NURUL HUSNA BINTI SHANSU BAHARING

BACHELOR OF SURVEYING SCIENCE AND GEOMATICS (HONOURS)

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ACCURACY ASSESSMENT OF CROSS SECTION AND LONG SECTION GENERATED FROM DTM DERIVED USING UAV IMAGE AND GPS OBSERVATION

NURUL HUSNA BINTI SHANSU BAHARING

2022475122

SCHOOL OF GEOMATICS SCIENCE AND NATURAL RESOURCES

COLLEGE OF BUILT ENVIRONMENT

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NURUL HUSNA BINTI SHANSU BAHARING

2022475122

Thesis submitted to the Universiti Teknologi MARA Malaysia
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DECLARATION

I declare that the work on this project/dissertation was carried out in accordance with the regulations of Universiti Teknologi MARA (UiTM). This project/dissertation is original and it is the result of my work, unless otherwise indicated or acknowledged as referenced work.

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Name of Student	:	Nurul Husna Binti Shansu Baharing
Student's ID No	:	2022475122
Project/Dissertation Title	:	Accuracy Assessment of Cross Section and Long Section Generated from DTM Derived Using UAV Image And GPS Observation
Signature and Date	:	

Approved by:
I certify that I have examined the student's work and found that they are in accordance with the rules and regulations of the School and University and fulfils the requirements for the award of the degree of Bachelor of Surveying Science and Geomatics (Honours).

Name of Supervisor	:	Sir Zaki Bin Ahmad Dahlan
Signature and Date	:	

ABSTRACT

This study explores an innovative approach to enhancing road construction efficiency by integrating Unmanned Aerial Vehicles (UAVs) for generating Digital Terrain Models (DTMs). UAVs have become essential tools, offering real-time, high-resolution images and data from construction sites, thereby transforming the planning and execution phases of road construction projects. Given the increasing demand for streamlined and data-driven methods in the construction industry, the deployment of UAVs is both timely and beneficial. Traditional GPS-based methods, although precise, are labor-intensive and encounter significant difficulties, particularly in confined and deep excavation sites where signal tracking is problematic. The aim of this study is to assess UAV data by creating DTM for planning and designing road by utilizing UAVs equipped with advanced sensors and cameras. The findings reveal that UAV methods provide more reliable and accurate results compared to GPS methods. UAV-derived DTMs achieved a Root Mean Square Error (RMSE) of 0.284 meters for long sections and 0.036 meters for cross sections, demonstrating high accuracy. The greater point density of UAV-derived DTMs allows for better capture of fine-scale terrain features, whereas GPS methods showed larger errors, raising concerns about their reliability. In comparison, GPS methods offered wider coverage but required further refinement to match the accuracy levels of UAV-derived data. This study highlights the superior reliability, efficiency, and detailed terrain representation of UAVs, indicating their potential to replace traditional GPS methods in road construction projects.

TABLE OF CONTENTS