IDENTIFYING THE TECHNIQUES AND CHALLENGES OF GPS SURVEYING FOR VERTICAL ALIGNMENTS IN HIGH-RISE BUILDINGS

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Degree of Master of Science

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Dissertation submitted in partial fulfillment of the requirements for the degree of Master of Science in Project Management

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DECLARATION

I declare that this is my own work and this dissertation does not incorporate without acknowledgement any material previously submitted for a Degree or Diploma in any other University or institute of higher learning and to the best of my knowledge and belief it does not contain any material previously published or written by another person except where the acknowledgement is made in the text.

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DEDICATION

This is dedicated to

My Parents

&

beloved wife M.L. Fathima Mafaisa

for their love, support and encouragement

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ABSTRACT

Identifying the Techniques and Challenges of GPS Surveying for Vertical Alignments in High-Rise Buildings

Vertical alignment in high-rise building is a very important aspect. In order to manage the growing demand for spaces in urban cities, the people are now interested in construction of super high-rise buildings. The architects are nowadays interested in improvising untypical complicated morphology in building designs which increase the difficulties in surveying for vertical alignments. Consequently the surveyors are themselves forced to find alternative survey techniques to manage the difficulties. Though the GPS survey techniques are applicable like in other constructions, the majority of the construction society is still depended on the traditional survey methods.

As per the existing data sources, operational and spaces related challenges of GPS surveying are common for any kind of GPS applications; and though the GPS survey techniques are applicable for vertical alignment in high-rise buildings, there is lack of data sources to explicitly expose the applicability of different GPS survey techniques and the challenges to be considered in such applications. This study has been oriented to find out the best suitable GPS survey technique for the vertical alignments in high-rise buildings by checking the applicability of all five basic GPS techniques with their accuracy, efficiency, time consuming and cost implications while focusing on identifying further practical challenges apart from the already identified operational and space related problems.

The findings prove that the GPS techniques can be used for vertical alignments in high-rise buildings and the best technique among them is Static GPS with the combination of traditional survey methods; and there are some practical challenges to be considered in such GPS applications for vertical alignments in high-rise buildings. The findings have been attained by analyzing the reliable data gained through experts' comments, case studies and experiments.

Keywords: *High-Rise Building, Vertical Alignment, GPS Techniques, CORS, CWCSS*

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LIST OF ABBREVIATIONS

Abbreviation	Description
AR	Ambiguity Resolution
BIM	Building Information Modeling
CAD	Computer Aided Design
CORS	Continuous Operating Reference Stations
CWCSS	Core Wall Control Survey System
DGPS	Differential Global Positioning System
GNSS	Global Navigation Satellite System
GPS	Global Positioning System
GSM	Global System for Mobile Communications
KSA	Kingdom of Saudi Arabia
MSS	Mobile Satellite Service
RF	Radio Frequency
RII	Relative Importance Index
RTK	Real Time Kinematic
SA	Selective Availability
UAE	United Arab Emirates
UHF	Ultra High Frequency
US	United States
UWB	Ultra-Wideband
VHF	Very High Frequency
VRS	Virtual Reference Station

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