A CASE STUDY ON GEOTECHNICAL ASSESSMENT FOR OPTIMIZATION OF DEEP FOUDATION CAPACITY

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DHAKA

SPRING 2016

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by **ZISSAN TARIQ, MD. TOUHIDUL HASAN, MEHEDI HASAN BAPPI** and **MD. MOHAIMINUL ISLAM** entitled **"A CASE STUDY ON GEOTECHNICAL ASSESSMENT FOR OPTIMIZATION OF DEEP FOUDATION CAPACITY"** is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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STATISTICAL ANALYSIS OF RECYCLED AGGREGATE CONCRETE

A THESIS SUBMITTED FOR FULFILLING THE PART

OF THE REQUIREMENTS THE DEGREE OF

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

BY

MOHD. MAHBUBUR RAHMAN

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NOVEMBER 2016

UNIVERSITY OF ASIA PACIFIC
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Certificate of Approval

The thesis titled "Statistical analysis of recycled aggregate concrete", Submitted by: MOHD. MAHBUBUR RAHMAN Session: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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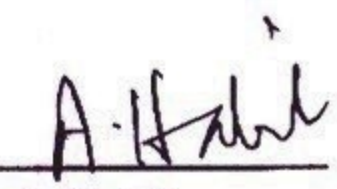

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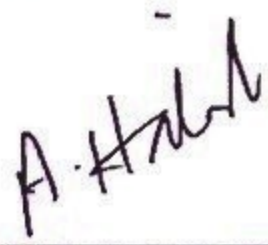

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ABSTRACT

A detailed Statistical Analysis was carried out to evaluate their strength distribution and reliability of using recycled aggregate concrete (RCA). In this research a statistical analysis of the compressive and tensile strength of recycled aggregate concrete is conducted and the data are collected from different journal papers. Different researchers shows different test results with different percentage of recycle aggregate, different size of coarse aggregate, different water cement ratio, different fine and coarse aggregate ratio and a wide range of compressive and tensile strength are found. Here, Statistical analysis and probability theory was used for the purpose of finding the reliability of using recycled aggregate concrete based on these test results.

The coarse fraction of natural stone aggregates was replaced at (0-10) %, (10-25) %, (25-50) %, (50-75) % and 100% with recycled stone aggregate. In this study, mix design are were made with water to cement (w/c) ratio from (0.31-0.70) and Portland combined cement of (280-600) kg/m^3. Different admixtures are also found that is used by the researcher to improve the quality of recycled aggregate concrete. The analysis was done by normality test, K-S test, regression analysis, finding correlation, upper and lower bound of test data, finding coefficient of variance, standard deviation, plotting frequency curve etc. All Concrete specimens data were tested at 28 days to determine the compressive strength, tensile strength, stress-strain response and Young's modulus of hardened concrete.

Analysis results shows that maximum percentage test results are lies within one standard deviation and they lies mostly within a range of 35-45 MPa and the coefficient of variance are quite smaller for the replacement below 50%. The rejection area for normality test are less than 5% which shows strong evidence for using recycled aggregate concrete.

This analysis shows that compressive strength of recycled aggregate prepared below 50% replacement shows quite same results as natural aggregate. They have less variance (10-20) % in their strength distribution

PHYSICAL AND MECHANICAL PROPERTIES OF BRICKS, STONES, AND SANDS COMMONLY USED IN BANGLADESH

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The thesis titled "Physical and Mechanical properties of Bricks, stones and sands commonly used in Bangladesh", Submitted by Najmus Sakib and Md. Ashraful Islam. Session: Spring 2016 has been accepted in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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Abstract

A detailed investigation was carried out to evaluate the physical and mechanical properties of different aggregates and bricks used in construction work in Bangladesh. Both fine and coarse aggregate were taken to consider in the research. Raw materials, source and transportation process also been discussed in the paper. Bricks were collected from 8 different sources, stones were collected from 4 different places. Sand was collected from 3 different sources. Physical tests were done with brick, stone and sand. Where mechanical tests were done with only bricks.

Bricks were tested to evaluate various physical properties (T-test, hardness test, soundness test, burnt-uniformity, unit weight and absorption capacity) and mechanical properties (compressive strength). For sand and stones specific gravity, absorption capacity, and unit weight test were conducted. In addition to there several personal interview in source of materials to understand the present scenario of construction materials in Bangladesh.

T-Test results shows that Picket and 1st class in a well figure. Only 10% shows fracture for picket, 30% shows failure for 1st Class and 2nd class shows 100% failure. No rain spot was found in any bricks. 1st Class and Picket bricks are found to be well-burnt. A minor percent shows non-uniform bunt. 2nd and 3rd class shows almost all are non-uniform burnt. Cracked surface was found in picket, no cracks was on 1st, 2nd and 3rd class brick. Average compressive strength was found for brick was near 11000 psi. Picket shows the most strength, average strength was 5000 psi and minimum was 2200 psi. 1st class brick shows value near picket, average value found 4100 psi and minimum strength was 1900 psi. For 2nd class brick Maximum, minimum and average strength were close, average strength was 2100 psi. 3rd class bricks shows all values under 1900 psi. Absorption capacity of bricks shows Picket and 1st class brick absorb a small. Average absorption capacity was almost similar for Picket and 1st class brick, about 15% water absorption. 2nd class brick shows all the value greater than 15%. 3rd class bricks absorption capacity value was similar for maximum, minimum and average.

Maximum unit weight of brick was found near 2300 kg/m^3 for picket. 1st class brick shows maximum value of 2100 kg/m^3 and average unit weight 1800 kg/m^3. Maximum absorption capacity of stone was 0.37%. Others values were almost similar to each other ranging from 0.04 to 0.18. Maximum sp. Gravity of stone was 2.76, others values ranges from 2.45 to 2.71. Maximum unit weight of sand was found 1710 kg/m^3 and minimum was 1445 kg/m^3. Maximum Sp. Gravity of sand was found 2.62, others value was almost near the maximum value. Maximum absorption capacity for sand was found 5% and others values were close to the maximum value.

A Study on Partial Replacement of Fine Aggregate with Stone Dust and Brick Dust in Concrete.

A Thesis

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Certificate of Approval

We hereby recommend that the thesis prepared by **Md. Zahidul Islam, Pavel Ahmed, Md. Nishan Rahman, & Md. Amirul Islam** Entitled **"Partial Replacement of Fine Aggregate with Stone Dust and Brick Dust in Concrete."** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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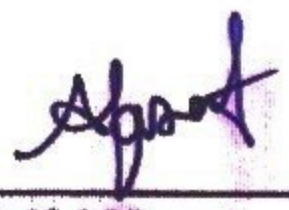
Abstract

This experimental study presents the variation in the strength of concrete when replacing sand by Stone and Brick dust from 0%, 30%, 50% and 70%. The compressive strength of concrete cylinder were taken at the age of 28 days. Main goal of the project is to determine the optimum replacing level for maximum compressive strength. For this study some specific test was required for the materials. They are Sieve Analysis, Unit Weight test, Absorption Capacity test, Specific Gravity test. Mix design Ratio was 1:2:4. There were 16 cylinders which were used for determining the compressive strength. Amount of Fine aggregates were made different intentionally for our experimental purpose. Different cylinder shows different compressive strength from where we can determine the composition of materials for maximum compressive strength. Compressive strength, strain deformation, modulus of elasticity, density are determined for fulfilling our purpose. Here the maximum values of deformation is 80mm which occurred due to 135KN applied on (50% brick Dust). Minimum Deformation 5mm which occurred due to 120KN load applying on cylinder 8(stone dust 50%). Maximum compressive strength is 137KN is found (brick dust 50%) minimum compressive strength is 95KN is found in cylinder 15(no replacement of sand). So here we can decide that brick dust 50%) contains best composition of materials for compressive strength. In case deformation stone dust provides better result.

UNIVERSITY OF ASIA PACIFIC
DEPARTMENT OF CIVIL ENGINEERING

Certificate of Approval

The thesis titled "Effect of Sand to Total Aggregate ratio on Mechanical Properties of Stone Aggregate Concrete", Submitted by: **Jillur Rahman, Md. Ashiqur Rahman** and **Md. Noruzzaman**. Session: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.



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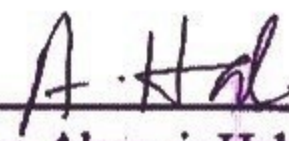

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Abstract

A detailed investigation was carried out to evaluate the effect of sand to total aggregate volume ratio on mechanical properties of stone aggregate concrete. In this study, twelve mixes were made with different sand to total aggregate (s/a) ratio (0.35, 0.40, 0.45, and 0.50) and w/c ratio (0.50, 0.60, and 0.70). Portland composite cement content kept constant 340 kg/m^3. The properties of stone aggregate such as specific gravity, unit weight, and abrasion value were tested. The fresh-state properties were executed by Slump cone test. About 144 cylinder concrete specimens of diameter 4 in and height 8 in were made. Concrete specimens were tested at 3, 7, and 82 days to determine the compressive strength, tensile strength, stress-strain response and Young's modulus of hardened concrete. The result of fresh state revealed that the slump value was highest for s/a=0.40 and slump value increased with the increment of w/c, except when s/a ratio 0.45. For low water-cement ratio, the compressive strength of concrete decreased with the increase of s/a ratio. In contrast, opposite results were observed for high w/c. No pattern was observed in tensile strength and Young's modulus results with the variation of s/a. Stress-strain indicates that all twelve cases follow a parabolic shape which means when the strain is increased, stress also increased.

PRIVATE UNIVERSITY STUDENT'S MODE CHOICE MODELING IN DHAKA CITY

A Thesis Submitted by

MD. JAMIL HASAN KHAN

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CERTIFICATE OF APPROVAL

We thereby recommend that the thesis prepared by Md. Jamil Hasan Khan, Md. Aminul Islam and Al-Amin Hossain entitled Private University Students Mode Choice Modeling in Dhaka City is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Dhaka, the capital city of Bangladesh, is facing tremendous pressure to meet the traffic demand of its inhabitants. In Dhaka among other trips, significant percentages of trips comprise education trips. However, none of the policy addressed the strategies or recommendation to overcome issues of education trip. Most of the Public Universities have students' accommodation facility. However, Private Universities usually not only lack of accommodation facility, most of them do not have any transport facility as well. This paper explores significant factors for private university students' education trip to the University.

A paper pencil based survey has been conducted on Asia Pacific University students' travel pattern from May 2016 to July 2016. As it is centrally located and students from different background are admitted into University of Asia Pacific, this has been chosen as the study location. Due to time restriction data was collected only from 104 randomly selected respondents. Methodological approach taken is exploratory analysis of survey data and multinomial logit choice model calibrated with the survey data.

Exploratory analysis of the survey data showed that modal share of students' university trip are approximately public bus 50%, walk 25%, rickshaw 12%, leguna (i.e., Omni Bus) 6%, car 3% and bicycle 3%. Even though maximum percentages of students travel by bus, survey result showed that about 50% of respondents are not satisfied with the travel by public bus. Unorganized and unsystematic bus services are the main reasons for this. Exploratory analysis also revealed that cost, comfort, time and availability are the main factors for choosing different modes for private university students' education trip. Results from Multinomial Logit model revealed that travel cost, travel time and comfort are the significant factors for private university students to choose different modes. As the sample size is small, comfort and availability factors were merged together for model calibration. Results showed that magnitude of coefficient of attribute comfort is significantly higher compared to travel cost and travel time. Result from this paper can be used by policymakers and Government agencies to provide policies, such as bus rapid transit or student only bus that support more cost effective, and comfortable journey to the University.

Evaluation of Pagla Sewage Treatment Plant and Impact of Different Outfalls on the Water Quality of Buriganga River

A Thesis Submitted By:

SABBIR MAHMUD SAGAR

KAZI ARFINUL HOQUE

and

MD. HASHIBUL AHSAN

In partial fulfillment of the requirements for the degree of

Bachelor of Science in Civil Engineering

Under the supervision of

Dr. Nehreen Majed

Assistant Professor

Department of Civil Engineering

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Dhaka, Bangladesh

Spring 2016

University of Asia Pacific

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Certificate of Approval

We hereby recommend that the thesis prepared by**SABBIR MAHMUD SAGAR, KAZI ARFINUL HOQUE** and **MD. HASHIBUL AHSAN** "Evaluation of PSTP, Buriganga River and Effluent Quality of Some Industries on Buriganga around Pagla" is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

The sewage treatment plant of the Dhaka Metropolitan, known as Pagla Sewage Treatment Plant (PSTP) was designed to treat a maximum flow of 120,000 m3/day of domestic sewage generated from about 18% population of the metropolitan. Against the current daily generation of 13 lakhs cubic meters of sewage, only 40,000 cubic meters can be treated by plant. The final effluent from the treatment plant is discharged into the adjacent Buriganga River.The River Buriganga is one of the most polluted rivers in Bangladesh situated around the capital city Dhaka. The river receives wastewater from numerous sources which are discharged as industrial effluents, municipal sewage, household wastes, clinical wastes and oils. The main objective of this thesis was to evaluate; different phases of Pagla Sewage Treatment Plant (PSTP), quality of Buriganga and the quality of effluent discharged from outfalls on it. PSTP and its corresponding area of Buriganga river were visited. Samples were collected from six different phases and outlet of PSTP. Sampling involved four different locations along the Buriganga river and sixindustrial outfalls including the PSTP outlet. Surface water quality parameters such as pH, color, Turbidity, Salinity, Temperature, Iron, BOD_5, TDS, NH_3, Nitrate, Temperature, TSS, COD, DO, SO_4 and PO_4were analyzed in the laboratory for the collected samples. The efficiency of BOD removal was found unsatisfactory by the treatment plant with effluent BOD being 23% higher than the inlet BOD. Almost 90% of Total Dissolved Solid is being removed by treatment plant. TSS was obtained 18% higher in the outlet than the inlet TSS concentration. Removal of nutrient is quite satisfactory by the plant. Rate of removal is 67%, 50% and 98% for the parameters ammonia, sulphate and phosphate respectively. Concentration of DO, BOD, COD, NH_3 and EC in Buriganga River were found beyond the ranges of surface water quality standards. Corresponding area of Buriganga around the point Between The Rani Steel Re-Rolling Mills Ltd. and PSTP outlet contributed the most in the pollution. The averageDO of the river water was found 52% less than required. The river water has an elevated BOD of more than 10% of the standard value. The study has concluded that the river water quality parameters such as temperature, pH, PO_4,SO_4 are in the range of surface water quality standard. Discharge from outfalls can be considered safe in consideration for the parameters Cl^-, BOD_5, TDS, TSS, NH_3, Temperature, Iron and COD. A framework was made for using the treated water from the sewage treatment plant alternatively instead of discharge into the river.

Study of Point and Non Point Pollution Sources- A Case Study of Gulshan Lake in Dhaka, Bangladesh

This thesis paper is presented to the Department of Civil Engineering, University of Asia Pacific (UAP) in partial fulfillment of the requirements for the degree of B.Sc. in Civil Engineering.

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CERTIFICATE OF APPROVAL

I hereby recommend that the thesis presented by Mohammad Khairul Amin Shamim, Arup Dey Sarker and K.G.M. Alimul Razi entitled as ***Study of Point and Non Point Pollution Sources - A Case Study of Gulshan Lake in Dhaka, Bangladesh*** has been accepted as satisfactory in partial fulfillment for the requirement of the degree of Bachelor of Science in Civil Engineering on 28 November 2016.

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Abstract

Gulshan Lake, most important green spots and one of the largest water bodies in Dhaka city (the capital city of Bangladesh) are on the brink of destruction now. Gulshan Lake is located on 23°48'N and 90°25' E. "Gulshan" a Persian word, that means flower garden but our Gulshan Lake is nothing but a polluted sanitary and washing pool. Water pollution in Gulshan Lake due to human activities is causing serious ecological problems in many ways. Gulshan Lake mainly polluted through point and non-point pollution sources. This study focuses on the detection of pollution sources and categorization of selected major pollution sources of the Lake. A field survey was conducted to fulfill the objectives. GPS device was used during the field survey. Results showed that pollutants coming from overall 163 point sources and nonpoint source, which included 24 major (outlet diameter/ size 20 inch and above) pollution sources. A comprehensive list of pollution sources of Gulshan Lake has been tabulated also. Point (P) and Non-point (NP) pollution sources of Gulshan Lake further classified as Domestic (D), Industrial (I), Commercial (C), Surface runoff drain (SD), Open drain (OD), Hanging latrine (HL), Auto mobile servicing center (AMSC), Nursery runoff (NR). During field survey a questionnaire survey to the local people were also conducted to understand the conditions of pollution sources.

Keywords: Gulshan Lake, Point source pollution, Non Point source pollution

UNSKILLED WORKERS OF BANGLADESH IN CONSTRUCTION SITE

A Thesis is submitted by

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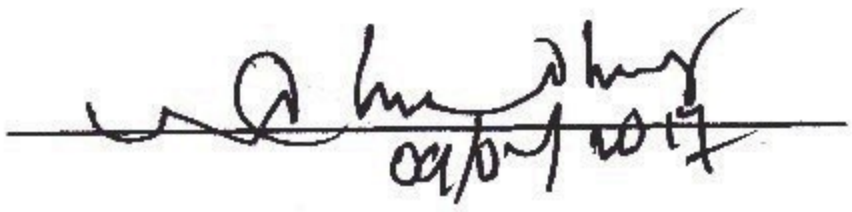
We hereby recommend that the thesis prepared by Fahad Bin Haque, Md.Mizanur Rahman and Md.Aminul Islam entitled "UNSKILLED LABOUR OF BANGLADESH IN CONSTRUCTION SITE" is accepted as fulfilling the part of the requirements for the degree of Bachelor of science in Civil Engineering.

Supervisor



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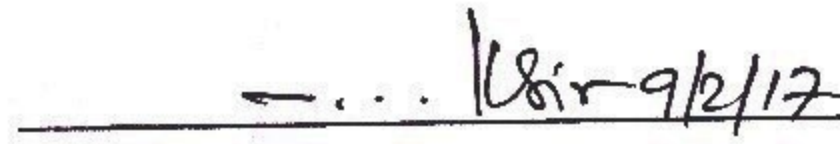

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ABSTRACT

Construction work is very important for civilized nation. Construction industry is one of the stable growing industries worldwide, including Bangladesh. To make easier life and to be civilized, construction industry is highly required to grow and it is also grow day by day. The parameter of it becomes broad day by day. There are many construction sites in Bangladesh (particularly in Dhaka city). A huge number of people work in it. Every day new people join in construction sites as worker. Most of them have no work experience. They don't know what they have to do because they don't get any professional training and knowledge. They only follow the instruction of foreman. These kinds of people are called unskilled worker. In construction site maintaining unskilled workers is a big problem because their accident rates are very high. In this study we show comparison scenario of construction safety worldwide. In our study there are three basic objectives. First of all we find out the percentage (%) of unskilled workers and their previous work experience. Secondly accidents of unskilled workers in construction site. Finally some recommendation for preventing accidents and improving safety of unskilled workers.

A Study to Compare U- loop Traffic System with Conventional Roadway Intersection

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&

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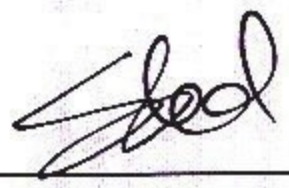
The thesis titled "Comparison of U-Loop System with Conventional Roadway Intersections", Submitted by: Amitav Choudhury, Debashis Jha: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.



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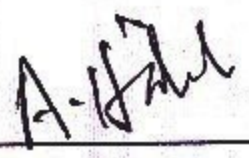

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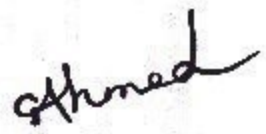

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ABSTRACTS

The present work focuses on comparing U -loop traffic system with conventional roadway intersection. The study location was Kallyanpur – Shyamoly - College gate - Agargaon area in Dhaka city.

Main focus of this research work was to find out the impact of installing u loop system to reduce traffic jam. The study area was chosen as it is considered as one of the busiest routes in the Capital. Not only in the daylight, but at least till 10pm the road remains densely filled up by tons of vehicles. After finishing analysis, authors have observed that installation of U Loop system can reduce traffic congestion to a certain limit. The range is up to15-20%, which cannot be said legendary. Yet this can contribute to some extent. at least as a temporary solution. Authors think that though it might not be the greatest way out of the anomaly, yet this can be the initiation for more updated structures. For example, in the bustling city, elevated U Loop System can provide better results.

In this study, authors have collected peak data and off peak data for better aspectual analysis. The researchers have analyzed their data by 4th generation upgraded *Vissim* software. Researchers have developed two models of roads (after u loop and before u loop) for proper examination every relevant situation.

CALIBRATION AND VALIDATION OF VISSIM MODEL FOR NON - LANE BASED HETEROGENEOUS TRAFFIC - A CASE STUDY IN DHAKA CITY

A Thesis Submitted by

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&

MD. RAKIB HASAN

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I hereby recommend that the thesis presented by Yashin Abdullah Ali, Jonayet Bogdadi & Md. Rakib Hasan entitled '*CALIBRATION AND VALIDATION OF VISSIM MODEL FOR NON - LANE BASED HETEROGENEOUS TRAFFIC - A CASE STUDY IN DHAKA CITY* is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Traffic congestion problem has become a burning question of this era. With a gradual increase in population the need for travel has increased significantly. During the past few decades, the public transport systems in major cities have seen a decrease in passenger ridership while personal automobiles have gradually emerged as the most popular means of transportation. This trend creates overcrowded and overburdened road networks. The transportation system of Dhaka is predominantly road based where non-motorized transportation (mainly rickshaw) has a substantial share. A substantial part of total traffic is non-motorized vehicles which contribute to severe congestion especially in road intersections. Transport planners adopt a variety of strategies to cope with this situation. But nothing proved to be fruitful so far, and very interestingly most of the undertakings have failed to establish an efficient traffic system. Due to inadequate road space motorized vehicles mainly the buses sometimes make congestion by stopping at the main junctions. The objective of this thesis is to calibrate and validate the VISSIM simulation model for a non-lane based heterogeneous traffic condition for Dhaka city. The road network of Dhaka City is non-lane based and all transport modes (motorized and non-motorized) use the same lane. A survey has been conducted on the roads where the traffic volume is high. The locations are suitably taken into six intersections according to the transportation experts. The data collection consists of some strategies which are - Queue length measure, traffic volume counting, detail of bus and Para transit service schedule, signal phase timing & road geometry data.VISSIM model has been simulated based on this real condition to determine the delay time of this real scenario. Results obtained after the simulation run shows the delay time of five major intersections at two peak hours namely morning peak hour (7.00 am-9.00 am) and evening peak hour (3.00 pm-5.00 pm).Shahbagh intersection has the highest delay time during the morning peak hours while the Kawran Bazaar intersection has the highest delay time during the evening peak hours of the day. The different routes where the maximum delay time is obtained can be identified easily based on this model development. New plans to adopt modern transportation methods such as Bus Priority lane can be implemented to minimize congestion after determining the delay time at different sections of these major intersections.

ASSESSMENT OF SERVICE QUALITY OF RIDESHARE IN DHAKA CITY BY STRUCTURAL EQUATION MODELLING APPROACH

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ABSTRACT

This study attempts to investigate the service quality of Rideshare in Dhaka city. In addition, the study is focused to build an optimal structural equation model by using STATA 2014 software for establishment of the best service quality of rideshare along with the different kind of variables. Two causal relationship models are analyzed in this research. For building the models, it needed some endogenous and exogenous variables, which have been taken from stated preference questionnaire survey. 628 Questionnaires drawn from 700 questionnaires are used to develop two (Structural Equation) SE models for Dhaka.

Two models (M1, M2) were developed to reveal the relationship of different variables with the overall rideshare service quality (SQ). The service quality of Rideshare is significantly influenced by many observed manifest variables. Educational qualification and occupation are significant variables for SQ of rideshare of both models that we developed from Structural Equational Modelling. The values of standard coefficient are respectively in model 1 is 0.31 and -0.58 and in model 2 is 0.3 and -0.51. Goodness of fit measures employed for the models are Standardized Root Mean Square Residual, Root Mean Squared Error of Approximation and Comparative Fit Index. The results show that both models are well fitted for the fit indices.

To accomplish the objective of this research some hypothetical results are to be considered which are relating to the actual scenario. The results obtained from the research are also compared between the actual scenario and statically significant variables. After the static analysis of this research the ranking order with significance and non-significance factor from their direct and indirect effect of service quality of rideshare are also expressed. Out of 26 variables, 'Income/Month' is found having the greatest influence on the rideshare service quality.

This research also permits to give some future recommendation regarding to this field according to the result and user's opinions. Acknowledging limited resources of a developing nation, this study gives a clear way ahead to planners, organizations to design an appropriate Ridesharing system concerning the important factors for best service quality.

A SURVEY ON FOOT OVER BRIDGES USERES IN DHAKA CITY

THIS THESIS PAPER IS PRESENTED TO THE DEPARTMENT OF CIVIL ENGINEERING, UNIVERSITY OF ASIA PACIFIC IN PARTIAL FULFILMENT OF THE REQUIRED FOR THE DEGREE OF B.SC IN CIVIL ENGINEERING.

Submitted by

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The thesis titled "A Survey on Foot Over bridge Users' in Dhaka City", Submitted by: Ashfak Amin Khan Mahi, Md Rabbiul Hasan: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Dhaka is the capital city of Bangladesh which is one of the most populated towns in the world. From now and onwards pedestrian in Dhaka city will be a serious headache to the city planners. Among several road user groups; Pedestrians are most vulnerable, on the contrary, they are less prioritized. Pedestrians are the victim of most fatality and casualty occurred in Dhaka city. Like other mega cities, pedestrian volume here is very high and it is very dense—especially in peak hours. Many foot over bridges have already been constructed at different locations in the city to solve pedestrian-vehicle conflict at busy roads. However, number of foot over bridges in Dhaka are negligible comparing to huge pedestrian demand and people are not interested to use FOB. In this study, questioner surveys will be conducted to investigate the reasons behind the less use of FOB. Several issues or key factors will be incorporated in the survey form and people will be allowed to fill up those voluntarily. Results of the survey will be compared to some common attributes of people's reluctance using foot over bridges like inconvenience, unawareness of the risk in crossing the street, poor accessibility, congested foot over bridges, lack of security, time consuming and bad surroundings. Usually these are the common reasons that foot over bridges remain under-served and become ineffective to meet public demand. Zebra crossing is mostly preferable by the pedestrian. But it's not effective in our country due to untrained driver and unconscious pedestrian. By increasing the facilities of fob and make drivers bound to obey the traffic rules the situation can be improved

Effect of Lime in Soil Improvement

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ABSTRACT

Soil improvement is the alteration of any property of a soil to improve its engineering performance. Soil improvement is needed to prevent excessive settlement of reclaimed land when it is used to support foundation and the load. To attain the engineering criteria, the soil properties can be improved by using several soil improvement techniques and thus the shear strength and bearing capacity of the soil are increased. Soil stabilization is one of the soil improvement techniques conducted to attain the desired engineering properties. In this study, the effects of different percentages of lime on Dhaka clay are investigated. In this respect, Atterberg Limit Tests, Standard Proctor Tests and California Bearing Ratio Tests have been carried out. Based on the experimental results, it is found that CBR is significantly increased with the increase in the percentage of lime.

AXIAL STRENGTH ENHANCEMENT OF PLAIN CONCRETE COLUMN USING CARBON FIBER REINFORCEMENT POLYMER (CFRP) WRAPPING

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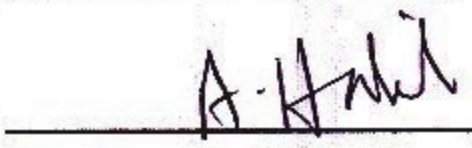
We hereby recommend that the thesis prepared by Tanzina Habib, Rashed Uz Zaman and Md. Siful Islam entitled "Axial Strength Enhancement of Plain Concrete Column Using Carbon Fiber Reinforcement Polymer (CFRP) wrapping", is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.



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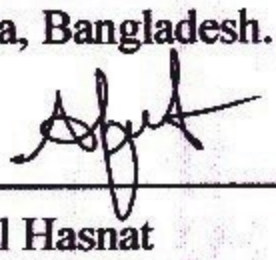

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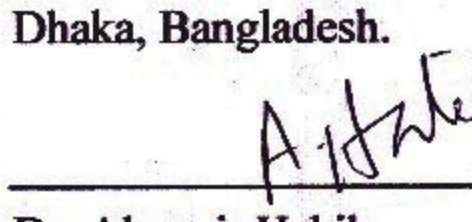

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ABSTRACT

Carbon Fiber Reinforced Polymer (CFRP) has been widely used to improve the load-carrying capacity and ductility of columns for its high strength providing characteristic though it is expensive. CFRP wrapping effect is not same in brick and stone aggregate column and it is not same also in circular and square/rectangular column. This study presents a retrofitting method for concrete column using partially and fully CFRP wrapping and also presents comparisons between circular and square column and between brick and stone aggregate column.

In order to obtain desired objectives the research work proceeds with the casting of 20 columns; 10 circular columns and 10 square columns. 5 circular and 5 square columns are made of brick aggregate concrete and the rest 5 circular and 5 square columns are made of stone aggregate concrete. All the columns are same height 16 inch (406.4 mm); all square columns are 4 inch × 4 inch (101.6 mm × 101.6 mm) cross section and all circular columns are 4 inch (101.6 mm) dia. The specimens are divided in 4 groups; 5 brick square (BS), 5 brick circular (BC), 5 stone square (SS) and 5 stone circular (SC). Corner radius was provided to the square columns. The FRP confinement amount for this research work was 0%, 25%, 50%, 75% and 100% for each group.

Finally the research work was concluded with the testing of columns. All columns were tested under axial compressive test. And then failure mode, crack patterns, CFRP rupture, axial capacity, stress-strain behavior (curve) for different specimen was observed and compared.

The stress-strain curve of circular columns are more perfect parabolic shape than square columns. Increment of axial strength capacity is more effective in stone, roughly 100% for full wrap; for brick it is 50% to 70%. Compressive strength is 20% higher for circular column than square column due to uniform stress distribution. It was observed that 20% lower ultimate capacity for brick due to comparatively more volumetric dilation of brick concrete. For partially wrapped, unconfined concrete failure occurred, not fully CFRP failure. For corner radius provided column failure initiated at corner side because of high stress concentration at corners.

At the very end conclusive remarks and recommendations are carried out for the further research and development.

PERFORMANCE EVALUATION OF TALL BUILDINGS SUBJECTED TO DYNAMIC LOADING

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We hereby recommend that the thesis presented by **MD. KHAIRUL ISLAM, MD. UBAYDUL HOQUE and SULTANA RAHMAN TABASSUM** and entitled ***"PERFORMANCE EVALUATION OF TALL BUILDINGS SUBJECTED TO DYNAMIC LOADING"*** be accepted as fulfilling this part of the requirements for the Degree of Bachelor of Science in Civil Engineering.

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ABSTARCT

Tall buildings present unique challenges in terms of both design and construction. The definition of tall is always a matter for debate and actually is related to the proportions of the building, although the actual physical height does also result in other influences such as extreme lateral loading. The demand for tall buildings are increasing rapidly in our country as well as worldwide. Hence it is essential to understand the behavior of the aforementioned structures i.e., tall buildings. The topic of this work deals with the performance assessment of slender buildings under extreme dynamic loads such as earthquake. To do this end, a 30-storied reinforced concrete building has been selected as a problem to investigate. In a first step, a 3D model was developed and analyses are performed via a finite element software so-called the ETABS 2015 Ultimate. In a second step, the performances of the investigated model were evaluated and the post processing was performed via MATLAB® R2012a. In order to evaluate the performance several analyses were performed such as (i) Static Load Analysis (e.g. dead and live load), both factored and unfactored, namely, WSD and USD respectively, (ii) Modal Analysis, and (iii) Dynamic Load Analysis (e.g. wind and earthquake loads), (iv) Linear Time-History Analysis, were conducted. The design basis was BNBC 2006. In order to evaluate the performance the El Centro 1940 earthquake was employed. The goal is achieved by performing the linear time-history analysis. Additionally, the effect of the boundary conditions such as hinge and fixed are assigned and the response are evaluated. The post-processing of the results obtained from ETABS are done via.

KEYWORDS: Modal Analysis, Dynamic Loads, Linear Time-History Analysis, MATLAB®, Linear Time-History Analysis.

NONLINEAR STATIC AND DYNAMIC ANALYSIS OF DUCTILE ENGINEERED CEMENTITIOUS COMPOSITE

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ABSTRACT

The experimental probation is only to ascertain mechanical properties of polypropylene reinforced composite. The numerical investigations carried out on polyvinyl alcohol reinforced composite member and structural model subjected to moment-curvature relations, static incremental loads and earthquake motions are presented in this paper. A six storeys building models of both conventional concrete and fiber reinforced composite are analyzed to investigate the development of moment-curvature relations, incremental loads and dynamic behavior of the structures using software (ETABS 15).

Nonlinear customized hinge is used in nonlinear static analysis and a modified EI Centro earthquake motion is used in software (ETABS 15) as ground motion for nonlinear dynamic analysis. EI Centro earthquake motion was modified from the original EI Centro earthquake (1940) ground data.

The experiments of polypropylene reinforced composite demonstrate that the stain and deformation capacities are significantly higher than conventional concrete. The software (ETABS 15) result shows that the poly vinyl alcohol reinforced composite models have greater capacity of load, moment and ductility than the conventional structural models. Poly vinyl alcohol reinforced composite models show significant seismic survival performance and capacity than the models of conventional concrete.

Comparison of numerical results between poly vinyl alcohol reinforced composite models and conventional concrete models using software (ETABS 15) show a grate profile of ductility, survival capacity, economy and environment friendliness.

SEISMIC ANALYSIS AND RETROFIT OF FLAT SLABS

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ABSTRACT

Seismic analysis of flat slabs is performed in this thesis work using the El Centro earthquake (1940) ground acceleration to check the performance against punching. Buildings of three different heights (i.e. 4-, 6- and 10-stories) are used in this thesis. Slab thickness and vertical loadings are kept similar for all buildings but the column dimensions are varied for different heights of building. Load combination is followed according to the ACI code 318-14.

Nonlinear time history analysis is performed using ETABS 15, while software SAFE performs the structural design. Each type of model containing only the vertical loads are analyzed to check the demand-capacity ratio for punching shear and the same structures are performed for El Centro ground acceleration.

The same structural models are analyzed using periphery beams and drop panels in interior columns to see their demand-capacity ratio of punching shear. Flat slabs with periphery beams and drop panels results show better seismic resistance capacity and also fulfill the criteria to resist punching shear in flat slabs.

NONLINEAR SEISMIC ANALYSIS OF SOFT-STORIED STRUCTURES BY ZEUS-NL

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ABSTRACT

The thesis contains the non-linear time history analysis result of structural models using the software Zeus-NL, which is available online free of cost. The objective is to compare the behavior of structures without and with soft storey. Two 3-storied structural models and two 6-storied models have been used, one each without soft storey and other with soft storey. Equivalent struts are used in this thesis for representing masonry infills, using the equivalent strut method proposed by Saneinejad & Hobbs (1995). El Centro (1940) earthquake data has been used as ground acceleration data.

The analysis process of Zeus-NL is found to be quite reliable but some necessary elements of a building cannot be added to the software. Overall, it is quite suitable for research purposes but not so suitable for practical use.

The results show that models without soft-storey perform better in terms of shear force and bending moment for both 3-storey and 6-storey models. Moreover, the distributions of inter-storey drift are uniform for models without soft-storey, while the ground floors of the soft-storied models suffer maximum inter-storey drift. So, the distributions of inter-storey drift for soft-storey models are not uniform.

IDENTIFYING THE IMPACTS ON RURAL LIVELIHOOD DUE TO SEASONAL VARIATION OF DAHUK RIVER BASIN AREA IN BANGLADESH

A THESIS SUBMITTED FOR FULFILLING THE PART
OF THE REQUIREMENTS FOR THE DEGREE OF
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

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Certificate of Approval

We hereby recommend that the thesis presented by Shah Abdul Moyeen, Roni Ahammed, and Md. Anamul Karim entitled **"Identifying the impacts on rural livelihood due to seasonal variation of Dahuk river area in Bangladesh"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

This study investigates the impacts of seasonal variation of Dahuk River discharge on rural livelihood of villagers in "Tetulia Upazilla" of Panchagarh district in Bangladesh. For this study, approximately 100 stakeholders are randomly selected in order to identify the impacts on agriculture, fishing, sand mining, tea-harvesting and overall livelihood. As a study mechanism and data collection, well-structured questionnaire, Focus Group Discussion (FGD), Participatory Rural Appraisal (PRA), and Cross Check interviews are utilized. Among the people interviewed, 45% work in agricultural sector, 29% are day-laborer, and 6% people are involved in fishing related business. The rest 20% of the people consists in public service, businessman and students. Approximately, 75% of the people in the study area depend on Dahuk River for their livelihood. The survey results indicate that seasonal discharge variation causes climate change effect on natural, physical and financial resources of the stakeholders. Some of these impacts are: reduction to access to land, crop production, surface water and human capitals; reduction of work days, and increase of health hazards including spread of diseases such as diarrhea, cholera, phlegm, fever and other vector bond disorders. The seasonal variation also impact stakeholder's profession. Many farmers and stone miners change their profession during high discharge season (i.e., monsoon period). The fishermen switch their profession during low discharge season (i.e., non-monsoon period). Though, stakeholder's ability to eliminate seasonal variation of the River is very limited, efforts can be made to reduce these adverse impacts by improving the livelihood of rural people in Dahuk River basin. These include but not limited to, (i) making more investments in agricultural modernization for higher production, (ii) rescue Dahuk River water from pollution, (iii) implement sustainable food production systems and (iv) sustainable use of terrestrial and inland freshwater ecosystems.

COMPARISON OF SEISMIC ASSESSMENT AND RETROFIT BY BNBC AND JAPANESE STANDARD

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We here by recommend that the thesis presented by **ANWAR HOSSAIN MAHID, MD. FARUK ISLAM** and **MD. ABDULLAH AL ARAFAT** entitled **COMPARISON OF SEISMIC ASSESSMENT AND RETROFIT BY BNBC AND JAPANESE STANDARD** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

The main objective of this work is to perform a comparative study on seismic analysis by BNBC 1993 and the proposed BNBC and also seismic evaluation of RC existing building and retrofit using Japanese code. A hypothetical 4-storied building is used in this analysis. Seismic base shear is found to increase in the proposed BNBC compared to the existing BNBC 1993 mainly due to decrease in Response reduction factor.

According to both the first level and 2nd level screening of Japanese code, the building is found to be weak against seismic loading. Capacity of heavily loaded columns are found to be governed by flexure while capacity lightly loaded columns are governed by shear.

Retrofit is done by four methods; i.e. RC Column jacketing, Steel Plate Jacketing, Wing Wall and Steel Frame Bracing. Other than Steel Plate Jacketing, the Strength Indices in both x- and y-directions are found to greater than the Seismic Demand Index upon using all the retrofit schemes. However, there remains some confusion in using the strength equation and incorporating contribution of steel plate.

A CASE STUDY ON GEOTECHNICAL ASSESSMENT FOR OPTIMIZATION OF DEEP FOUDATION CAPACITY

ZISSAN TARIQ

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MD. TOUHIDUL HASAN

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MEHEDI HASAN BAPPI

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DEPARTMENT OF CIVIL ENGINEERING

UNIVERSITY OF ASIA PACIFIC

DHAKA

SPRING 2016

UNIVERSITY OF ASIA PACIFIC

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by **ZISSAN TARIQ, MD. TOUHIDUL HASAN, MEHEDI HASAN BAPPI** and **MD. MOHAIMINUL ISLAM** entitled **"A CASE STUDY ON GEOTECHNICAL ASSESSMENT FOR OPTIMIZATION OF DEEP FOUDATION CAPACITY"** is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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STATISTICAL ANALYSIS OF RECYCLED AGGREGATE CONCRETE

A THESIS SUBMITTED FOR FULFILLING THE PART

OF THE REQUIREMENTS THE DEGREE OF

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

BY

MOHD. MAHBUBUR RAHMAN

DEPARTMENT OF CIVIL ENGINEERING

UNIVERSITY OF ASIA PACIFIC

DHAKA 1000, BANGLADESH

NOVEMBER 2016

UNIVERSITY OF ASIA PACIFIC
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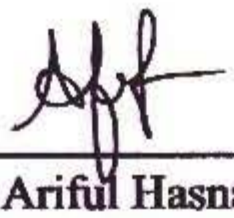
Certificate of Approval

The thesis titled "Statistical analysis of recycled aggregate concrete", Submitted by: MOHD. MAHBUBUR RAHMAN Session: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.



Engr. Ariful Hasnat
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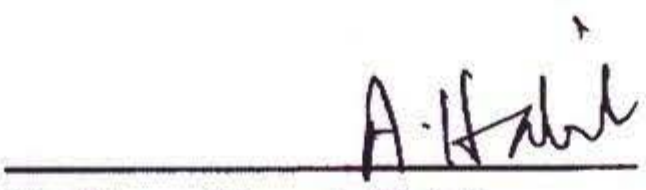

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ABSTRACT

A detailed Statistical Analysis was carried out to evaluate their strength distribution and reliability of using recycled aggregate concrete (RCA). In this research a statistical analysis of the compressive and tensile strength of recycled aggregate concrete is conducted and the data are collected from different journal papers. Different researchers shows different test results with different percentage of recycle aggregate, different size of coarse aggregate, different water cement ratio, different fine and coarse aggregate ratio and a wide range of compressive and tensile strength are found. Here, Statistical analysis and probability theory was used for the purpose of finding the reliability of using recycled aggregate concrete based on these test results.

The coarse fraction of natural stone aggregates was replaced at (0-10) %, (10-25) %, (25-50) %, (50-75) % and 100% with recycled stone aggregate. In this study, mix design are were made with water to cement (w/c) ratio from (0.31-0.70) and Portland combined cement of (280-600) kg/m^3. Different admixtures are also found that is used by the researcher to improve the quality of recycled aggregate concrete. The analysis was done by normality test, K-S test, regression analysis, finding correlation, upper and lower bound of test data, finding coefficient of variance, standard deviation, plotting frequency curve etc. All Concrete specimens data were tested at 28 days to determine the compressive strength, tensile strength, stress-strain response and Young's modulus of hardened concrete.

Analysis results shows that maximum percentage test results are lies within one standard deviation and they lies mostly within a range of 35-45 MPa and the coefficient of variance are quite smaller for the replacement below 50%. The rejection area for normality test are less than 5% which shows strong evidence for using recycled aggregate concrete.

This analysis shows that compressive strength of recycled aggregate prepared below 50% replacement shows quite same results as natural aggregate. They have less variance (10-20) % in their strength distribution

PHYSICAL AND MECHANICAL PROPERTIES OF BRICKS, STONES, AND SANDS COMMONLY USED IN BANGLADESH

SPRING 2016

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Certificate of Approval

The thesis titled "Physical and Mechanical properties of Bricks, stones and sands commonly used in Bangladesh", Submitted by Najmus Sakib and Md. Ashraful Islam. Session: Spring 2016 has been accepted in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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Abstract

A detailed investigation was carried out to evaluate the physical and mechanical properties of different aggregates and bricks used in construction work in Bangladesh. Both fine and coarse aggregate were taken to consider in the research. Raw materials, source and transportation process also been discussed in the paper. Bricks were collected from 8 different sources, stones were collected from 4 different places. Sand was collected from 3 different sources. Physical tests were done with brick, stone and sand. Where mechanical tests were done with only bricks.

Bricks were tested to evaluate various physical properties (T-test, hardness test, soundness test, burnt-uniformity, unit weight and absorption capacity) and mechanical properties (compressive strength). For sand and stones specific gravity, absorption capacity, and unit weight test were conducted. In addition to there several personal interview in source of materials to understand the present scenario of construction materials in Bangladesh.

T-Test results shows that Picket and 1st class in a well figure. Only 10% shows fracture for picket, 30% shows failure for 1st Class and 2nd class shows 100% failure. No rain spot was found in any bricks. 1st Class and Picket bricks are found to be well-burnt. A minor percent shows non-uniform bunt. 2nd and 3rd class shows almost all are non-uniform burnt. Cracked surface was found in picket, no cracks was on 1st, 2nd and 3rd class brick. Average compressive strength was found for brick was near 11000 psi. Picket shows the most strength, average strength was 5000 psi and minimum was 2200 psi. 1st class brick shows value near picket, average value found 4100 psi and minimum strength was 1900 psi. For 2nd class brick Maximum, minimum and average strength were close, average strength was 2100 psi. 3rd class bricks shows all values under 1900 psi. Absorption capacity of bricks shows Picket and 1st class brick absorb a small. Average absorption capacity was almost similar for Picket and 1st class brick, about 15% water absorption. 2nd class brick shows all the value greater than 15%. 3rd class bricks absorption capacity value was similar for maximum, minimum and average.

Maximum unit weight of brick was found near 2300 kg/m^3 for picket. 1st class brick shows maximum value of 2100 kg/m^3 and average unit weight 1800 kg/m^3. Maximum absorption capacity of stone was 0.37%. Others values were almost similar to each other ranging from 0.04 to 0.18. Maximum sp. Gravity of stone was 2.76, others values ranges from 2.45 to 2.71. Maximum unit weight of sand was found 1710 kg/m^3 and minimum was 1445 kg/m^3. Maximum Sp. Gravity of sand was found 2.62, others value was almost near the maximum value. Maximum absorption capacity for sand was found 5% and others values were close to the maximum value.

A Study on Partial Replacement of Fine Aggregate with Stone Dust and Brick Dust in Concrete.

A Thesis

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Registration No.: 12105034

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Spring-2016

Certificate of Approval

We hereby recommend that the thesis prepared by **Md. Zahidul Islam, Pavel Ahmed, Md. Nishan Rahman, & Md. Amirul Islam** Entitled **"Partial Replacement of Fine Aggregate with Stone Dust and Brick Dust in Concrete."** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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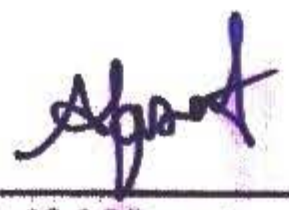
Abstract

This experimental study presents the variation in the strength of concrete when replacing sand by Stone and Brick dust from 0%, 30%, 50% and 70%. The compressive strength of concrete cylinder were taken at the age of 28 days. Main goal of the project is to determine the optimum replacing level for maximum compressive strength. For this study some specific test was required for the materials. They are Sieve Analysis, Unit Weight test, Absorption Capacity test, Specific Gravity test. Mix design Ratio was 1:2:4. There were 16 cylinders which were used for determining the compressive strength. Amount of Fine aggregates were made different intentionally for our experimental purpose. Different cylinder shows different compressive strength from where we can determine the composition of materials for maximum compressive strength. Compressive strength, strain deformation, modulus of elasticity, density are determined for fulfilling our purpose. Here the maximum values of deformation is 80mm which occurred due to 135KN applied on (50% brick Dust). Minimum Deformation 5mm which occurred due to 120KN load applying on cylinder 8(stone dust 50%). Maximum compressive strength is 137KN is found (brick dust 50%) minimum compressive strength is 95KN is found in cylinder 15(no replacement of sand). So here we can decide that brick dust 50%) contains best composition of materials for compressive strength. In case deformation stone dust provides better result.

UNIVERSITY OF ASIA PACIFIC
DEPARTMENT OF CIVIL ENGINEERING

Certificate of Approval

The thesis titled "Effect of Sand to Total Aggregate ratio on Mechanical Properties of Stone Aggregate Concrete", Submitted by: **Jillur Rahman, Md. Ashiqur Rahman** and **Md. Noruzzaman**. Session: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.



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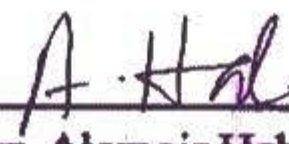

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Abstract

A detailed investigation was carried out to evaluate the effect of sand to total aggregate volume ratio on mechanical properties of stone aggregate concrete. In this study, twelve mixes were made with different sand to total aggregate (s/a) ratio (0.35, 0.40, 0.45, and 0.50) and w/c ratio (0.50, 0.60, and 0.70). Portland composite cement content kept constant 340 kg/m^3. The properties of stone aggregate such as specific gravity, unit weight, and abrasion value were tested. The fresh-state properties were executed by Slump cone test. About 144 cylinder concrete specimens of diameter 4 in and height 8 in were made. Concrete specimens were tested at 3, 7, and 82 days to determine the compressive strength, tensile strength, stress-strain response and Young's modulus of hardened concrete. The result of fresh state revealed that the slump value was highest for s/a=0.40 and slump value increased with the increment of w/c, except when s/a ratio 0.45. For low water-cement ratio, the compressive strength of concrete decreased with the increase of s/a ratio. In contrast, opposite results were observed for high w/c. No pattern was observed in tensile strength and Young's modulus results with the variation of s/a. Stress-strain indicates that all twelve cases follow a parabolic shape which means when the strain is increased, stress also increased.

PRIVATE UNIVERSITY STUDENT'S MODE CHOICE MODELING IN DHAKA CITY

A Thesis Submitted by

MD. JAMIL HASAN KHAN

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MD. AMINUL ISLAM

12205031

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12205028

CERTIFICATE OF APPROVAL

We thereby recommend that the thesis prepared by Md. Jamil Hasan Khan, Md. Aminul Islam and Al-Amin Hossain entitled Private University Students Mode Choice Modeling in Dhaka City is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Dr. Muhammad Mizanur Rahman
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ABSTRACT

Dhaka, the capital city of Bangladesh, is facing tremendous pressure to meet the traffic demand of its inhabitants. In Dhaka among other trips, significant percentages of trips comprise education trips. However, none of the policy addressed the strategies or recommendation to overcome issues of education trip. Most of the Public Universities have students' accommodation facility. However, Private Universities usually not only lack of accommodation facility, most of them do not have any transport facility as well. This paper explores significant factors for private university students' education trip to the University.

A paper pencil based survey has been conducted on Asia Pacific University students' travel pattern from May 2016 to July 2016. As it is centrally located and students from different background are admitted into University of Asia Pacific, this has been chosen as the study location. Due to time restriction data was collected only from 104 randomly selected respondents. Methodological approach taken is exploratory analysis of survey data and multinomial logit choice model calibrated with the survey data.

Exploratory analysis of the survey data showed that modal share of students' university trip are approximately public bus 50%, walk 25%, rickshaw 12%, leguna (i.e., Omni Bus) 6%, car 3% and bicycle 3%. Even though maximum percentages of students travel by bus, survey result showed that about 50% of respondents are not satisfied with the travel by public bus. Unorganized and unsystematic bus services are the main reasons for this. Exploratory analysis also revealed that cost, comfort, time and availability are the main factors for choosing different modes for private university students' education trip. Results from Multinomial Logit model revealed that travel cost, travel time and comfort are the significant factors for private university students to choose different modes. As the sample size is small, comfort and availability factors were merged together for model calibration. Results showed that magnitude of coefficient of attribute comfort is significantly higher compared to travel cost and travel time. Result from this paper can be used by policymakers and Government agencies to provide policies, such as bus rapid transit or student only bus that support more cost effective, and comfortable journey to the University.

Evaluation of Pagla Sewage Treatment Plant and Impact of Different Outfalls on the Water Quality of Buriganga River

A Thesis Submitted By:

SABBIR MAHMUD SAGAR

KAZI ARFINUL HOQUE

and

MD. HASHIBUL AHSAN

In partial fulfillment of the requirements for the degree of

Bachelor of Science in Civil Engineering

Under the supervision of

Dr. Nehreen Majed

Assistant Professor

Department of Civil Engineering

University of Asia Pacific

Dhaka, Bangladesh

Spring 2016

University of Asia Pacific

Department of Civil Engineering

Certificate of Approval

We hereby recommend that the thesis prepared by**SABBIR MAHMUD SAGAR, KAZI ARFINUL HOQUE** and **MD. HASHIBUL AHSAN** "Evaluation of PSTP, Buriganga River and Effluent Quality of Some Industries on Buriganga around Pagla" is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Dr. AlamgirHabib

Professor and Head

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ABSTRACT

The sewage treatment plant of the Dhaka Metropolitan, known as Pagla Sewage Treatment Plant (PSTP) was designed to treat a maximum flow of 120,000 m3/day of domestic sewage generated from about 18% population of the metropolitan. Against the current daily generation of 13 lakhs cubic meters of sewage, only 40,000 cubic meters can be treated by plant. The final effluent from the treatment plant is discharged into the adjacent Buriganga River.The River Buriganga is one of the most polluted rivers in Bangladesh situated around the capital city Dhaka. The river receives wastewater from numerous sources which are discharged as industrial effluents, municipal sewage, household wastes, clinical wastes and oils. The main objective of this thesis was to evaluate; different phases of Pagla Sewage Treatment Plant (PSTP), quality of Buriganga and the quality of effluent discharged from outfalls on it. PSTP and its corresponding area of Buriganga river were visited. Samples were collected from six different phases and outlet of PSTP. Sampling involved four different locations along the Buriganga river and sixindustrial outfalls including the PSTP outlet. Surface water quality parameters such as pH, color, Turbidity, Salinity, Temperature, Iron, BOD_5, TDS, NH_3, Nitrate, Temperature, TSS, COD, DO, SO_4 and PO_4were analyzed in the laboratory for the collected samples. The efficiency of BOD removal was found unsatisfactory by the treatment plant with effluent BOD being 23% higher than the inlet BOD. Almost 90% of Total Dissolved Solid is being removed by treatment plant. TSS was obtained 18% higher in the outlet than the inlet TSS concentration. Removal of nutrient is quite satisfactory by the plant. Rate of removal is 67%, 50% and 98% for the parameters ammonia, sulphate and phosphate respectively. Concentration of DO, BOD, COD, NH_3 and EC in Buriganga River were found beyond the ranges of surface water quality standards. Corresponding area of Buriganga around the point Between The Rani Steel Re-Rolling Mills Ltd. and PSTP outlet contributed the most in the pollution. The averageDO of the river water was found 52% less than required. The river water has an elevated BOD of more than 10% of the standard value. The study has concluded that the river water quality parameters such as temperature, pH, PO_4,SO_4 are in the range of surface water quality standard. Discharge from outfalls can be considered safe in consideration for the parameters Cl^-, BOD_5, TDS, TSS, NH_3, Temperature, Iron and COD. A framework was made for using the treated water from the sewage treatment plant alternatively instead of discharge into the river.

Study of Point and Non Point Pollution Sources- A Case Study of Gulshan Lake in Dhaka, Bangladesh

This thesis paper is presented to the Department of Civil Engineering, University of Asia Pacific (UAP) in partial fulfillment of the requirements for the degree of B.Sc. in Civil Engineering.

Submitted by:

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CERTIFICATE OF APPROVAL

I hereby recommend that the thesis presented by Mohammad Khairul Amin Shamim, Arup Dey Sarker and K.G.M. Alimul Razi entitled as ***Study of Point and Non Point Pollution Sources - A Case Study of Gulshan Lake in Dhaka, Bangladesh*** has been accepted as satisfactory in partial fulfillment for the requirement of the degree of Bachelor of Science in Civil Engineering on 28 November 2016.

BOARD OF EXAMINERS

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Abstract

Gulshan Lake, most important green spots and one of the largest water bodies in Dhaka city (the capital city of Bangladesh) are on the brink of destruction now. Gulshan Lake is located on 23°48'N and 90°25' E. "Gulshan" a Persian word, that means flower garden but our Gulshan Lake is nothing but a polluted sanitary and washing pool. Water pollution in Gulshan Lake due to human activities is causing serious ecological problems in many ways. Gulshan Lake mainly polluted through point and non-point pollution sources. This study focuses on the detection of pollution sources and categorization of selected major pollution sources of the Lake. A field survey was conducted to fulfill the objectives. GPS device was used during the field survey. Results showed that pollutants coming from overall 163 point sources and nonpoint source, which included 24 major (outlet diameter/ size 20 inch and above) pollution sources. A comprehensive list of pollution sources of Gulshan Lake has been tabulated also. Point (P) and Non-point (NP) pollution sources of Gulshan Lake further classified as Domestic (D), Industrial (I), Commercial (C), Surface runoff drain (SD), Open drain (OD), Hanging latrine (HL), Auto mobile servicing center (AMSC), Nursery runoff (NR). During field survey a questionnaire survey to the local people were also conducted to understand the conditions of pollution sources.

Keywords: Gulshan Lake, Point source pollution, Non Point source pollution

UNSKILLED WORKERS OF BANGLADESH IN CONSTRUCTION SITE

A Thesis is submitted by

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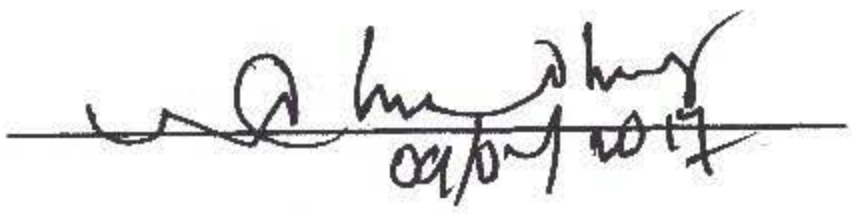
SPRING 2016

We hereby recommend that the thesis prepared by Fahad Bin Haque, Md.Mizanur Rahman and Md.Aminul Islam entitled "UNSKILLED LABOUR OF BANGLADESH IN CONSTRUCTION SITE" is accepted as fulfilling the part of the requirements for the degree of Bachelor of science in Civil Engineering.

Supervisor



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ABSTRACT

Construction work is very important for civilized nation. Construction industry is one of the stable growing industries worldwide, including Bangladesh. To make easier life and to be civilized, construction industry is highly required to grow and it is also grow day by day. The parameter of it becomes broad day by day. There are many construction sites in Bangladesh (particularly in Dhaka city). A huge number of people work in it. Every day new people join in construction sites as worker. Most of them have no work experience. They don't know what they have to do because they don't get any professional training and knowledge. They only follow the instruction of foreman. These kinds of people are called unskilled worker. In construction site maintaining unskilled workers is a big problem because their accident rates are very high. In this study we show comparison scenario of construction safety worldwide. In our study there are three basic objectives. First of all we find out the percentage (%) of unskilled workers and their previous work experience. Secondly accidents of unskilled workers in construction site. Finally some recommendation for preventing accidents and improving safety of unskilled workers.

A Study to Compare U- loop Traffic System with Conventional Roadway Intersection

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&

DEBASHIS JHA

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DEPARTMENT OF CIVIL ENGINEERING

Certificate of Approval

The thesis titled "Comparison of U-Loop System with Conventional Roadway Intersections", Submitted by: Amitav Choudhury, Debashis Jha: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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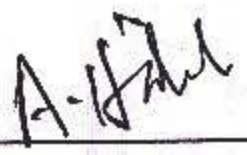

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ABSTRACTS

The present work focuses on comparing U -loop traffic system with conventional roadway intersection. The study location was Kallyanpur – Shyamoly - College gate - Agargaon area in Dhaka city.

Main focus of this research work was to find out the impact of installing u loop system to reduce traffic jam. The study area was chosen as it is considered as one of the busiest routes in the Capital. Not only in the daylight, but at least till 10pm the road remains densely filled up by tons of vehicles. After finishing analysis, authors have observed that installation of U Loop system can reduce traffic congestion to a certain limit. The range is up to15-20%, which cannot be said legendary. Yet this can contribute to some extent. at least as a temporary solution. Authors think that though it might not be the greatest way out of the anomaly, yet this can be the initiation for more updated structures. For example, in the bustling city, elevated U Loop System can provide better results.

In this study, authors have collected peak data and off peak data for better aspectual analysis. The researchers have analyzed their data by 4th generation upgraded *Vissim* software. Researchers have developed two models of roads (after u loop and before u loop) for proper examination every relevant situation.

CALIBRATION AND VALIDATION OF VISSIM MODEL FOR NON - LANE BASED HETEROGENEOUS TRAFFIC - A CASE STUDY IN DHAKA CITY

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I hereby recommend that the thesis presented by Yashin Abdullah Ali, Jonayet Bogdadi & Md. Rakib Hasan entitled '*CALIBRATION AND VALIDATION OF VISSIM MODEL FOR NON - LANE BASED HETEROGENEOUS TRAFFIC - A CASE STUDY IN DHAKA CITY* is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Traffic congestion problem has become a burning question of this era. With a gradual increase in population the need for travel has increased significantly. During the past few decades, the public transport systems in major cities have seen a decrease in passenger ridership while personal automobiles have gradually emerged as the most popular means of transportation. This trend creates overcrowded and overburdened road networks. The transportation system of Dhaka is predominantly road based where non-motorized transportation (mainly rickshaw) has a substantial share. A substantial part of total traffic is non-motorized vehicles which contribute to severe congestion especially in road intersections. Transport planners adopt a variety of strategies to cope with this situation. But nothing proved to be fruitful so far, and very interestingly most of the undertakings have failed to establish an efficient traffic system. Due to inadequate road space motorized vehicles mainly the buses sometimes make congestion by stopping at the main junctions. The objective of this thesis is to calibrate and validate the VISSIM simulation model for a non-lane based heterogeneous traffic condition for Dhaka city. The road network of Dhaka City is non-lane based and all transport modes (motorized and non-motorized) use the same lane. A survey has been conducted on the roads where the traffic volume is high. The locations are suitably taken into six intersections according to the transportation experts. The data collection consists of some strategies which are - Queue length measure, traffic volume counting, detail of bus and Para transit service schedule, signal phase timing & road geometry data.VISSIM model has been simulated based on this real condition to determine the delay time of this real scenario. Results obtained after the simulation run shows the delay time of five major intersections at two peak hours namely morning peak hour (7.00 am-9.00 am) and evening peak hour (3.00 pm-5.00 pm).Shahbagh intersection has the highest delay time during the morning peak hours while the Kawran Bazaar intersection has the highest delay time during the evening peak hours of the day. The different routes where the maximum delay time is obtained can be identified easily based on this model development. New plans to adopt modern transportation methods such as Bus Priority lane can be implemented to minimize congestion after determining the delay time at different sections of these major intersections.

ASSESSMENT OF SERVICE QUALITY OF RIDESHARE IN DHAKA CITY BY STRUCTURAL EQUATION MODELLING APPROACH

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I hereby recommend that the thesis presented by MD. AL-AMIN, ABDULLAH AL FAHAD & SAJID TARIQ entitled '*ASSESSMENT OF SERVICE QUALITY OF RIDESHARE IN DHAKA CITY BY STRUCTURAL EQUATION MODELLING APPROACH' is* accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

This study attempts to investigate the service quality of Rideshare in Dhaka city. In addition, the study is focused to build an optimal structural equation model by using STATA 2014 software for establishment of the best service quality of rideshare along with the different kind of variables. Two causal relationship models are analyzed in this research. For building the models, it needed some endogenous and exogenous variables, which have been taken from stated preference questionnaire survey. 628 Questionnaires drawn from 700 questionnaires are used to develop two (Structural Equation) SE models for Dhaka.

Two models (M1, M2) were developed to reveal the relationship of different variables with the overall rideshare service quality (SQ). The service quality of Rideshare is significantly influenced by many observed manifest variables. Educational qualification and occupation are significant variables for SQ of rideshare of both models that we developed from Structural Equational Modelling. The values of standard coefficient are respectively in model 1 is 0.31 and -0.58 and in model 2 is 0.3 and -0.51. Goodness of fit measures employed for the models are Standardized Root Mean Square Residual, Root Mean Squared Error of Approximation and Comparative Fit Index. The results show that both models are well fitted for the fit indices.

To accomplish the objective of this research some hypothetical results are to be considered which are relating to the actual scenario. The results obtained from the research are also compared between the actual scenario and statically significant variables. After the static analysis of this research the ranking order with significance and non-significance factor from their direct and indirect effect of service quality of rideshare are also expressed. Out of 26 variables, 'Income/Month' is found having the greatest influence on the rideshare service quality.

This research also permits to give some future recommendation regarding to this field according to the result and user's opinions. Acknowledging limited resources of a developing nation, this study gives a clear way ahead to planners, organizations to design an appropriate Ridesharing system concerning the important factors for best service quality.

A SURVEY ON FOOT OVER BRIDGES USERES IN DHAKA CITY

THIS THESIS PAPER IS PRESENTED TO THE DEPARTMENT OF CIVIL ENGINEERING, UNIVERSITY OF ASIA PACIFIC IN PARTIAL FULFILMENT OF THE REQUIRED FOR THE DEGREE OF B.SC IN CIVIL ENGINEERING.

Submitted by

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Certificate of Approval

The thesis titled "A Survey on Foot Over bridge Users' in Dhaka City", Submitted by: Ashfak Amin Khan Mahi, Md Rabbiul Hasan: Spring 2016 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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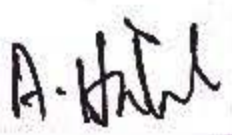

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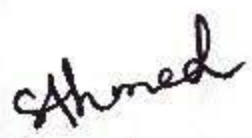

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ABSTRACT

Dhaka is the capital city of Bangladesh which is one of the most populated towns in the world. From now and onwards pedestrian in Dhaka city will be a serious headache to the city planners. Among several road user groups; Pedestrians are most vulnerable, on the contrary, they are less prioritized. Pedestrians are the victim of most fatality and casualty occurred in Dhaka city. Like other mega cities, pedestrian volume here is very high and it is very dense—especially in peak hours. Many foot over bridges have already been constructed at different locations in the city to solve pedestrian-vehicle conflict at busy roads. However, number of foot over bridges in Dhaka are negligible comparing to huge pedestrian demand and people are not interested to use FOB. In this study, questioner surveys will be conducted to investigate the reasons behind the less use of FOB. Several issues or key factors will be incorporated in the survey form and people will be allowed to fill up those voluntarily. Results of the survey will be compared to some common attributes of people's reluctance using foot over bridges like inconvenience, unawareness of the risk in crossing the street, poor accessibility, congested foot over bridges, lack of security, time consuming and bad surroundings. Usually these are the common reasons that foot over bridges remain under-served and become ineffective to meet public demand. Zebra crossing is mostly preferable by the pedestrian. But it's not effective in our country due to untrained driver and unconscious pedestrian. By increasing the facilities of fob and make drivers bound to obey the traffic rules the situation can be improved

Effect of Lime in Soil Improvement

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We thereby recommend that the thesis prepared by **Md. Razaul Islam Masum, Tamim Hossain, Nobel Datta** and entitled "**Effect of Lime in Soil Improvement**" is accepted as full filling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Soil improvement is the alteration of any property of a soil to improve its engineering performance. Soil improvement is needed to prevent excessive settlement of reclaimed land when it is used to support foundation and the load. To attain the engineering criteria, the soil properties can be improved by using several soil improvement techniques and thus the shear strength and bearing capacity of the soil are increased. Soil stabilization is one of the soil improvement techniques conducted to attain the desired engineering properties. In this study, the effects of different percentages of lime on Dhaka clay are investigated. In this respect, Atterberg Limit Tests, Standard Proctor Tests and California Bearing Ratio Tests have been carried out. Based on the experimental results, it is found that CBR is significantly increased with the increase in the percentage of lime.

AXIAL STRENGTH ENHANCEMENT OF PLAIN CONCRETE COLUMN USING CARBON FIBER REINFORCEMENT POLYMER (CFRP) WRAPPING

SPRING 2016

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We hereby recommend that the thesis prepared by Tanzina Habib, Rashed Uz Zaman and Md. Siful Islam entitled "Axial Strength Enhancement of Plain Concrete Column Using Carbon Fiber Reinforcement Polymer (CFRP) wrapping", is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Carbon Fiber Reinforced Polymer (CFRP) has been widely used to improve the load-carrying capacity and ductility of columns for its high strength providing characteristic though it is expensive. CFRP wrapping effect is not same in brick and stone aggregate column and it is not same also in circular and square/rectangular column. This study presents a retrofitting method for concrete column using partially and fully CFRP wrapping and also presents comparisons between circular and square column and between brick and stone aggregate column.

In order to obtain desired objectives the research work proceeds with the casting of 20 columns; 10 circular columns and 10 square columns. 5 circular and 5 square columns are made of brick aggregate concrete and the rest 5 circular and 5 square columns are made of stone aggregate concrete. All the columns are same height 16 inch (406.4 mm); all square columns are 4 inch × 4 inch (101.6 mm × 101.6 mm) cross section and all circular columns are 4 inch (101.6 mm) dia. The specimens are divided in 4 groups; 5 brick square (BS), 5 brick circular (BC), 5 stone square (SS) and 5 stone circular (SC). Corner radius was provided to the square columns. The FRP confinement amount for this research work was 0%, 25%, 50%, 75% and 100% for each group.

Finally the research work was concluded with the testing of columns. All columns were tested under axial compressive test. And then failure mode, crack patterns, CFRP rupture, axial capacity, stress-strain behavior (curve) for different specimen was observed and compared.

The stress-strain curve of circular columns are more perfect parabolic shape than square columns. Increment of axial strength capacity is more effective in stone, roughly 100% for full wrap; for brick it is 50% to 70%. Compressive strength is 20% higher for circular column than square column due to uniform stress distribution. It was observed that 20% lower ultimate capacity for brick due to comparatively more volumetric dilation of brick concrete. For partially wrapped, unconfined concrete failure occurred, not fully CFRP failure. For corner radius provided column failure initiated at corner side because of high stress concentration at corners.

At the very end conclusive remarks and recommendations are carried out for the further research and development.

PERFORMANCE EVALUATION OF TALL BUILDINGS SUBJECTED TO DYNAMIC LOADING

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We hereby recommend that the thesis presented by **MD. KHAIRUL ISLAM, MD. UBAYDUL HOQUE and SULTANA RAHMAN TABASSUM** and entitled ***"PERFORMANCE EVALUATION OF TALL BUILDINGS SUBJECTED TO DYNAMIC LOADING"*** be accepted as fulfilling this part of the requirements for the Degree of Bachelor of Science in Civil Engineering.

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ABSTARCT

Tall buildings present unique challenges in terms of both design and construction. The definition of tall is always a matter for debate and actually is related to the proportions of the building, although the actual physical height does also result in other influences such as extreme lateral loading. The demand for tall buildings are increasing rapidly in our country as well as worldwide. Hence it is essential to understand the behavior of the aforementioned structures i.e., tall buildings. The topic of this work deals with the performance assessment of slender buildings under extreme dynamic loads such as earthquake. To do this end, a 30-storied reinforced concrete building has been selected as a problem to investigate. In a first step, a 3D model was developed and analyses are performed via a finite element software so-called the ETABS 2015 Ultimate. In a second step, the performances of the investigated model were evaluated and the post processing was performed via MATLAB® R2012a. In order to evaluate the performance several analyses were performed such as (i) Static Load Analysis (e.g. dead and live load), both factored and unfactored, namely, WSD and USD respectively, (ii) Modal Analysis, and (iii) Dynamic Load Analysis (e.g. wind and earthquake loads), (iv) Linear Time-History Analysis, were conducted. The design basis was BNBC 2006. In order to evaluate the performance the El Centro 1940 earthquake was employed. The goal is achieved by performing the linear time-history analysis. Additionally, the effect of the boundary conditions such as hinge and fixed are assigned and the response are evaluated. The post-processing of the results obtained from ETABS are done via.

KEYWORDS: Modal Analysis, Dynamic Loads, Linear Time-History Analysis, MATLAB®, Linear Time-History Analysis.

NONLINEAR STATIC AND DYNAMIC ANALYSIS OF DUCTILE ENGINEERED CEMENTITIOUS COMPOSITE

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In partial fulfillment of the requirements for the degree of
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ABSTRACT

The experimental probation is only to ascertain mechanical properties of polypropylene reinforced composite. The numerical investigations carried out on polyvinyl alcohol reinforced composite member and structural model subjected to moment-curvature relations, static incremental loads and earthquake motions are presented in this paper. A six storeys building models of both conventional concrete and fiber reinforced composite are analyzed to investigate the development of moment-curvature relations, incremental loads and dynamic behavior of the structures using software (ETABS 15).

Nonlinear customized hinge is used in nonlinear static analysis and a modified EI Centro earthquake motion is used in software (ETABS 15) as ground motion for nonlinear dynamic analysis. EI Centro *earthquake motion was modified from the original EI Centro earthquake (1940) ground data.*

The experiments of polypropylene reinforced composite demonstrate that the stain and deformation capacities are significantly higher than conventional concrete. The software (ETABS 15) result shows that the poly vinyl alcohol reinforced composite models have greater capacity of load, moment and ductility than the conventional structural models. Poly vinyl alcohol reinforced composite models show significant seismic survival performance and capacity than the models of conventional concrete.

Comparison of numerical results between poly vinyl alcohol reinforced composite models and conventional concrete models using software (ETABS 15) show a grate profile of ductility, survival *capacity, economy and environment friendliness.*

SEISMIC ANALYSIS AND RETROFIT OF FLAT SLABS

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We hereby recommend that the thesis presented by **ABDULLAH AL MAMUN** and **MD. ABDUL AZIM** entitled **SEISMIC ANALYSIS AND RETROFIT OF FLAT SLABS** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Seismic analysis of flat slabs is performed in this thesis work using the El Centro earthquake (1940) ground acceleration to check the performance against punching. Buildings of three different heights (i.e. 4-, 6- and 10-stories) are used in this thesis. Slab thickness and vertical loadings are kept similar for all buildings but the column dimensions are varied for different heights of building. Load combination is followed according to the ACI code 318-14.

Nonlinear time history analysis is performed using ETABS 15, while software SAFE performs the structural design. Each type of model containing only the vertical loads are analyzed to check the demand-capacity ratio for punching shear and the same structures are performed for El Centro ground acceleration.

The same structural models are analyzed using periphery beams and drop panels in interior columns to see their demand-capacity ratio of punching shear. Flat slabs with periphery beams and drop panels results show better seismic resistance capacity and also fulfill the criteria to resist punching shear in flat slabs.

NONLINEAR SEISMIC ANALYSIS OF SOFT-STORIED STRUCTURES BY ZEUS-NL

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We hereby recommend that the thesis presented by **ANIT HASAN MOLLA** and **FOZLY RABBI** entitled **NONLINEAR SEISMIC ANALYSIS OF SOFT-STORIED STRUCTURES BY ZEUS-NL** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

The thesis contains the non-linear time history analysis result of structural models using the software Zeus-NL, which is available online free of cost. The objective is to compare the behavior of structures without and with soft storey. Two 3-storied structural models and two 6-storied models have been used, one each without soft storey and other with soft storey. Equivalent struts are used in this thesis for representing masonry infills, using the equivalent strut method proposed by Saneinejad & Hobbs (1995). El Centro (1940) earthquake data has been used as ground acceleration data.

The analysis process of Zeus-NL is found to be quite reliable but some necessary elements of a building cannot be added to the software. Overall, it is quite suitable for research purposes but not so suitable for practical use.

The results show that models without soft-storey perform better in terms of shear force and bending moment for both 3-storey and 6-storey models. Moreover, the distributions of inter-storey drift are uniform for models without soft-storey, while the ground floors of the soft-storied models suffer maximum inter-storey drift. So, the distributions of inter-storey drift for soft-storey models are not uniform.

IDENTIFYING THE IMPACTS ON RURAL LIVELIHOOD DUE TO SEASONAL VARIATION OF DAHUK RIVER BASIN AREA IN BANGLADESH

A THESIS SUBMITTED FOR FULFILLING THE PART
OF THE REQUIREMENTS FOR THE DEGREE OF
BACHELOR OF SCIENCE IN CIVIL ENGINEERING

BY

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NOVEMBER 2016

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Certificate of Approval

We hereby recommend that the thesis presented by Shah Abdul Moyeen, Roni Ahammed, and Md. Anamul Karim entitled **"Identifying the impacts on rural livelihood due to seasonal variation of Dahuk river area in Bangladesh"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

20.11.2016

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ABSTRACT

This study investigates the impacts of seasonal variation of Dahuk River discharge on rural livelihood of villagers in "Tetulia Upazilla" of Panchagarh district in Bangladesh. For this study, approximately 100 stakeholders are randomly selected in order to identify the impacts on agriculture, fishing, sand mining, tea-harvesting and overall livelihood. As a study mechanism and data collection, well-structured questionnaire, Focus Group Discussion (FGD), Participatory Rural Appraisal (PRA), and Cross Check interviews are utilized. Among the people interviewed, 45% work in agricultural sector, 29% are day-laborer, and 6% people are involved in fishing related business. The rest 20% of the people consists in public service, businessman and students. Approximately, 75% of the people in the study area depend on Dahuk River for their livelihood. The survey results indicate that seasonal discharge variation causes climate change effect on natural, physical and financial resources of the stakeholders. Some of these impacts are: reduction to access to land, crop production, surface water and human capitals; reduction of work days, and increase of health hazards including spread of diseases such as diarrhea, cholera, phlegm, fever and other vector bond disorders. The seasonal variation also impact stakeholder's profession. Many farmers and stone miners change their profession during high discharge season (i.e., monsoon period). The fishermen switch their profession during low discharge season (i.e., non-monsoon period). Though, stakeholder's ability to eliminate seasonal variation of the River is very limited, efforts can be made to reduce these adverse impacts by improving the livelihood of rural people in Dahuk River basin. These include but not limited to, (i) making more investments in agricultural modernization for higher production, (ii) rescue Dahuk River water from pollution, (iii) implement sustainable food production systems and (iv) sustainable use of terrestrial and inland freshwater ecosystems.

COMPARISON OF SEISMIC ASSESSMENT AND RETROFIT BY BNBC AND JAPANESE STANDARD

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We here by recommend that the thesis presented by **ANWAR HOSSAIN MAHID, MD. FARUK ISLAM** and **MD. ABDULLAH AL ARAFAT** entitled **COMPARISON OF SEISMIC ASSESSMENT AND RETROFIT BY BNBC AND JAPANESE STANDARD** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

The main objective of this work is to perform a comparative study on seismic analysis by BNBC 1993 and the proposed BNBC and also seismic evaluation of RC existing building and retrofit using Japanese code. A hypothetical 4-storied building is used in this analysis. Seismic base shear is found to increase in the proposed BNBC compared to the existing BNBC 1993 mainly due to decrease in Response reduction factor.

According to both the first level and 2nd level screening of Japanese code, the building is found to be weak against seismic loading. Capacity of heavily loaded columns are found to be governed by flexure while capacity lightly loaded columns are governed by shear.

Retrofit is done by four methods; i.e. RC Column jacketing, Steel Plate Jacketing, Wing Wall and Steel Frame Bracing. Other than Steel Plate Jacketing, the Strength Indices in both x- and y-directions are found to greater than the Seismic Demand Index upon using all the retrofit schemes. However, there remains some confusion in using the strength equation and incorporating contribution of steel plate.