

# **EMF SITE SURVEY**

**Pertaining to:**

**5800 Yonge Street**

**Prepared for:  
Life Construction Inc.**

**Prepared by:  
Amanda Jeffs  
January 29, 2019**

**W.O. #: 105036**

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## **1.0 INTRODUCTION**

### **1.1 Site Description**

The property surveyed is being developed by Life Construction Inc. The land is presently partially vacant, with an existing (closed) Toronto Hydro Building, as well as 2 parking lots. There is a fenced enclosure along the North side of the property. HydroOne's 'Fairchild' transformer station (5760 Yonge Street) is located in parallel to the access road, running diagonally along the South West side of the property (See Photo's #1 & #2). There are distribution lines running along the South side of the property & the perimeter of the Fairchild transformer station (See Photo #3).

### **1.2 Site Usage**

The proposed site development includes 4 residential towers and a park. The towers are anticipated to be in the mid-30 storey/110m (above-grade) to low-40 storey/135m range. A daycare facility is proposed for the podium of Tower 3 (West side, first and second floors). The development is subject to site plan review and the design will be finalized throughout that process.

### **1.3 Purpose of this Study**

In accordance with City of Toronto's Prudent Avoidance Policy, the purpose of this EMF Site Survey is to determine the actual level of magnetic field from all sources. Present and probable future scenarios are evaluated to quantify the magnetic field exposure and outline the mitigation measures required. The survey readings are superimposed on the site plan for easy correlation and assessment of any magnetic field interference.

## **2.0 ELF MAGNETIC FIELD SURVEY**

### **2.1 Testing Methodology**

The electromagnetic field survey was carried out on January 11<sup>th</sup>, 2019 from 8:00 a.m. to 12:30 p.m.

The readings were taken at regularly spaced locations over the entire property considered for development. The entire site was surveyed at the standard height of 1m above grade, in accordance with the relevant parts of IEEE standard 644-94.

The readings were recorded onto the site plan next to the location of the measurement, marked with a cross.

Additional readings were taken across the Hydro One right of way, as well as the direct vicinity of the Fairchild Transformer Station to evaluate individual line contributions to the overall field levels.

### **2.2 Testing Instrument**

The testing instrument for this survey was EMF/ELF Meter Model TM-192D manufactured by TENMARS. This instrument is a handheld triaxial magnetic field meter with frequency response from 30Hz to 2000Hz. It is calibrated to match the power frequency. Calibration date, July 2018.

## **2.3 Sources of Magnetic Field**

The main sources of magnetic field at the time of this survey were evidently the Fairchild Distribution Center, and the Toronto Hydro distribution lines running diagonally alongside the South West side of the property. The extent of their combined magnetic field, at actual load during the time of the survey at 1m height, are displayed in drawing S-105036-01.

Readings taken within the direct vicinity of the Hydro One Fairchild Transformer Station were as high as 21mG, this would be consistent with electrical load approximately 30-40% of maximum, see Photo #4. Readings were extrapolated to full load, displayed on drawing S-105036-02.

*Note: this reading was not taken on the proposed development property. This measurement was taken on the adjacent Hydro One lands.*

Magnetic field from the Toronto Hydro distribution lines decay with distance more rapidly than single phase current generated fields (with square of the distance) and thus affects a smaller area.

## **2.4 Findings**

As displayed in drawing S-105036-01, the magnetic field readings varied throughout the property with a notable increase within close proximity to the Toronto Hydro distribution lines & Hydro One Fairchild Transformer Station.

Readings taken within the proposed designated child care area ranged from 0.6-2.2mG, at 1m. At Point A, Drawing S-105036-01, there was a source of elevated magnetic field readings evidently emanating from a source in the ground. Photo #5 displays readings as high as 13mG recorded at ground level.

Within close proximity to the existing Toronto Hydro distribution line poles, readings as high as 29mG were recorded at 1m height. See Photos #6. *Note: this reading was taken outside of the development property. This measurement was taken to assess the contribution of individual sources for extrapolation to full-load situation.*

As displayed on drawing S-105036-02, readings extrapolated to full load, we estimate that magnetic field readings have the potential to reach levels as high as 20.0mG at the property's closest corner to the switchyard.

### **3.0 MITIGATION MEASURES**

- 3.1 The high occupancy areas of the park could be located northward. From the recorded findings it can be estimated that 50m from the property line would be of sufficient distance to be in compliance with the City of Toronto's EMF Guidelines.

Alternatively, the Toronto Hydro distribution lines could be relocated Southward, to a distance from the property line sufficient enough to lower the magnetic field levels below 5mG. From the recorded findings it can be estimated that 10m (30ft) from the property line, would be of sufficient distance for the Toronto Hydro distribution line. Feasibility of this alternative is not known at present.

If relocation of the high occupancy areas of the park is not feasible, an active cancellation system can be installed to lower the magnetic field levels from the transformer station & Toronto Hydro Distribution lines to acceptable levels. This active field cancellation system can be installed on the property line, not to impose on Hydro One ROW.

The ground source, Point A drawing S-105036-01, is evidently emanating from a source in the ground. The existing property will be demolished, and 4 floors of parking are planned to be constructed. As such, this ground source will be eliminated at that time.

## **4.0 EMI INTERFERENCE LIMITS**

### **4.1 Canadian Standards**

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).

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 children's exposures to magnetic field with a particular focus on children under 12.

### **4.2 American Conference of Governmental Industrial Hygienists (ACGIH)**

4.2.1 ACGIH publishes Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices in an annual publication.

4.2.2 The exposure limit for sub-radio frequency magnetic fields is frequency-dependent: for 60 Hz (fundamental power frequency), the exposure limit is 1 mT (10,000 mG). This limit is reduced to 0.1 mT (1,000 mG) in the "Notes" to accommodate people with cardiac pacemakers and other metallic medical implants.

### **4.3 World Health Organization (WHO)**

4.3.1 The WHO adopts guidelines put forth by the International Commission on Non-Ionizing Radiation Protection (ICNIRP). The exposure limit for the power frequency (60 Hz) magnetic field is given by the formula provided in table 7 (see Appendix 5) and is graphically displayed in Fig. 2. (For 60 HZ, the limit for the general public is 833 mG.)

#### **NOTE:**

*Both ACGIH and WHO (ICNIRP) limits are based on the same principle of interaction of the magnetic field with living tissue. The mechanism of the interaction is primarily thermal, as a result of the induced current. No other effect is considered.*

*However, there are other possible interaction mechanisms between the magnetic field and the human body, mainly supported by epidemiological studies, suggesting malignant growth promotion and other negative health effects. Discussion of the scientific aspects of this topic is beyond the scope of this report.*

#### **4.4 Safety Code 6**

- 4.4.1 As mentioned previously, there is no Canadian standard and/or guideline or regulation governing exposure to ELF (60Hz power frequency) magnetic fields. The closest exposure standard is Safety Code 6, published by Health Canada. The Safety Code 6 mandate concerns electromagnetic fields from 3,000 Hz upward to a microwave range of 300 GHz.
- 4.4.2 The Safety Code 6 exposure limit for the general public in the lowest range of frequencies (3 kHz to 1,000 kHz) is 2.19 A/m, which translates to an unperturbed field situation of 2.753 microTesla (27.5 mG).

#### **4.5 Industry Practice**

- 4.5.1 Some large corporation's collective agreements stipulate a maximum limit to which workers can be continuously exposed. The exposure limits vary but 10mG is typical.
- 4.5.2 The Siemon Company manual for communication cabling specifies a distance from sources on EMI interference, which corresponds to approximately 20 mG of external power frequency magnetic fields.
- 4.5.3 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.
- 4.5.4 4mG limit is chosen to comply with the City of Toronto guidelines and would primarily apply to childcare facilities, playgrounds, school yards and similar situations.



## **5.0 CONCLUSIONS**

### **5.1 Summary of Findings**

The magnetic field readings varied throughout the property with a notable increase in magnetic field levels on the South side of the property, closer to the Toronto Hydro distribution lines and the Hydro One Fairchild Transformer Station.

For comparison, readings were taken alongside the bike-path located inside the Finch hydro corridor. Readings taken in this area also indicates elevated magnetic field readings. Electromagnetic field readings were observed between 15-60mG throughout the path.

There was a moderate variation of the readings at the same distance from the line, alongside the line length. This was evidently a result of the variation to the line height (conductor sag) and the conductor spacing.

Readings are recorded on the enclosed site plan S-105036-01, at the location of the measurement. Readings extrapolated to full load are depicted on enclosed drawing S-105036-02.

Areas shaded in red are exposed to magnetic field of 4.0 mG and more. This area is not in accordance with the City of Toronto's guidelines, 0.0 to 4.0mG.

### **5.2 Recommendations**

In order to comply with the City of Toronto limits, we recommend the high occupancy areas of the proposed park be located approximately 50m North of the South property line.

Should relocation of the high occupancy areas be impractical, we recommend approaching Toronto Hydro to explore the possibility of relocating the poles (approximately 10m South from it's current position). Feasibility of this alternative is not known at present.

If relocation is not feasible, we recommend the Toronto Hydro distribution lines and Hydro One Fairchild distribution station magnetic field levels to be mitigated using an active field cancellation system installed alongside the South property line.

### **5.3 Conclusions**

Based on the findings made during the survey, the most prominent source of inundating magnetic field is the Hydro One Fairchild Transformer Station & the Toronto Hydro distribution lines located on the South side of the property. Eliminating these sources would greatly reduce the overall field onto the property.

We recommend considering relocating high occupancy areas of the proposed park approximately 50m North from the South property line.

Alternatively, relocating the Toronto Hydro distribution lines and installing an active cancellation system along the property line will reduce the magnetic field exposure to recommended 3-4mG level at all material locations on this property.

Based on the findings in this survey, the magnetic field on this property is within acceptable limits with exception of the south-west corner, closest to the hydro one substation. The area with limits exceeding the guidelines can be brought within the required exposure limits required by the City of Toronto guidelines using standard field mitigation techniques. These field mitigation measures would eliminate any concerns with spurious external magnetic field on the proposed development.

Signed by:  
C-INTECH



A handwritten signature in black ink, appearing to read 'Jan Morava', with a long horizontal flourish extending to the right.

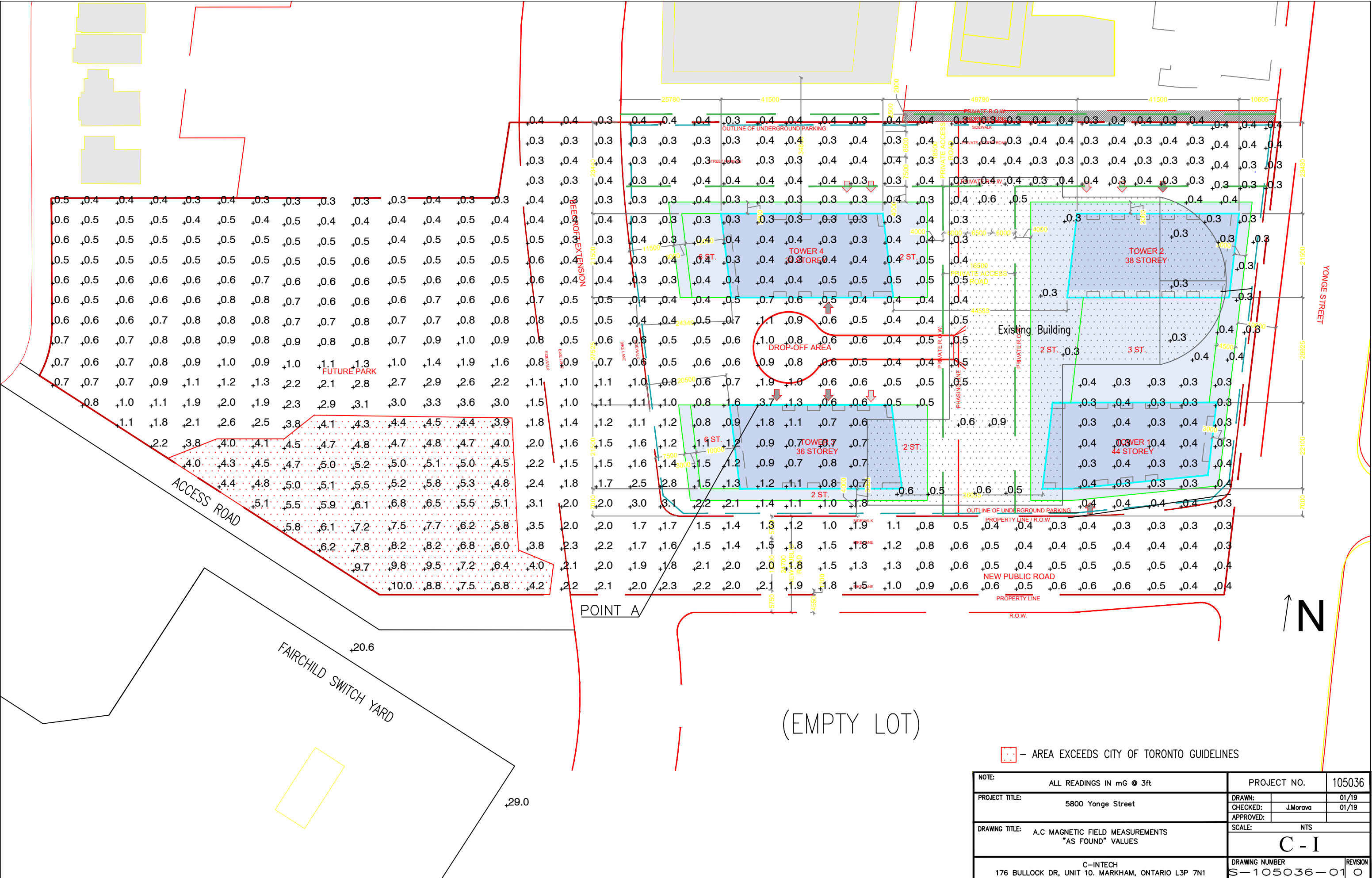
Jan Morava, M.A.Sc., P.Eng.

Encl.

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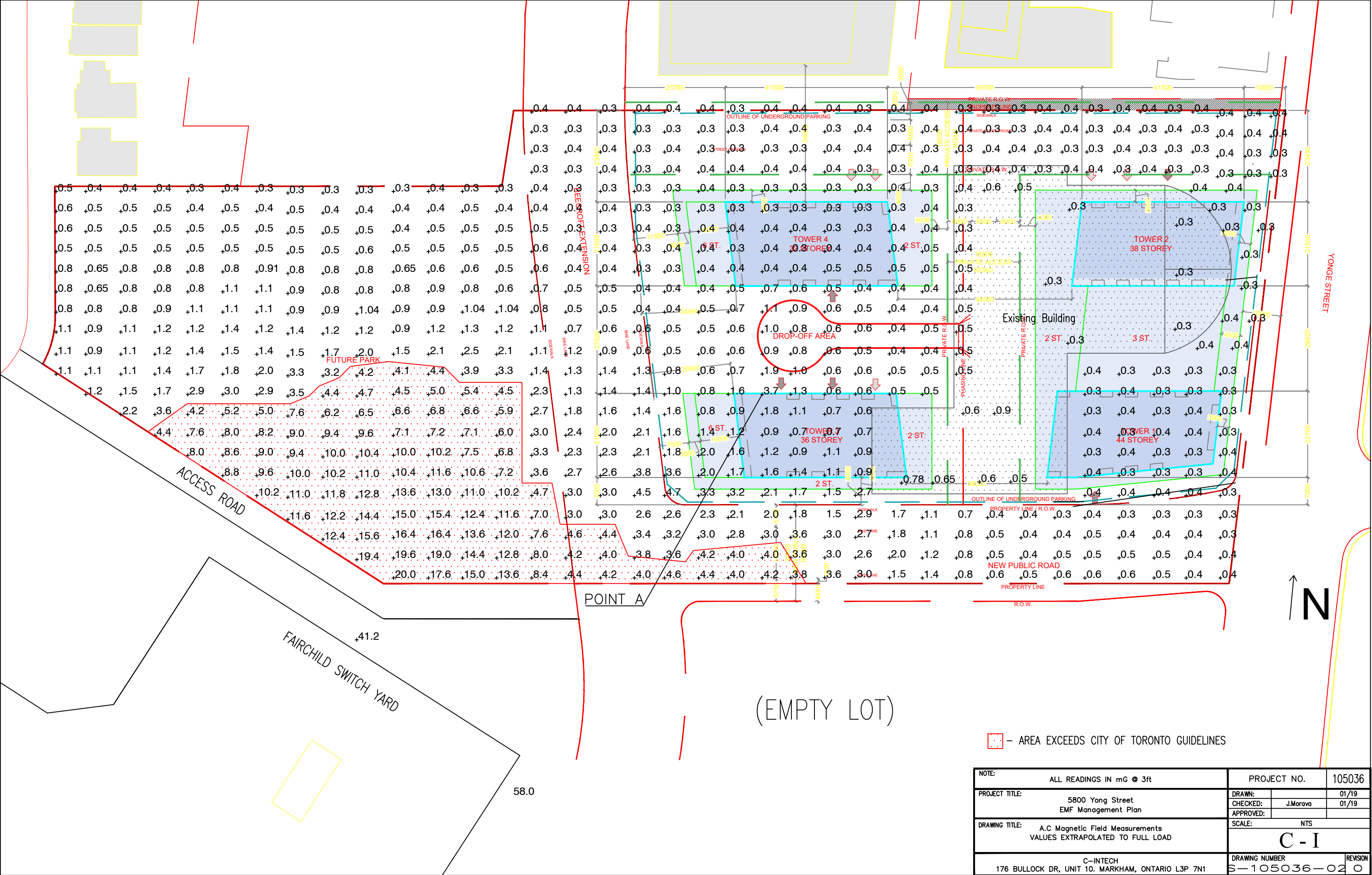
DWG S-105036-02

Photo Documentation (3 pages)



- AREA EXCEEDS CITY OF TORONTO GUIDELINES

|  |                   |                               |               |
|--|-------------------|-------------------------------|---------------|
| NOTE: ALL READINGS IN mG @ 3ft                                   |                   | PROJECT NO. 105036            |               |
| PROJECT TITLE: 5800 Yonge Street                                 | DRAWN:            |                               | 01/19         |
|  | CHECKED: J.Morava |                               | 01/19         |
|  | APPROVED:         |                               |               |
| DRAWING TITLE: A.C MAGNETIC FIELD MEASUREMENTS "AS FOUND" VALUES | SCALE: NTS        |                               |               |
|  | C - I             |                               |               |
| C-INTECH<br>176 BULLOCK DR, UNIT 10. MARKHAM, ONTARIO L3P 7N1    |                   | DRAWING NUMBER<br>S-105036-01 | REVISION<br>0 |



- AREA EXCEEDS CITY OF TORONTO GUIDELINES

|  |                   |                               |               |
|--|-------------------|-------------------------------|---------------|
| NOTE: ALL READINGS IN mG @ 3ft   |                   | PROJECT NO. 105036            |               |
| PROJECT TITLE: 5800 Yonge Street<br>EMF Management Plan                            | DRAWN:            |                               | 01/19         |
|  | CHECKED: J.Morava |                               | 01/19         |
|  | APPROVED:         |                               |               |
| DRAWING TITLE: A.C Magnetic Field Measurements<br>VALUES EXTRAPOLATED TO FULL LOAD | SCALE: NTS        |                               |               |
|  | C - I             |                               |               |
| C-INTECH<br>176 BULLOCK DR, UNIT 10. MARKHAM, ONTARIO L3P 7N1                      |                   | DRAWING NUMBER<br>S-105036-02 | REVISION<br>0 |