<h1 style="text-align:center">SUMMARY OF NEW CONTRIBUTIONS OF THE THESIS</h1>

Title: **Investigation of Graphene Oxide for Enhancing the Mechanical Properties of Asphalt Concrete under Vietnamese Conditions**

Field of training : Transport Construction Engineering

Code : 9580205

PhD student : **Hoang Thi Huong Giang**

Supervisors:

- AssocProf. Dr. Nguyen Hoang Long   - University of Transport Technology
- Dr. Ly Hai Bang   - University of Transport Technology

Institution: University of Transport Technology

Summary of new contributions of the thesis:

This research is carried out in the direction of inheritance and further development compared to previous studies on the use of GO in improving some properties of asphalt concrete. Using theoretical approach, laboratory experiments combined with machine learning applications, modern laboratory equipment, statistically analyzed experimental data, methods of designing and analyzing flexible pavement structures, this thesis has made a number of new scientific and practical contributions as follows:

1. The proposed content of GO (1 - 2%) by weight of asphalt ensures the dispersion of GO in the asphalt and improves several physical properties of BTN_GO, such as Marshall stability, static elastic modulus, dynamic modulus, splitting tensile strength, and rutting resistance. Additionally, the study also suggests a method for designing the BTN_GO mixture composition and indicates that BTN_GO has a higher mixing and compaction temperature compared to conventional AC from 5 to 8°C.

2. Construction of several regression equations that describe the relationships between the viscosity function, $G^*/\sin\delta$, Marshall stability, static elastic modulus, splitting tensile strength with the GO content and test temperature. Additionally, research constructed the master curve $|E^*|$ for BTN_GO at the

reference temperature of 21°C and has made initial indications of the potential applicability of the 2S2P1D viscoelastic model for modeling the dynamic modulus |E*| of BTN_GO.

3. The proposal suggests the application, calculation, simulation, audit and evaluation of a flexible pavement structure with a surface layer using BTN_GO, and initial evidence indicates that this is a promising solution for reducing the thickness and enhancing the operational quality of the pavement structure.

4. Developed prediction tools based on machine learning models for several physical properties of N_GO and BTN_GO. Developed a GUI to assist engineers in using these tools for predicting the physical characteristics of N_GO and BTN_GO without the need for coding.

Ha Noi, October 26th, 2023

Principal Supervisor 1   **Principal Supervisor 2**   **PhD Student**

AssocProf. Dr. Nguyen Hoang Long   **Dr. Ly Hai Bang**   **Hoang Thi Huong Giang**