Dedicated to my

Parents, Wife (Jutika) & Daughter (Aarvi K.)

DECLARATION

I hereby declare that the thesis entitled "**An Experimental Study on Behaviour of Geocell-Reinforced Sand Beds under Static and Repeated Loads"** was carried out by me at the Department of Civil Engineering, Tezpur University, Tezpur under the guidance of Prof. Utpal Kumar Das, Professor of Civil Engineering Department, Tezpur University, Tezpur. This thesis is being submitted towards the partial fulfilment of the award of the degree of the Doctor of Philosophy in Civil Engineering by Tezpur University, Napam, Tezpur, Assam, India.

All help received by me have been duly acknowledged.

I further declare that this thesis has not been submitted elsewhere for the award of any other degree.

Place: Tezpur University, Tezpur (**Chirajyoti Doley)**

Date: Reg. No. TZ167109 of 2016

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CERTIFICATE OF THE SUPERVISOR

This is to certify that the thesis entitled "**An Experimental Study on Behaviour of Geocell-Reinforced Sand Beds under Static and Repeated Loads**" submitted to the School of Engineering, Tezpur University in partial fulfillment for the award of the degree of Doctor of Philosophy in the Department of Civil Engineering, Tezpur University, Assam is a record of research work carried out by Mr. Chirajyoti Doley under my supervision and guidance.

All help received by him from various sources have been duly acknowledged.

No part of this thesis has been submitted elsewhere for the award of any other degree.

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Tezpur **Chirajyoti Doley**

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ABBREVIATIONS AND SYMBOLS

ABBREBIATIONS AND SYMBOLS	SIGNIFICANCE
α	Level of significance
γ	Bulk unit weight of the sand
γ_d	Dry unit weight of the sand
$\gamma_{d,\,max}$	Maximum dry unit weight of the sand
$\gamma_{d,\,min}$	Minimum dry unit weight of the sand
δ	Surface deformation
δ_s	Interfacial friction angle of sand-geogrid
σ_3	Minor principal stress
σ_n	Normal stress
τ	Shear stress
ε_u	Strain at failure
φ	Frictional angle of sand
φ_{ps}	Frictional angle of sand for plane strain state
φ_{tr}	Frictional angle of sand for triaxial state
ξ_i	Partial regression coefficient
b	Width of the geocell mattress
B	Width of footing
BC	Bearing capacity
c	Cohesion
C_u	Coefficient of uniformity
C_c	Coefficient of curvature
d	Pocket size of the geocell mattress
df	Degrees of freedom
d_c, d_q, d_γ	Depth factor
df	Degrees of freedom
D_{10}	Effective size of particle
D_f	Depth of foundation
D_r	Relative density of subgrade sand
$D_{r,\,infill}$	Relative density of geocell infill sand

E_s	Standard error
G	Specific gravity of sand
GR	Geocell reinforcement
GRF	Geocell-reinforced foundation
h	Height of the geocell mattress
IF	Improvement factor
J_s	Secant modulus
k	Stiffness of reinforcement layer
l	Length of geocell reinforcement
L	Length of footing
n	Number of observations
N	Number of cycles
N_c, N_q, N_y	Bearing capacity factor
p	Number of independent variables
PRS	Percentage reduction of settlement
q	Bearing pressure
q_d	Applied repeated pressure
$q_{ult.}$	Ultimate bearing pressure for unreinforced or reinforced soil
$q_d / q_{ult.}$	Repeated load ratio
q_R	Ultimate bearing capacity of geocell-reinforced sand
q_U	Ultimate bearing capacity of unreinforced sand
R^2	Coefficient of determination
R^2_{adj}	Adjusted coefficient of determination
s	Footing settlement
s_c, s_q, s_γ	Shape factor
s_{rep}	Settlement due to repeated load only
s_t	Total settlement
t	Thickness of footing/woven geotextile
T_u	Ultimate tensile strength
x	Distance from centre of footing to dial gauge
u	Placement depth of the geocell mattress below the footing
$\hat{y}_i$	Predicted values
y_i	Dependent variables