

**UNIVERSITI TEKNOLOGI MARA**

**THE COMPARISON BETWEEN  
GROUND PENETRATING RADAR  
(GPR) AND ELECTROMAGNETIC  
LOCATOR (EML) IN  
UNDERGROUND UTILITY  
DETECTION**

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Thesis submitted in fulfillment  
of the requirements for the degree of  
**Surveying Science and Geomatics (Hons)**

**Faculty of Architecture, Planning & Surveying**

**July 2018**

## AUTHOR'S DECLARATION

I declare that the work in this thesis was carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own work, unless otherwise indicated or acknowledged as referenced work. This thesis has not been submitted to any other academic institution or non-academic institution for any degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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## ABSTRACT

This research is about the using of equipment Ground Penetrating Radar (GPR) and Electromagnetic Locator (EML) in underground utility detection. Both of the GPR and EML have their own advantages and disadvantages. Besides, the ability of both methods is different. Every utility survey relates with accuracy and precision. Furthermore, the utility mapping subject is very new to UiTM. The knowledge about utility mapping of the student is very few because they have not been exposed yet to this field. For that reason, this research study may help student to give the knowledge about the comparison between GPR and EML in underground utility detection. Besides, it may help the license surveyor to analyse the difference between both equipment before they can decide to buy it. The study area was conduct at Gurun, Kedah. The survey design dimension of 80m x 5m is created on top of the detected pipeline. The pipeline is a 0.750m diameter main water supply pipe established by Darul Aman Water Company (SADA). The pipeline horizontal position and depth is observed by using GPR MALA GroundVision model and EML RD8100 model with the help of Ground Positioning System (GPS) South Galaxy G1 model which then being compared with the reference value produced by SADA. From the research study, the findings that was found is the data produced by GPR is more detail and very functional to be used for data interpretation by using Reflex2DQuick software. However, the EML have the advantage in term of cost and time saving because the data cannot be post-processed and the instrument price is also less expensive. For the final output, the table of accuracy difference is produced and it can be conclude that the GPR accuracy is better than EML. The root mean square error (RMSE) for GPR observation is lower than EML observation for both horizontal position and depth.

# TABLE OF CONTENT

|   | <b>Page</b> |
|---|-------------|
| <b>CONFIRMATION BY PANEL OF EXAMINERS</b> | <b>ii</b>   |
| <b>AUTHOR'S DECLARATION</b>               | <b>iii</b>  |
| <b>SUPERVISOR'S DECLARATION</b>           | <b>iv</b>   |
| <b>ABSTRACT</b>                           | <b>v</b>    |
| <b>ACKNOWLEDGEMENT</b>                    | <b>vi</b>   |
| <b>TABLE OF CONTENT</b>                   | <b>vii</b>  |
| <b>LIST OF TABLES</b>                     | <b>x</b>    |
| <b>LIST OF FIGURES</b>                    | <b>xi</b>   |
| <b>LIST OF ABBREVIATIONS</b>              | <b>xiv</b>  |
| <br>                                      |             |
| <b>CHAPTER ONE: INTRDUCTION</b>           | <b>1</b>    |
| 1.1 Introduction                          | 1           |
| 1.2 Background of Study                   | 1           |
| 1.3 Research Gap                          | 2           |
| 1.4 Problem Statement                     | 3           |
| 1.5 Study Area                            | 3           |
| 1.6 Research Objectives                   | 4           |
| 1.7 Research Questions                    | 4           |
| 1.8 Significant of Study                  | 4           |
| 1.9 Summary                               | 4           |
| <br>                                      |             |
| <b>CHAPTER TWO: LITERATURE REVIEW</b>     | <b>5</b>    |
| 2.1 Introduction                          | 5           |
| 2.2 Overview of Utility Mapping           | 5           |
| 2.3 Overview of GPR                       | 6           |
| 2.4 Basic of GPR Concept                  | 7           |
| 2.5 GPR Method                            | 8           |
| 2.6 Overview of EML                       | 9           |

|   |           |
|---|-----------|
| <b>CHAPTER FOUR: RESULT AND ANALYSIS</b>                              | <b>42</b> |
| 4.1 Introduction  | 42        |
| 4.2 Result of Filtration and Enhancement of Image                     | 42        |
| 4.2.1 Result for Line 1   | 43        |
| 4.2.2 Result for Line 2   | 44        |
| 4.2.3 Result for Line 3   | 45        |
| 4.2.4 Result for Line 4   | 46        |
| 4.2.5 Result for Line 5   | 47        |
| 4.2.6 Result for Line 6   | 48        |
| 4.2.7 Result for Line 7   | 49        |
| 4.2.8 Result for Line 8   | 50        |
| 4.2.9 Result for Line 9   | 51        |
| 4.2.10 Result for Line 10   | 52        |
| 4.3 Result of Depth Determination of Pipeline                         | 53        |
| 4.4 Result of GPS Observation   | 55        |
| 4.5 Comparison between GPR and EML Data                               | 57        |
| 4.6 Accuracy Difference between GPR and EML                           | 58        |
| 4.6.1 Correlation Coefficient Relationship of GPR and EML Depth Value | 59        |
| 4.6.2 RMSE for Depth  | 60        |
| 4.6.3 RMSE for Coordinates  | 61        |
| 4.7 Summary   | 62        |
| <br>  |           |
| <b>CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS</b>                   | <b>63</b> |
| 5.1 Introduction  | 63        |
| 5.2 Conclusion  | 63        |
| 5.3 Recommendations   | 64        |
| <br>  |           |
| <b>REFERENCES</b>   | <b>65</b> |