ANALYSIS OF VIBRATION LEVELS AT NEARBY STRUCTURES DUE TO ROAD CONSTRUCTION ACTIVITIES

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DECLARATION OF THE CANDIDATE AND SUPERVISOR

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ABSTRACT

Analysis of Vibration Levels at Nearby Structures Due to Road Construction Activities

The purpose of this research is to analysis of vibration levels at nearby structures due to road construction activities.

Vibration caused various types of structural damages and it may finally affect the project progress. Although, there are systems to control these issues, it is reported that available systems are not reliable, effective and systematic. Even though, there are many research studies about quantitative vibration studies, nobody presented systematic holistic solution for these problems. Main Objectives of this research is propose a vibration management plan prior to the start of construction and evaluate current vibration standards of Sri Lanka and propose suggestion to improvements. Firstly, existing vibration and structure damage monitoring systems of Sri Lanka and other countries were studied. Secondly data regarding existing system from experience site and Highway engineers were collected. Finally, vibration was monitored when do major vibration generation road construction activities which used heavy vibrator rollers.

Damages due to vibration depends on structure type, vibration value and affected time period. Those factors are taken into account to establish a vibration management plan. This vibration management plan will provide fair solution to both parties who take vibration consequences in construction and contractors. For the survey, hilly terrain area road section with various subgrade conditions is used.

On the basis of the results of this research, it can be concluded that vibration limits are exceeded its damage limits in nearby structure and current boundary limits are not in optimum range and it should change with structure condition and subgrade strength. Furthermore, Sri Lanka standard of vibration limits for construction vibration should be revised after proper analyze. According to this research analyze Type 1, Type2 and Type 3 structures prescribed limits easily can be increased up to higher limits. It will be helpful to contractor to do undisturbed work without contradicting government rules and regulation. As a result, sustainability of the road project can be improved. According to questionnaire survey 84 % engineers think existing system should improve to meet sustainable road development and 85% engineers think vibration monitoring system is required for construction activities.

This research generated two major outcomes which are very valuable to road construction sector. Those are vibration contour map for various type of compaction activities and various subgrade conditions. Secondly, vibration management plan which can use to minimize vibration related structures damage in road construction.

Key words: Vibration, Compaction, Structure.

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LIST OF ABBRIVIATIONS

ABC - Aggregate Base Course

PPV - Peak Particle Velocity

DT -Dump Truck

BS -British Standards

DCP -Dynamic Cone Penetrometer

CBR -California Baring Ratio

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