

ELECTROMAGNETIC FIELD STUDY

FOR

Metro Hall Daycare Center

Toronto, ON.

Proj. No.169930
Prepared by: Amanda Jeffs
Date: June 16th 2022

1.0 INTRODUCTION

1.1 Purpose of This Study

The purpose of this study was to survey the future daycare space, located in the existing Metro Hall building, located in Toronto, ON. A.C. electromagnetic field measurements were taken to identify any existing & potential sources of EMF exceeding project specified limits.

1.2 Testing Instrument

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.

1.3 Testing Methodology

The electromagnetic field survey was carried out on June 2nd, 2022, between the hours of 3:00 p.m. and 5:00 p.m. During the test, the loading on the 600V switchgear and bus-duct feeders located in the electrical room below was 20-30% of full design load.

The survey was carried out at 1m above ground in accordance with IEEE 644-94 Standard.

The readings were recorded on the site plan next to the location of the measurement.

1.4 Sources of Electromagnetic Field

The main source of electromagnetic field at the time of this survey was the equipment within the main electrical room located on P1 below, specifically the secondary side of the two 600V/3000kVA transformers and their associated switchgear and secondary feeders.

A site visit was conducted on June 16th 2022, at 3:30pm to confirm loading, as well as to confirm the electrical equipment layout within the main electrical room. See Photos #5-#10. Loading on the main breakers at the time of testing indicated 10-20% of full design load.

The Hydro One external high voltage switch yard, located on John Street & Wellington Street was not a significant source of electromagnetic field at the time of this survey. This is due to the relatively low EMF generated by high voltage services at this distance. See Photos #1-#4.

2.0 FINDINGS

- 2.1 A.C. electromagnetic field readings within the future daycare space, measured at 1m height, ranged from 0.1mG – 5.2mG. See Drawing S-169930-01.
- 2.2 The highest measured EMF readings were recorded within the areas of the future “Preschool Play” & “Meeting Room” areas, corresponding with the footprint of the main electrical room below. See Photos #11 & #12.
- 2.3 The electromagnetic field levels will increase with higher load on the electrical equipment below. Due to the light (<20% of full design capacity) loading at time of testing a 3x increase in magnetic field strength over the measured values can be expected when the equipment is loaded closer to full design levels.

3.0 EMI INTERFERENCE LIMITS

3.1 Canadian Standards

- 3.2.1 Presently, there are no Canadian standards 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).
- 3.2.2 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.

3.2 American Conference of Governmental Industrial Hygienists (ACGIH)

- 3.2.3 ACGIH publishes Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices in an annual publication.
- 3.2.4 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.

3.3 World Health Organization (WHO)

- 3.3.1 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 833.0mG.)

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.

3.4 Industry Practice

- 3.4.1 Some large corporation's collective agreements stipulate a maximum limit to which workers can be continuously exposed. The exposure limits vary but 5mG is typical for major corporate anchor tenants including financial institutions.
- 3.4.2 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 2.0-10.0mG. It has been our experience that for a general office environment 5.0mG has been established as acceptable.

4.0 CONCLUSIONS & RECCOMENDATIONS

- 4.1 The main electrical room located below the future daycare space represents a significant source of electromagnetic field. The measured values at the time of testing exceed typically acceptable levels for areas with high occupancy of children under 12. These levels will be further exceeded once loading is increased on the electrical equipment.
- 4.2 The areas of highest field strength are localized in the "Preschool Play" & "Meeting Room" areas. Electromagnetic field mitigation measures will be required to bring these spaces to within acceptable limits.

- 4.3 Suitable measures to limit the residual magnetic field to within project specifications include; a floor mounted shielding layer above the footprint of the main electrical room, as well as selective EMI shielding applied to major EMF sources within the main electrical room.

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

Yours truly,

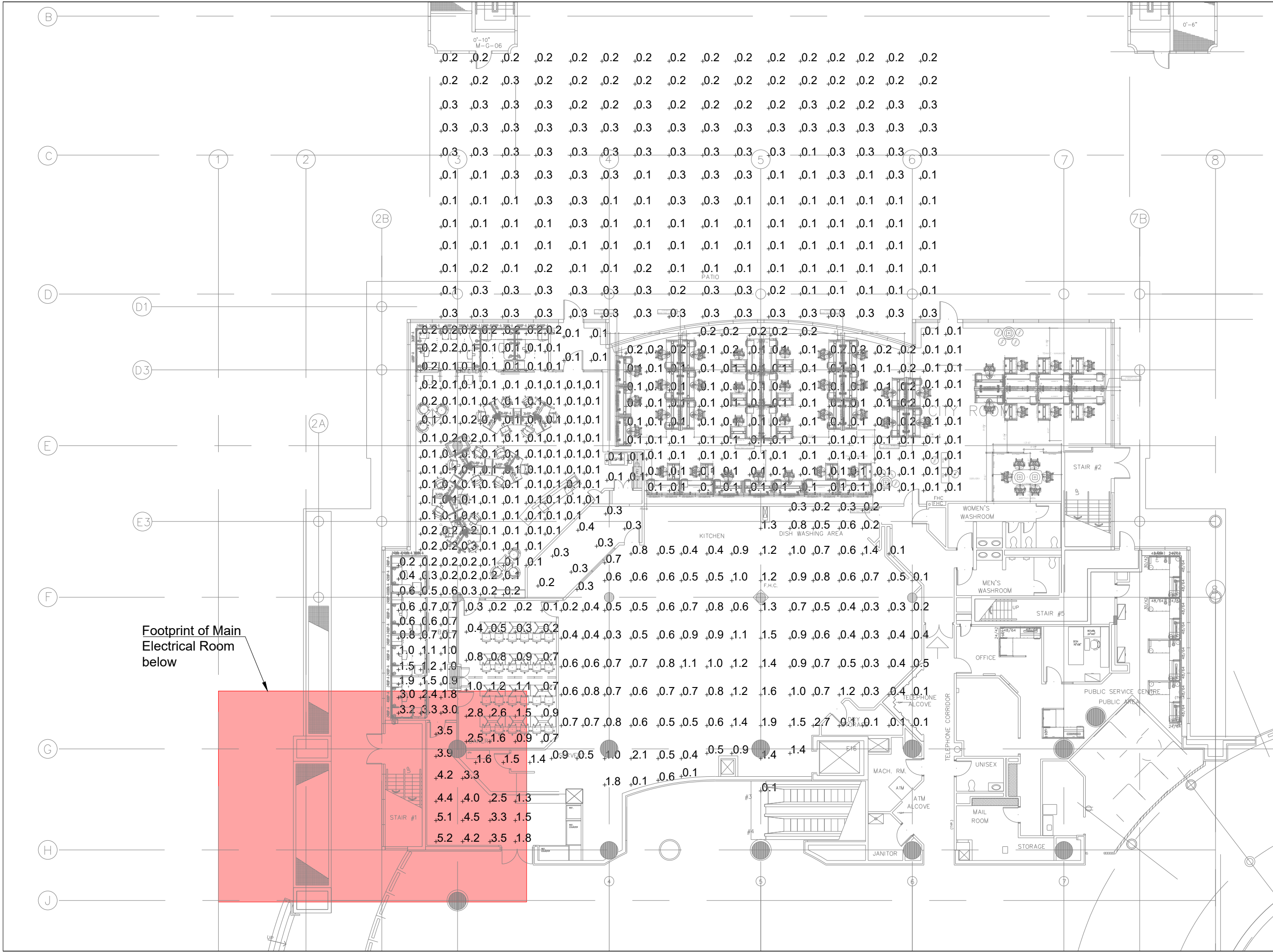


Amanda Jeffs

C-INTECH



Reviewed by: J. Morava, M.A Sc., P. Eng
Encl. DWG S-169930-01
Photo Documentation: 7 Pages



C-I

C-INTECH

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MARKHAM, ON L3P 7N1

NOTES:

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TRUE NORTH:

NOTE:

ALL READINGS IN mG
AT 1000mm AFF

PROJECT TITLE:

METRO HALL EMF STUDY

DRAWING TITLE:

EMF READINGS
LEVEL 01 FUTURE DAYCARE SPACE

DRAWN:

A. JEFFS

CHECKED:

E. MORAVA

SCALE:

NTS

DATE:

2022-06-17

PROJECT NO.

169930

DRAWING NO.

S-169930-01

REVISION NO.

01



Figure 1 & 2: Hydro One external high voltage switch yard. Located at John & Wellington Street



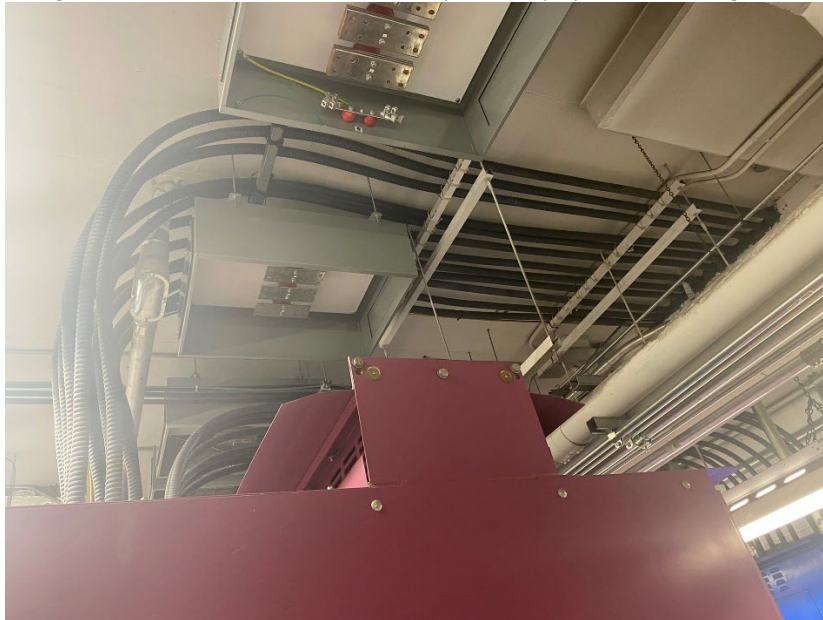


Figure 3 & 4: A.C. magnetic field readings taken outside Hydro One high voltage switch yard.





Figure 5 & 6: Main Electrical Room below preschool play area & meeting area.



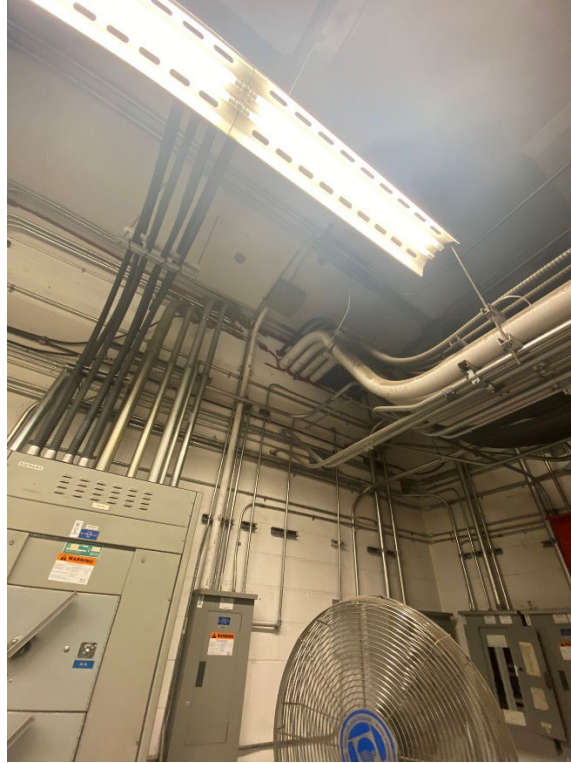


Figure 7 & 8: Main Electrical Room below preschool play area & meeting area.





Figure 9: A.C. Magnetic field readings taken below single conductor cables located in main electrical room.



Figure 10: A.C. magnetic field readings taken beside main transformer located in main electrical room.



Figure 11 A.C. magnetic field readings taken at 3ft above main electrical room



Figure 12 A.C. magnetic field readings taken at floor level above main electrical room.



Figure 13 & 14: A.C. magnetic field readings taken in future outdoor play area.



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NOTE:

PROJECT TITLE:
METRO HALL
EMF STUDY

DRAWING TITLE:
EMF LAYOUT
LEVEL 01 FUTURE DAYCARE SPACE

DRAWN: F. TSE
SCALE: NTS

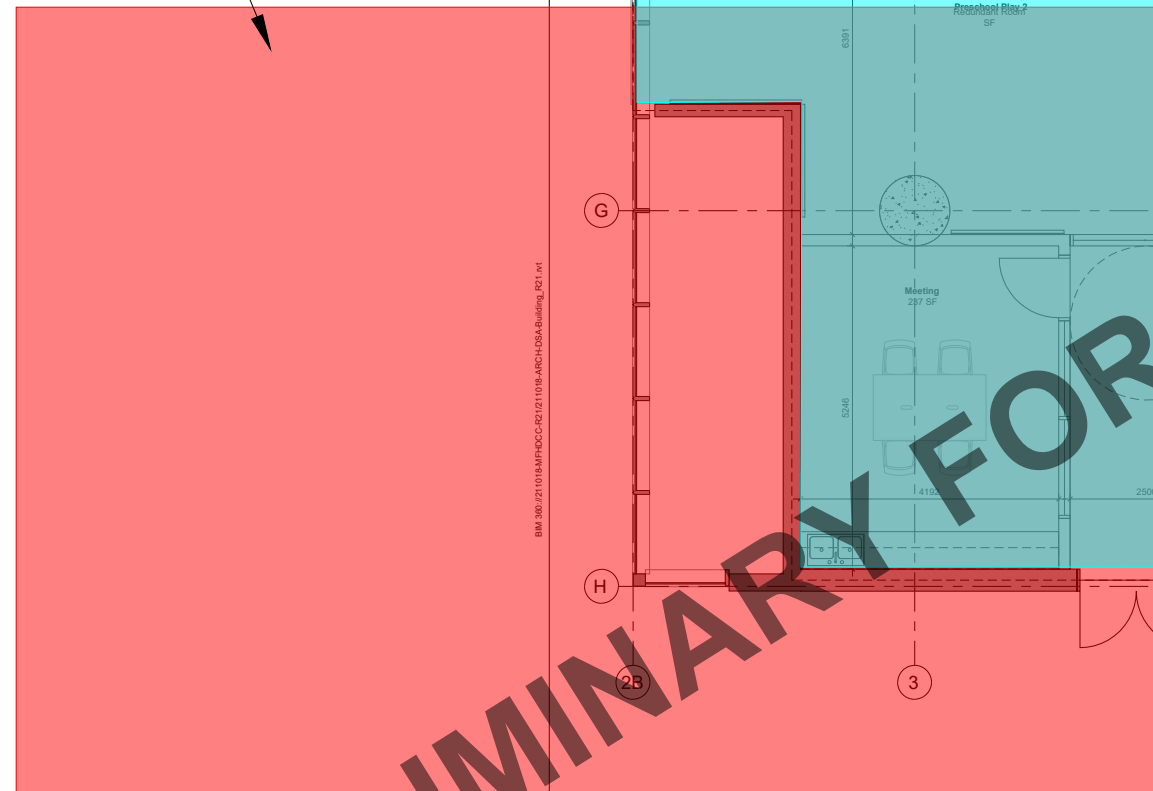
CHECKED: E. MORAVA
DATE: 2022-09-08

PROJECT NO. 169930

DRAWING NO. S-169930-02
REVISION NO. 00

APPROXIMATE
EXTENT OF FLOOR
SHIELDING

FOOTPRINT OF MAIN
ELECTRICAL ROOM
BELOW



PRELIMINARY FOR DISCUSSION