th 2022

Choice Properties Limited Partnership
700-22 St. Clair Avenue East
Toronto, Ontario
M4T 2S5

Attention: Jennifer Michi: Coordinator, Development
RE: 2280 Dundas Street West –EMF and Stray Current Study.

TABLE OF CONTENTS

1.0 Introduction

C-INTECH was contracted to perform an A.C. and D.C electromagnetic field survey, as well as ground potential measurements, at the location of the new development at 2280 Dundas Street West, located in Toronto, ON. The purpose of the measurements was to determine the extent of possible negative impacts of the TTC operations on the new proposed development, caused by stray currents or EMI interference.

The site's A.C. & D.C. electromagnetic field measurements, as well as ground potential measurements were performed on May 9th 2022 between the hours of 11:00a.m. and 3:30p.m

2.0 Testing methodology

2.1 The testing instrument for the A.C. magnetic field survey was EMF/ELF Meter Model TM-192D manufactured by TENMARS, in Taiwan. This instrument is a handheld triaxial magnetic field meter with frequency response from 30Hz to 2000Hz. It is calibrated to match the power frequency.

The testing instrument used for D.C. magnetic field readings was D.C. Milligauss Meter Model TFM1186-PC manufactured by Metrolab Technology SA, in Switzerland.

The testing instrument used for ground potential and soil resistivity measurements was Model DET4TCR2 manufactured by MEGGER.

2.2 The electromagnetic field in both D.C. and A.C. frequency spectra was measured in accordance with IEEE standard 644-94 using a three-axial instrument. The measurements were carried out at 3ft height above ground.

The D.C. readings were observed over a time period corresponding to several subway train passes and the maximum value was recorded on the site plan at the location of the measurement together with the time fluctuations.

The ground potential and resistivity measurements were conducted as per IEEE Std 81-2012: IEEE Guide for Measuring Earth Resistivity, Ground Impedance, and Earth Surface Potentials of a Grounding System. The soil conductivity and soil potential measurements were carried out in a grassy area on the North side of the property, as well as an existing parkette located on the South East side of the property. 12" long electrodes were utilized for these measurements. See Photos #1 & #2.

3.0 Findings

3.1 The A.C. magnetic field measurements taken at 3ft height were found to range between 0.1mG and 7.5mG, with no significant time variations observed. See Drawing S-169932-01. The A.C. magnetic field measurements are generally within normal levels. The higher values were found within close proximity to existing distribution lines & transformer. The elevated readings evidently were not TTC related. See Photos #3-#6.

3.2 Mean value for D.C. magnetic field was found to be 647-730mG range, with time variance in correlation with passing of the subway cars. The time variance was found to be generally within +/- 13mG range. See Drawing S-169932-02 & Graphs (3 pages).

3.3 The soil conductivity and soil potential measurements were carried out alongside the North side of the property as well as in an existing parkette on the South East area of the property. See Photos #1 & #2. The measurements were performed using the Four Point Wenner method. Soil resistivity on the South East side of the property was found to be 1.99Ωm. Soil resistivity on the North side of the property was found to be 0.87Ωm No anomalies were revealed during the readings.

3.4 The ground potential was measured on 40ft external electrodes, reading of 12mV D.C was observed with minor time variance over the time of measurement.

At present, the data collected does not indicate any significant problems associated with stray currents and electrochemical corrosion at this site.

4.0 Exposure Guidelines

4.1 A.C. Magnetic Field

4.1.1 Presently, there is no Canadian standard governing human exposure to extremely low frequency fields. Health and Welfare Canada has adopted guidelines provided by the American Conference of Governmental Industrial Hygienists (ACGIH) and World Health Organization (WHO) of 1000mG for continuous exposure.

4.1.2 The City of Toronto's "Prudent Avoidance Policy" is based upon an international review of childhood leukemia studies by the World Health Organization, which found a possible increased risk for long term average exposures above 3-4mG. The City has adopted a policy which encourages limiting exposures to magnetic field with a particular focus on children under 12. This is to satisfy health concerns based on epidemiological studies indicating possible negative health effects about this level.

4.1.3 A.C. magnetic field over 20mG may cause interference with data and computer equipment. Sensitive equipment such as MRI's, electron microscopes, and others, can be affected with significantly lower levels, (0.1-0.3mG). To our knowledge, there are no plans to install any kind of sensitive electronic equipment at this site.

4.2 D.C Magnetic Field

4.2.1 D.C. magnetic field and its swings are not known to pose any danger of negative health effects. However, it can affect sensitive electronic and communication equipment. To our knowledge, no D.C. magnetic field sensitive equipment will be present at this location. However, the D.C field swings and its rate of rise, should be considered during space utilization allocation.

4.3 Stray Currents

4.3.1 D.C. stray currents can arise when insulation on the D.C. traction is compromised, and a portion of the return current is carried through the bulk of the ground. Should such stray current enter a metallic object in the ground, it may cause electrochemical corrosion which, in serious cases, may affect the structural integrity.

4.4 Industry Practice

4.4.1 Magnetic Field:

Typically, it has been our experience that in situations where EMF exposure has been a concern, facilities have established a threshold of acceptance ranging from 2-10mG. It has been our experience that for a general office environment 5mG has been established as acceptable.

A.C. magnetic field (should it exceed acceptable levels) is controlled by means of architectural shielding at strategic locations, at, or around the sources of the field.

D.C. magnetic field, (and its swings) are usually controlled in accordance with the requirements of the sensitive equipment manufacturer. The typical approach would include a combination of passive and active shielding around the equipment itself.

4.4.4 Stray Currents:

Stray currents and their negative effects are usually controlled by minimizing the possibility of the current uptake into the structural metallic members. Extra bituminous insulation on the foundation caissons is frequently sufficient. In severe cases, cathodic protection might be required.

The best practice is to introduce remedial action at an early stage of a stray current problem. A monitoring system can be installed at the early construction phase, allowing the ability to monitor stray current levels, and implement corrective action as required.

5.0 Conclusion and Recommendations:

Based on the findings made during our field measurements, it can be concluded that the A.C. and D.C. magnetic fields are within acceptable limits for general class occupation.

Based on the findings, we do not expect any EMI interference problems associated with magnetic field radiation from the TTC subway line under normal operating conditions.

Localized elevated readings of the A.C. magnetic field are unrelated to the TTC operations.

At present, the ground potential was found to be within acceptable limits as well. We recommend to re-measure the ground potential at the bottom of the excavation pit to confirm the findings and assess the extent of mitigation measures, if any.

We recommend incorporating a ground potential monitoring system with provision of cathodic protection to be installed in the construction phase when such system can be seamlessly and economically incorporated. This will provide an early warning of incipient problems arising from stray currents, should such situation occur.

Based on the survey findings, we do not anticipate any need for external magnetic field mitigation action at present. However, we recommend a thorough review of the building plans in regards to any possible internal sources of EMI interference; such as main transformers, switchgears and substations, to comply with City of Toronto Exposure guidelines.

We trust this fulfills our assignment. Should you have any questions please do not hesitate to contact our office.

Yours truly,

Amanda Jeffs

Reviewed by: Jan Morava, M.A.Sc., P.Eng.

LICENSED PROFESSIONAL ENGINEER
J. MORAVA
PROVINCE OF ONTARIO

Encl: DWG S-169932-01, DWG S-169932-02

Graphs: POINT A: X, Y, Z DIRECTIONS (1 page)
POINT B: X, Y, Z DIRECTIONS (1 page)
POINT C: X, Y, Z DIRECTIONS (1 page)

Photographs: 4 pages

C-INTECH
176 BULLOCK DRIVE, UNIT 10
MARKHAM, ON L3P 7N1

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READINGS IN mG
TAKEN AT 3FT

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2280 DUNDAS STREET
TORONTO, ON

DRAWING TITLE:
A.C. MAGNETIC FIELD READINGS

DRAWN:	CHECKED:
AJ	EM
SCALE:	DATE:
NTS	05/22

PROJECT NO.: 169932

DRAWING NO.	REVISION NO.
S-169932-01	0

C-I C-INTECH
176 BULLOCK DRIVE, UNIT 10
MARKHAM, ON L3P 7N1

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2280 DUNDAS STREET

TORONTO, ON

DRAWING TITLE:

D.C. MAGNETIC FIELD READINGS

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SCALE: NTS	DATE: 05/22
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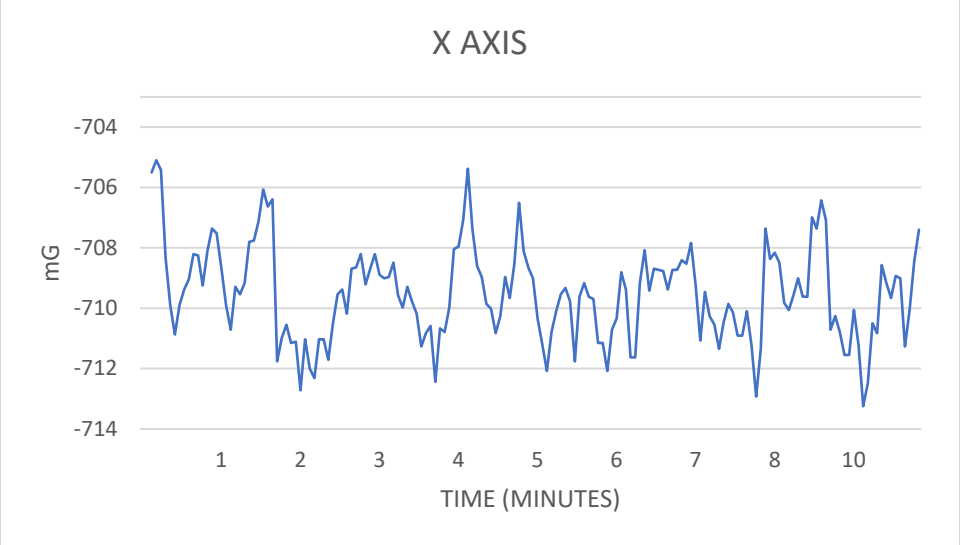
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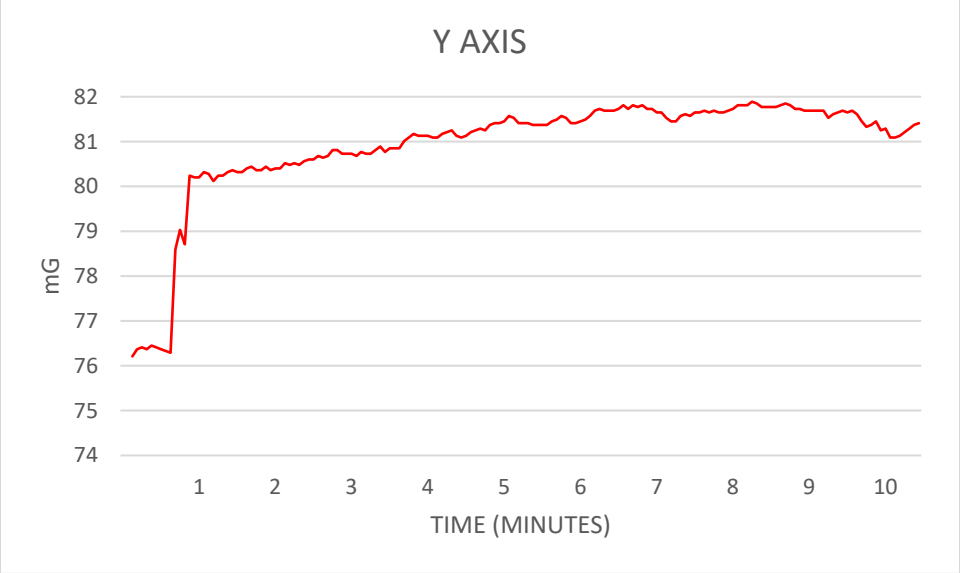
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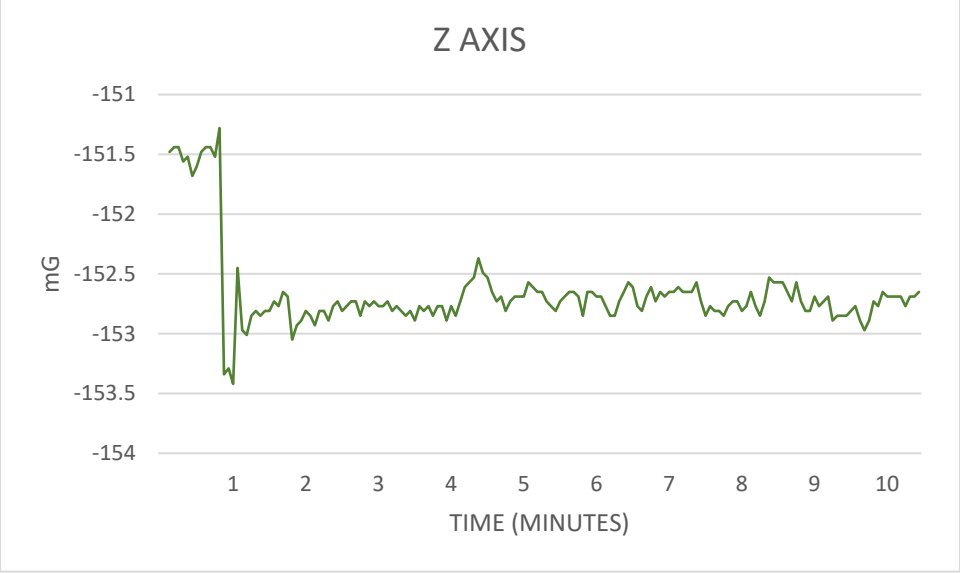
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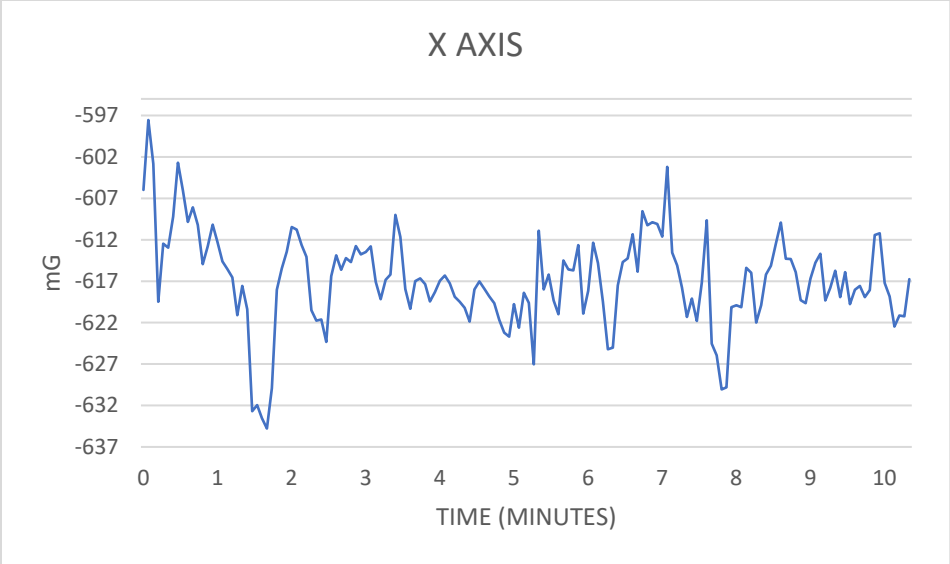
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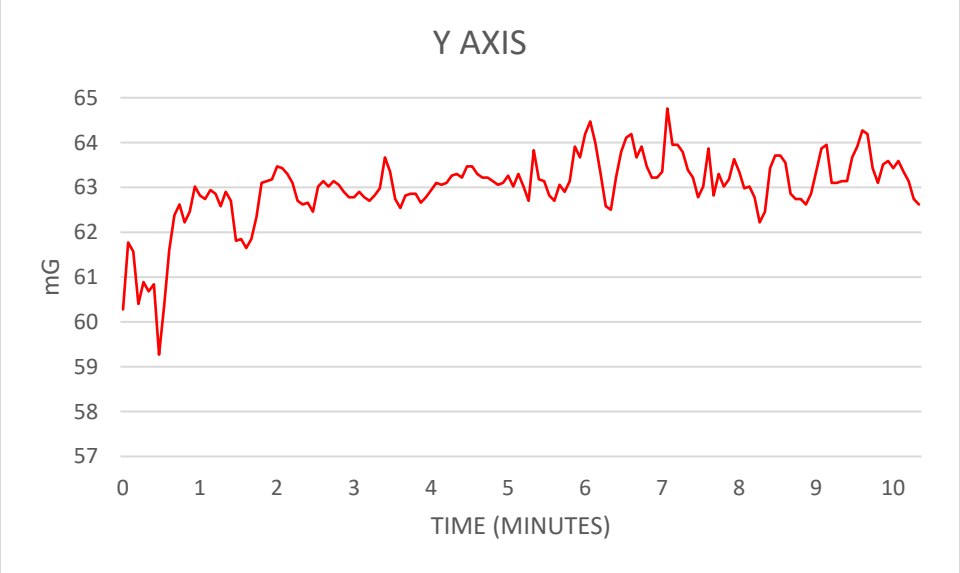
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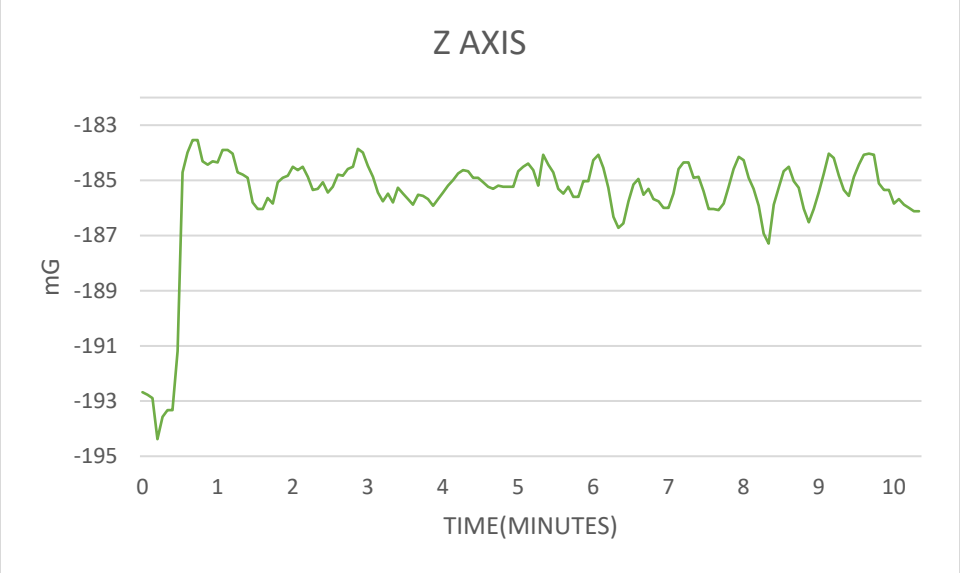
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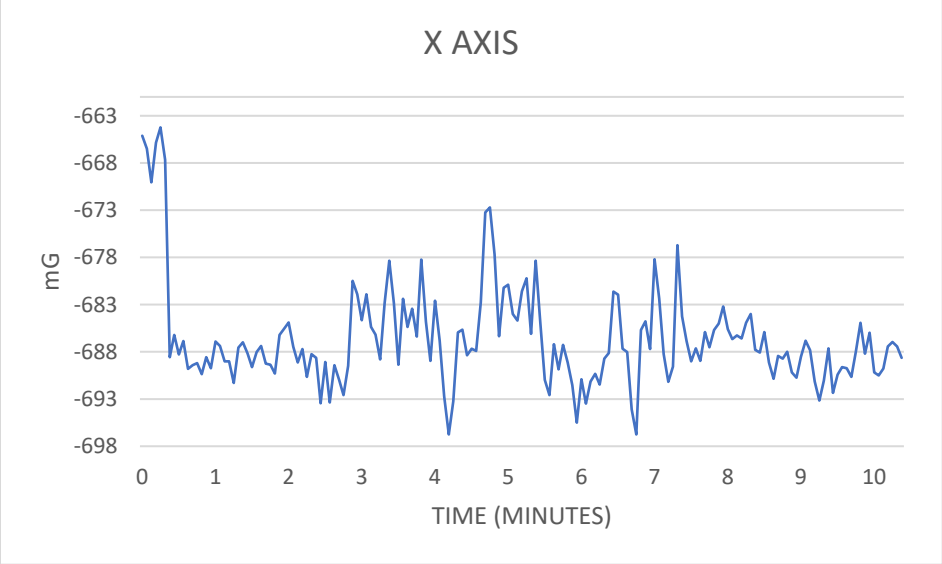
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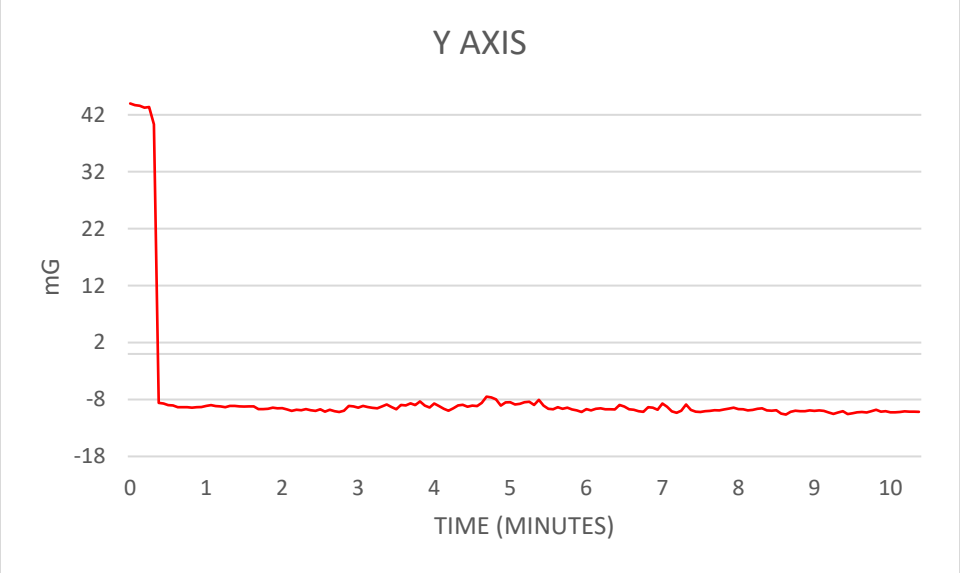
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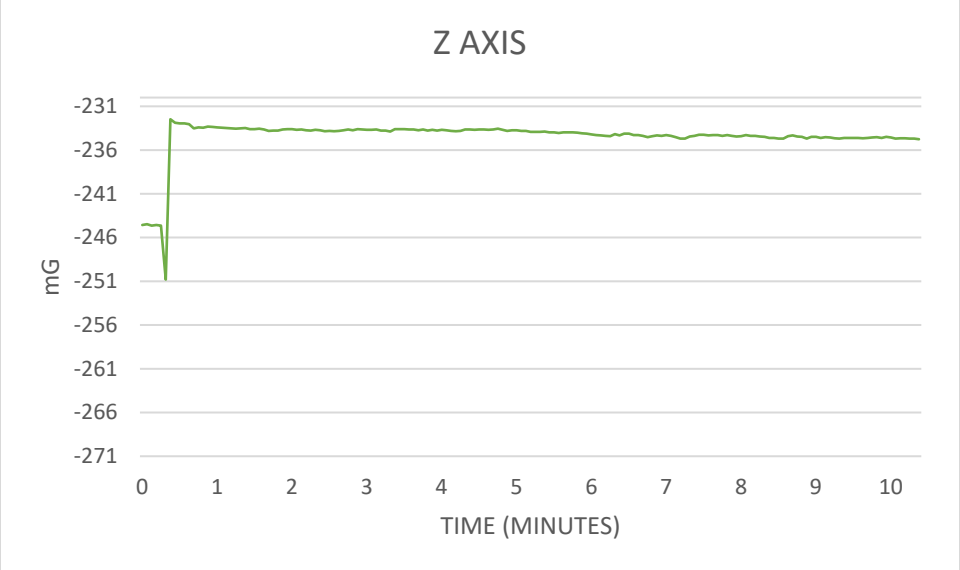
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169932 2280 Dundas Street West: PHOTOGRAPHS

Figure 1: Soil Resistivity measurements taken in the South East empty grass area.

Figure 2: Soil Resistivity measurements taken along the North side of the property.

Figure 3: Elevated A.C. magnetic field readings recorded beside existing transformer.

Figure 4: Elevated A.C. magnetic field readings recorded near existing Toronto distribution lines

Figure 5: Elevated A.C. magnetic field readings recorded near existing Toronto distribution lines.

Figure 6: Elevated A.C. magnetic field readings recorded near existing Toronto distribution lines.

Figure 7: A.C. magnetic field readings almost non existent.

Figure 8 A.C. magnetic field readings almost non existent.