100 Years Exposure Test on Carbonation of Concrete in Bangladesh

SPRING 2014

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We hereby recommend that the thesis prepared by **Nirupam Deb, Taj Muhammad Tanmoy, Sanjida Khanam, Mohiuddin Mohammed Towsif, Md. Ismail Hossain Siddiqui, Md. Abid Azad, and Fazle Rabbi** entitled **"100 years exposure test on carbonation of Concrete 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

The rate of carbon emission is increasing around the world day by day due to the Industrialization. Like many other mega city, amount of carbon emission in Dhaka city is increasing day by day as a result concrete carbonation become a major concern for the construction industries. Carbonation is a process by which concrete absorb CO_2 from atmosphere and affecting long term durability of concrete. A high carbonation rate is expected for concrete structures in Dhaka city that leads to corrosion over the steel bars in a short period of service life and subsequently results in early deterioration of structures. Corrosion is a major concern for durability of reinforced concrete structures in Bangladesh. A very few study is done to determine and understand the standard carbonation depth and process of concrete in our country. In this report 100 years exposure test on concrete carbonation the value of concrete carbonation depth using different variable and parameter is determined. in this report different parameter use e.g. Testing Age (Years), Cement Type, W/C Ratio, Fine Aggregate, Combined Sand (FM 2.4), Some Special Cases (Recycled Fine Aggregate, Stone Dust), FA/C Ratio, Exposure Location. From different exposure condition different result has been found and comparative study is done to evaluate the carbonation process and depth for different exposure condition.

Keywords:

Carbonation, Corrosion, Compressive Strength, Long term exposure, Mortar

CONSTRUCTION SAFETY CULTURE IN BANGLADESH

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ABSTRACT

The construction industry is considered to be one of the most risky sectors with frequent and high accidents rates and ill health problems to workers worldwide. Construction accidents have been causing many human tragedies, loss of life, productivity, and delay projects. The main reason for selecting this study is to check the status of construction safety performance in Bangladesh. The objectives of this research is thus to focus the standard of construction safety and its culture in Bangladesh particularly on construction firms, real estate and developers in Dhaka and Chittagong. The results show that there is still a lack of commitment from the government, companies' authority, contractors and also workers to improve safety performance on the construction sites. The recommendations are suggested to improve the safety culture on the construction sites, Government regulating authorizes to follow up the safety condition of the construction site by their routine visits, contractors should train the workers, promote the safety culture and follow up the safety performance as well as the workers should be awareness of safety issues in construction sites.

FACTORS FOR IMPLIMENTING INDEPENDENT POWER PRODUCER (IPP) PROJECT IN ASIA

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ABSTRACT

Development of Independent Power Producer (IPP) projects is essential for Asian countries due to huge shortage of electricity demand in this region and the governments are compelled to choose IPP projects to meet the current need of their population. An Attempt is thus taken to identify the factors governing the setup of IPP projects in Asia. In this connection, three cases in Asia are screened out for in-depth analysis on implementing IPP projects in Asia Some essential factors have been identified from these cases which is believed to be vital for successful implementation of an IPP project in Asia. The authors believe that the research findings should enable public as well as private sector clients to establish more efficient IPP projects in Asia.

INVESTIGATION ON EXISTING PEDESTRIAN SAFETY FACILITIES IN DHAKA CITY BASED ON PEDESTRIANS' OBSERVATION

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ABSTRACT

Dhaka City, the capital of Bangladesh, is located in Dhaka District that is surrounded by rivers. Dhaka is located in central Bangladesh at 23°43′0″N, 90°24′0″E, on the eastern banks of Buriganga River. Dhaka is a metropolis of 1528 km^2. Population density in Dhaka is over 10,000 per km^2 in the city area. The population in Greater Dhaka has already crossed 10 million and average annual growth rate is 7%. Over the last 10 years, the population of Dhaka has more than doubled. This growth has exceeded the demand for services in all sectors of society and the quality of life has been deteriorating. The city is now facing a crisis point when even small increases in activities and minor events cause wide-spread confusion, time wastages and potential danger to the people of the city. In Dhaka city pedestrians are the most vulnerable of all road users and require special facilities for their protection. The absence of a clearly defined system makes travel by this mode of travel unpleasant and hazardous. Some of the important factors which need to be addressed are; the lack of pedestrian first priority policy; the absence of continuous footpaths on both the main routes and the neighbourhood streets; poorly designed badly located and ill-advertised pedestrian crossings; encroachment on the footpath from traders and equipment and the absence of facilities for the movement of disabled persons, all contribute to a dangerous situation.

In the context of Bangladesh, pedestrians form the largest single user group. This is primarily because of the lack of sufficient transportation facilities and poor economic condition of the people. Besides these, day-by-day the pedestrian traffic of city is increasing rapidly.

There are 3 specific objectives in our thesis. Those are as: to find the factors that influencing pedestrian safety; evaluate the pedestrian safety in major arterial roads; recommend some possible improvement. A questionnaire survey was conducted topedestrian namely office worker, student, student parents, garments worker and of other occupations. The number of respondents of our survey are 200 persons in which 60 Students, 35 Garments workers, 15 Student parents, 60 Office workers, and 30 others.

Findings of this research show that:most of the pedestrian said that they are not feeling safe on road; most of the people are not using zebra crossing while they use road and also some of them have no idea about using zebra crossing; while some people are actually not interested to use footpath, foot over bridge or any other facilities provided on road. The result shows that most of the respondent

said they do not feel safe on road because of no application of traffic rules and lack of pedestrian facilities; pedestrian do not use footpath because of roadside hawker and insufficient place for walk; tiredness, lack of time and long distance to walk are the causes for not using foot over bridge; while most of the respondent replies that the condition of existing facility is poor.

The findings show that the present condition of existing facilities needs to be improved according to the respondents. It also shows that the pedestrian facilities are not adequate for these four locations like no application of traffic rules, poor condition of footpath, poor zebra crossings, poor drainage system, and uncontrolled traffic system. Awareness among the pedestrian should be increased and traffic rules should be applied strongly in case of the violating of traffic rules in order to provide a better pedestrian environment.

EFFECT OF GROUND IMPROVEMENT IN REDUCING SETTLEMENT OF STRIP FOOTING IN WEAK SOIL OVERLYING DENSE SAND

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We hereby recommend that the thesis prepared by Bulbul Ahammed, Md. Jakir Hossain, Md. Jahid Hasan, Md Al-Amin Basher entitled "Improvement of Existing ground for Settlement of Shallow Foundation " is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Soils with poor engineering properties are often encountered at shallow depths. Such soil layers are often found so weak that it can barely carry the pressure from the structure through the foundation. The thickness of the weak soil layer often exceeds the maximum possible thickness that can be replaced by a better quality soil. Therefore, while building any major structure or constructing on soils having allowable bearing capacity below about 40 kPa, pile and mat foundations are considered for supporting the structures. On the other hand, while building light structures shallow foundation is often selected if the structural load will not cause excessive settlement of the underlying soil layers. As it supports structures at a shallow depth below the ground surface, this type of foundations has limitations in their use in such locations having thick bed of weak soil near the ground. The selection of shallow foundation depends on different factors such as: the load-bearing capacity of soil, the magnitude of loads, the settlement of the underlying soil layers, the configuration of the structure, and other conditions that can occur in a project. Shallow foundation is usually be more economical type of foundation by a wide margin than the nearest alternative. In case of constructing light structures on the soils having allowable bearing capacity below about 240 kPa, a suitable ground improvement technique is applied, sometimes at little and sometimes at great cost, to overcome the limitations of selecting shallow foundation. Because, shallow foundation is usually be more economical type of foundation by a wide margin than the nearest alternative.

This study presents the data of five standard penetration tests conducted in Khulna Division, Bangladesh. All the SPT data show that there exists a 6-9 m deep bed of weak soil layer, near the existing ground level, overlying deep dense sand layers in the test location. For supporting a low contact pressure of 79 kPa at foundation base level, the settlement of a strip footing placed at 1.5 m depth was studied using a correlation software NOVOSPT. To limit the total settlement of the footing within maximum allowable settlement of 2.5

cm, two different strategies of ground improvement were examined. One of the strategies was placing of the footing in a 3 m thick compacted layer of good soil overlying the existing deposit. This is commonly practiced in Bangladesh but this study had not found it effective in reducing the settlement of the strip footing for the location under consideration. Therefore, this study recommends to improve the weak layer giving SPT N values at least 12, and then to place a compacted soil layer giving similar SPT N value over it. The footing can then be placed in the compacted layer of good soil. The total settlement of the footing on the soil after taking the proposed two stage measures was recalculated. This study has found the proposed measures effective in reducing the total settlement of strip footing significantly.

EFFECTS OF SOIL IMPROVEMENT ON THE BEARING CAPACITY OF STRIP FOOTINGS

Thesis

Submitted to the Department of Civil Engineering

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We hereby recommend that the thesis presented by **Babul Hosen, S.M. Samiul Islam, & Mahmud Hasan** entitled **"Effects of Soil Improvement on the Bearing Capacity of Strip Footings"** is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Abstract

Soils with poor engineering properties are often encountered at shallow depths in Bangladesh. Such soil layers are often found so weak that it can barely carry the pressure from the structure through the foundation. The thickness of the weak soil layer often exceeds the maximum possible thickness that can be replaced by a better quality soil. Therefore, while building any major structure or constructing on soils having allowable bearing capacity below about 40 kPa, pile and mat foundations are considered for supporting the structures. On the other hand, while building light structures, shallow foundation is often selected if the structural load will not cause excessive settlement of the underlying soil layers. Shallow foundation is usually more economical type of foundation by a wide margin than the nearest alternative. In case of constructing light structures on the soils having allowable bearing capacity below about 240 kPa, a suitable ground improvement technique is applied, sometimes at little and sometimes at great cost, to overcome the limitations of selecting shallow foundation.

The bearing capacity of a strip footing was studied for the profiles, where a deep bed of weak soil having field SPT below 4, overlying a deep bed of dense sand layer using a correlation software NOVOSPT. In this respect, field SPT data was collected from five borehole locations of Khulna Division, Bangladesh. In this thesis, an effective way to satisfy the requirements of shallow foundation in a deep bed of weak deposit overlying dense sand has been proposed, based on the results of bearing capacity analysis. In this respect, the effectiveness of the principle, commonly practiced in Bangladesh, has also been examined and was found unable to satisfy the design requirements of shallow foundation.

USERS' OPINION ASSESSING THE ATTRIBUTES OF BUS SERVICE QUALITY IN DHAKA CITY

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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ABSTRACT

The environment of public transport in Dhaka City is characterized by traffic congestion and delays, inadequate traffic management, unaffordable and inaccessible public transport for majority of the people, high accident rates and increasing air pollution problems. It has seriously been deteriorated and in many respects has already reached in a crisis level. But in the bus based public transport resource is not the main hindrance. The main problem is operational weakness of the present resources. To find the deficiencies first of all it is necessary to evaluate the present operational modes.

Despite the crucial function of public buses plying in developing countries, their roles are disrupted for different reasons. Transportation system of Dhaka city is under huge challenge of managing growing number of private cars and non motorized vehicles. Traffic congestion had become an everyday scenario of this city. Policy maker consider increasing the number of public buses as solution in most cases. The objective in this thesis is to find out the drawbacks of bus service based on user perception.

The thesis reports the existing service and the users' opinion about the service level of public bus operating within the city. For this purpose, four different bus stoppage had been chosen and a total of 200 passengers of bus (50 from each stoppage) had interviewed with a pre-determined structured questionnaire to know their experience/satisfaction and opinion about the existing service and as well as their expectation. It was found that maximum respondents think the service does not provide enough safety and security, does not maintain proper vehicle scheduling while ticket counter are not sufficient and ladies seat are not available. The result shows that fitness of the bus is poor, buses are dirty, and seats are uncomfortable while bus fare seems fair. It was found that the bus drivers don't obey the traffic rules. To anticipate the future, the exploration regarding many related aspects with service quality of bus is essential.

ANALYSIS OF TWO-WAY RC SLAB UNDER IMPACT LOAD

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We hereby recommend that the thesis presented by **Ashraful Islam and Md. Jafar Ikbal** entitled **ANALYSIS OF TWO-WAY RC SLAB UNDER IMPACT LOAD** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

With a growing awareness to resist both dynamic and static loads, several structures need to be designed for impact loads. An accidental impact load can be caused by mishaps in industry as well as accidents stemming from transportation or man-made disasters.

The overall objective of the study is to investigate the dynamic behavior of reinforced concrete slab under impact loading with respect to displacement and time. This study investigates the effects of different types of applied impact loads and shock absorbing foams on the dynamic response and behavior of reinforced concrete slabs. Displacements vs. time relationship for all the specimens are studied. The numerical study is based on nonlinear dynamic analysis using the software ABAQUS, possibly the first such work in this country.

The numerical results are compared with results obtained from the field test data. Drop weight tests are performed on eight RC slab specimens (size 4ft × 4ft × 1in) loaded by two impactors (weighing 150 lb and 500 lb). The numerical results matched reasonably well with the field data in some cases, but not too well in some other cases, particularly ones with shock absorbing foams. This shows some possible room for improvement required in both the numerical and experimental works performed.

PRESENT STATUS OFTHEBURIGANGA RIVER

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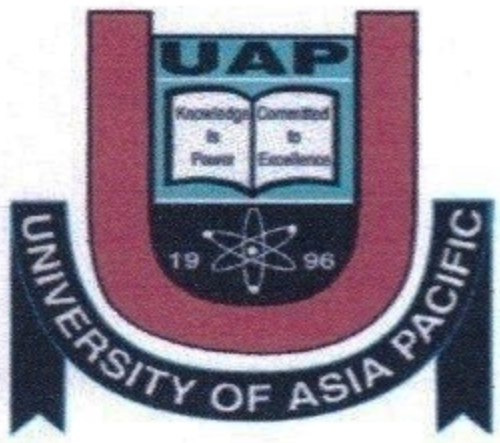

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ABSTRACT

For several decades, river pollution and fresh water depletion are viewed as one of the top environment problems in Asian region. The Buriganga River in Bangladesh is subject to sever pollution and considered as one of the worst polluted rivers in the World. Especially, the development of tannery industry at Hazaribagh that has contributed to Bangladesh economy is causing pollution and the disruption of the ecosystem. To the water shed environment. As a result, the environmental problems are getting worse. According to the Export promotion Bureau (EPB) of Bangladesh, export earnings from leather industry was US$401.64 million in 2009-2010. But Hazaribagh tannery city consisting of 196 tanneries is discharging hazardous effluents everyday directly to the to the Buriganga without any treatment. This is responsible for he high Biochemical Oxygen Demand (BOD) and low Dissolved Oxygen (DO) values in Buriganga water. Low DO value in Buriganga water and such relation is a crucial problem in any developing country that stresses on economic growth compromising environmental pollution. Inadequate waste water management systems, lack of sewerage and infrastructure facilities in on hand and lack effective pollution control measure and their strict enforcements may be largely responsible for this alarming problem and grave situation. When at the same time several dying industries at the river bank as well as the medical and dispensary wastes and solid wastes also produce irreversible hazards to Buriganga and surrounding environment. The pollution by the tanneries and health hazards caused by the pollution has also been investigated. Several government decisions has been made to revive the tolerant condition of Buriganga among which the shifting Tanneries from Hazaribagh to Saver area and subsidies to the toxic industries for establishing Effluent Treatment Plant(ETP) can be mentioned, but none of these projects have been implemented yet. That's why, Buriganga, the glory of Dhaka is under the threat of demolition and wiping out effect. The adjacent areas of Buriganga River like Keranigang and Kamrangirchar are also severely affected. At the end of this thesis, several proposals regarding the improvement of water quality of Buriganga River are highlighted.

University of Asia Pacific

Idea for a Brahmaputra River Basin Commission: Lessons from Mekong and Sava Rivers Basins

A Thesis

Submitted to the Department of Civil Engineering

UNIVERSITY OF ASIA PACIFIC

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BACHELOR OF SCIENCE IN CIVIL ENGINEERING

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ABSTRACT

The Brahmaputra is the 22nd longest river of the world. The Brahmaputra river has a total length of 2,880 kilometers. Total drainage area of the Brahmaputra River Basin is around 5,734,000 square km. The Brahmaputra River Basin is shared by China, India, Bhutan and Bangladesh. The course of the Brahmaputra has changed continually over time. But at this moment, the absence of integrated management of the Brahmaputra River Basin stands for an ongoing threat to future development in the Brahmaputra River Basin. Several studies show that integrated Brahmaputra River Basin management with effective participation of all riparian countries could ensure sustainable development in the whole region. This study analyzed Mekong and Sava Rivers Basins Commissions to understand how rivers basins are managed by riparian countries through formal commissions. Based on the experiences from Mekong and Sava Rivers Basins Commissions, this thesis provides a preliminary idea for a Brahmaputra River Basin Commission (BRBC). This commission could be instituted by all riparian countries of the Brahmaputra Basin (China, Bhutan, India, and Bangladesh). If implemented, proposed Brahmaputra River Basin Commission could potentially support the integrated development of the Brahmaputra Basin that promotes sustainable development of water and related resources for the riparian countries.

WATER PRICING FOR SLUM DWELLERS IN DHAKA METROPOLITAN AREA: IS IT AFFORDABLE?

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Dhaka 1205, Bangladesh. FALL 2013

Abstract

Like many other developing countries, Bangladesh is facing serious water management challenge to ensure affordable water supply for all, especially in urban areas. Both the availability and the quality of water are decreasing in the poor urban areas. Besides, the population situation of the country is getting worst in Dhaka, the capital of Bangladesh, which became one of the megacities in the world in terms of population and urbanization. The aim of this thesis is to address the following question: "Are slum dwellers in Dhaka city capable for paying for Dhaka Water Supply and Sewerage Authority (DWASA) services?". This study focused on three slums in Dhaka city namely Korail slum, Godown slum and Tejgaon slum to determine the current water price in selected slums and to compare it with water price of other cities of the world. A field study has been conducted during July and August 2014. It involves semi structured questionnaire survey and focus group discussions with slum dwellers and various stakeholders. For secondary data source, a wide range of books, peer-reviewed articles, researcher documents, related websites and databases have been reviewed. Result shows that slum dwellers are paying about 7 times higher than legal connection holder. Slum dwellers are paying about 23% of their average monthly income for domestic water supply, whereas in most of the countries, legal connection holders are paying less than 5% of their average monthly income for the same purpose. It is also observed that laws to prevent environmental pollution are rarely enforced. Overall service delivery is considered to be poor due to an inadequate tariff structure, high non-revenue water, lack of authority and commitment, inadequate management capacity, lack of sector coordination, inadequate investment, absence of effective decentralization, etc. The situation can be improved by higher investment, effective private sector participation, improved billing and revenue collection, structural reforms, establishing a regulatory body and finally converting DWASA into a truly service oriented commercial organization. Finally, it is observed that the slum dwellers in Dhaka City are capable for paying for DWASA.

Transboundary River Dharla:
Its Water availability and watershed people's Livelihood inside Bangladesh.

MD. MAHMUD HASAN

10205001

CERTIFICATE OF APPROVAL

We hereby recommend, that the thesis presented by **MD. MAHMUD HASAN** entitled **"Transboundary River Dharla: Its Water availability and watershed peoples Livelihood inside Bangladesh"** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

26-01-2015

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Abstract

This study contributes to understand the dependency of the people of the watershed of Dharla on the river. In few words Dharla River is a tributary of the Brahmaputra River, located in Bhutan, India and Bangladesh. Several impacts have focused on this study to get a clear view of the present situation. Also, recent hydrological data have analyzed to know the water availability.

The first stage of this work was to collect a large data set to characterize the nature and agricultural contexts of the Dharla watershed. The watershed has a contrasting topography, with mountains upstream and large plains downstream. It experiences high rainfall with a monsoonal pattern and an average of 2000 mm/year. The river flow is perennial, with a sustained flow during the dry season, high flows during the monsoon and recurrent flood events. The soils are sandy loam (upstream) to silty loam (downstream), with little permeability. The aquifers in the region are alluvial and the groundwater levels in the watershed are shallow and stable.

This study contributed to the development of a precise land use map which identifies the natural vegetation, the water bodies, the flood, the river bank erosion and the different cropping sequences in the agricultural land. Agricultural statistics were gathered at administrative levels for cropping sequences and crop yields. The irrigation in the watershed is predominantly from groundwater, with diesel pumps, to irrigate rice during the summer and potatoes during winter. This study has also expressed the effect of flood and people's condition, limitation, demand and the face of disaster.

Several surveys have been done in different issues like Flood, River Bank Irrosion, Crop, Siltation, Livinghood, Drought, etc. Those surveys and information shows the importance of Dharla as an transboundary river.

This paper ends by focusing the issues of the local people from this river and their future possibilities so that they may use this natural resource properly and without creating any environmental issues.

A STUDY ON CLIMATE CHANGE IMPACT ON THE LIVELIHOODS OF THE PEOPLE IN TANGUAR HAOR

A Thesis

Submitted to the Department of Civil Engineering

UNIVERSITY OF ASIA PACIFIC

By

Kamrul Islam Sajib
10205044

Intekhab Alam
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Anamul Haque
10205073

Mehedi Hasan
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In partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Under the supervision of

Dr. Muhammad Mizanur Rahaman

UNIVERITY OF ASIA PACIFIC

Spring 2014

UNIVERSITY OF ASIA PACIFIC
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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by **Kamrul Islam Sajib, Intekhab Alam, Anamul Haque & Mehedi Hasan** entitled **"A study on climate change impact on the livelihoods of the people in Tanguar haor"** is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Abstract

Bangladesh is generally viewed as a vulnerable country with respect to climate change because of its unique geographic location, dominance of flood plains, very low average altitude natural disturbance regimes, high population density, elevated level of poverty and overwhelming dependency on nature and its resources and services. Previous studies reveal that Surma-Kushiyara river system known as *haor* basin is projected to be under additional stress that climate change will cause to its temperature and rainfall pattern. Tanguar *haor* which is located in the north-eastern region of Bangladesh is characterized by large round shaped floodplain depressions and marshy lands. This research focuses on the climate change impacts on the environment, water resources, flood, fisheries, cropping patterns etc. that effects the livelihoods of the people living in the Tanguar *haor* area. Primary data has been collected from various government agencies (i.e., BMD, BWDB, BHWDB, IUCN) and through field level questionnaire. Secondary data has been collected from official documents, papers, books and reports. This study identified that changes in land use patterns, flash flood, flood, river bank erosion, water pollution and reduced fisheries are the usual hazards and risks associated with climate change impacting the livelihoods of the Tanguar *haor* communities. In conclusion, some recommendations were suggested for the community for mitigating and adapting with the climate change impacts and reducing climate change related vulnerabilities.

RAIN WATER HARVESTING IN UAP CITY CAMPUS

Spring 2014

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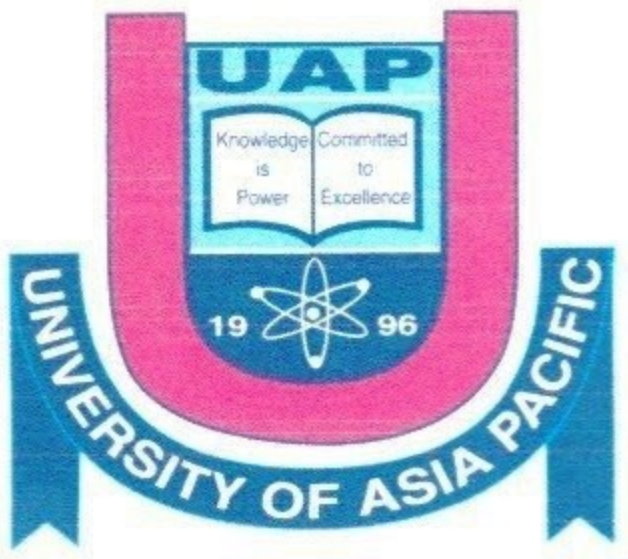

DEPARTMENT OF CIVIL ENGINEERING

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We hereby recommend that the thesis presented by **NASIRUL ISLAM, PARTHA CHANDRA SARKER & MD. NAZMUL HUDA** entitled **"RAINWATER HARVESTING IN UAP CITY CAMPUS"** be accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

In recent time, a crisis of water supply takes place around the Dhaka city especially in the dry season (November to March). All level of people greatly suffers throughout this time. On the contrary, in the period of monsoon (April to October), a huge amount of unused safe, clear and pure rainwater is drain mostly as runoff or through existing drainage system and ultimately reach rivers surrounding Dhaka city. There is a large scope to utilize rainwater for different purposes by storing or direct recharging the aquifer. In Dhaka city, 80% of the total supplied water comes from groundwater and the remaining 20% comes from surface water. However, the water demand is increasing as the higher growth rate of population in Dhaka city. This large volume of groundwater use is creating extra pressure on ground water. Statistics shows the underground water level is depleting 34.58m per 10 year so it is declining more than 3m annually. Considering the population pressure on the city, water crisis in the city will be more acute in the near future unless alternate source of water is found. Surface water (rivers) around the city cannot be the solution considering its water availability throughout the year and its quality. In this backdrop, rainwater harvesting system may be considered as a sustainable solution. University of Asia Pacific city campus located at Green Road near Farmgate is selected for this study.

Study shows that the harvested rainwater can only meet the drinking, washing and sanitation demand. But provides significant supplementary support during monsoon season. From our study we found that, in the months of April to October we found significant results.

NUMERICAL AND SHAKE TABLE ANALYSIS OF STEEL STRUCTURES

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by **ANIK ALAMGIR, AYESHA SIDDIQUA, MD. MEHEDI HASAN** and **MAHFUZA TABASSUM** entitled **NUMERICAL AND SHAKE TABLE ANALYSIS OF STEEL STRUCTURES** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

This thesis presents the results of a study on the structural response of multistoried steel structures subjected to seismic ground motion. Nonlinear Dynamic Analyses of three steel building models are used in this study. The effect of deflection of structure is examined in this analysis. 'ETABS 13', computer software capable of performing nonlinear dynamic analysis, is used to perform most of the analysis in this study. The systemic parameters considered are geometric nonlinearity of structure (P-Delta), proportional damping, scale factor, number of out-put time steps, output time steps size.

Verification of ETABS 13 analysis with experiments is also an important part of this study. Laboratory experiments provide results that are compared to the analyses results and hence the efficiency of the software is evaluated. Three ground motions are used in this study to generate the record of displacement vs. time curves (using scaled El Centro ground motion data of various time durations). These ground motions are scaled to laboratory data prior to their applications. The numerical results matched reasonably well with the laboratory data.

EFFECT OF LIMESTONE POWDER ON MECHANICAL PROPERTIES OF CEMENT MORTAR

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We hereby recommend that the thesis prepared by **Md. Mostofa Kamal, Nafiz Khan Majlish, and Md. Al Sohanur Reza** entitled **"Effect of limestone powder on mechanical properties of cement mortar"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Limestone powder used as a mineral admixture with cement to improve the physical and mechanical properties of cement concrete. It helps to increase the workability, stability, and durability of concrete. Until now, different codes permit different percentage of limestone powder in cement. Use of limestone can reduce the clinker requirement and save the environment. Effect of limestone powder (filler material) on the mechanical properties of cement mortar are studied. Mortars are made of different replacement of limestone with Portland composite cement (CEM II-BM) by using the w/c ratio 0.475. Compressive strength was tested at 3, 7, 14 and 28 days after curing of cement mortar. Test results showed that the maximum compressive strength was obtained for 15% limestone replacement at 28 days. Results also showed that the increasing of limestone replacement gradually decreases the compressive strength of mortar and test age has also effect on compressive strength. But these properties reduces at later ages for continuous limestone addition.

MECHANICAL PROPERTIES OF STEEL FIBER REINFORCED CONCRETE

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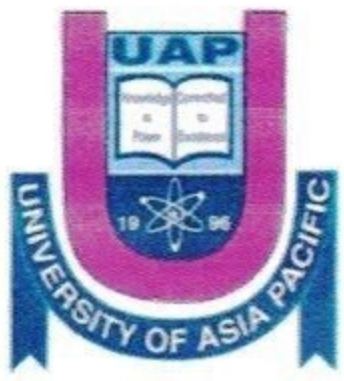

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis prepared by **Md. Farhad Hossain, Md. Ariful Haque, and Md. Mazharul Islam** entitled **"Mechanical Properties of Steel Fiber Reinforced 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

A detailed study on mechanical properties of steel fiber reinforced concrete was conducted. For this steel fiber concrete cylinder specimens of size 4" dia and 8" length were made with W/C=0.4 and aspect ratio 47 and64.For comparison, specimen were made with stone aggregate without using any fiber. After 28 day curing, the specimens were tested Under the Universal Testing machine (UTM) as per ASTM A-820 to determine the mechanical properties of concrete made with different percent of fiber. Based on the experimental results, a comparative study on mechanical properties of concrete made with different percentage of fiber and aggregate. Several relationships tensile strength, compressive strength, stress strain relation are also developed.

Keyword: steel fiber, aspect ratio, ductility, abrasion, fatigue strength.

COMPUTER AIDED ANALYSIS AND DESIGN OF A MULTI-STORIED RESIDENTIAL REINFORCED CONCRETE BUILDING

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University of Asia Pacific
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Certificate of Approval

The Project entitled **"Computer Aided Analysis and Design of a Multi-Storied Residential Reinforced Concrete Building"** submitted by H.M. Golam Samdani & Md. Noman Kamal Sabbir has been accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Bangladesh is a densely populated developing country. Everyday huge amount of construction works are undertaken. Nowadays most structures are RCC structures. The volume and types of works range from construction of six-storied residential building to multistoried market complex. Due to enormous amount of civil engineering works, the structural engineering has been developed in various dimensions in our country. The computer software is helping the engineers in solving the increasing problems very quickly and easily. Many popular programs are being used in this regard.

In order to compete in the ever growing market, it is very important for a structural engineer to save time. As a sequel to this, an attempt is made to analyze and design a multistoried building by using a software package ETABS. For analyzing a multistoried building one has to consider all the possible loadings and see that the structure is safe against all conditions. There are several methods for analysis of different frames like kani's method, cantilever method, portal method, and Matrix method. The present project deals with the analysis of a multistoried residential building of G+7 consisting of 4apartments in each floor. Thereafter, the loads are calculated namely the dead loads, which depend on the unit weight of the materials used (concrete, brick) and the live loads, according to the code (BNBC 1993). Lateral loads i.e. seismic and wind load as per BNBC 1993 are also considered in designing the building.

ETABS with its new features surpassed its predecessors with its data sharing capabilities with other major software like AutoCAD, SAFE and MS Excel. It is a very powerful tool which can save much time and is very accurate in designs. SAFE is also a powerful tool for foundation design and analysis, which can save much time and is very accurate in designs. Both are suitable for the design of a multistoried building.

COMPUTER AIDED ANALYSIS AND DESIGN OF A MULTI-STORIED COMMERCIAL REINFORCED CONCRETE BUILDING

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Certificate of Approval

The Project entitled **"Computer Aided Analysis and Design of a Multi-storied Commercial Reinforced Concrete Building"** submitted by Md. Mahadi Hasan & Md. Muntakimul Hasan has been accepted as fulfilling this part of the requirements for the degree of bachelor of Science in Civil Engineering.

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ABSTRACT

Dhaka is the largest city in our country. As it is rapidly developing the construction in the city is very costly. Now-a-days the construction of multi-storied building is common in our country. Manual calculation of a multi-storied building is very difficult and it may makes error in calculation and also takes long time to design. But using design software it is very easy to analyze and design a multi-storied building. Using design software, it reduce error and provides more accurate results and save time. If the building is designed by using software, it can also possible to make the design economically. There are many softwares in civil engineering fields such as ETABS, STAAD PRO etc. In this project, the building is designed using ETABS software.

The purpose of this major project is to analyze and design a structural system for an illustrative commercial building in Dhaka. The design process included an architectural layout, structural framing options using reinforced concrete, a flat roof, and a partial glass curtain wall. The work is completed in compliance with the ACI 318-11 and BNBC codes.

This report outlines the structural design of a reinforced concrete commercial building with one basement + 10 storied structure following BNBC 1993 codes. The framing arrangement and column locations of the building were provided based on architectural and structural requirements. The structure system of the building is a reinforced concrete frame with a two-way slab and beam floor system. This report covers the design process in the following order: the calculation of the expected loads on the structure, the design of the slab depth, the estimation of the column sizes, the design of the slab reinforcement, the design of the beam reinforcement for both flexural and shear, the calculation to check crack control, the calculation to check beam deflections and finally the design of the column reinforcement. Additionally, figures displaying the placement of the steel rebar in the structure are contained in the report.

ASSESSMENT ON AIR POLLUTION AND SOLID WASTE REDUCTION IN DHAKA CITY USING POLLI BRICK

SPRING 2014

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We hereby recommend that the thesis presented by Sakhawath Hossain Rajon, Khokon Ahmed and Prodip Kumar Saha, entitled with **"ASSESSMENT ON AIR POLLUTION AND SOLID WASTE REDUCTION IN DHAKA CITY USING POLLI BRICK"** be accepted in fulfilling as a part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Abstract

Air pollution is one of the major environmental concerns around the globe. Rapid urbanization enhanced by population growth, accelerates the demand of new housing and hence increases the demand of brick construction. The growing number of brick fields throughout the country has exacerbated the air pollution scenario, especially in Dhaka and its nearby area. To reduce brickfield emission, this study has proposed an alternative to conventional brick, names as POLLI BRICK, which is already being used in many countries. The scope of reducing solid waste volume to be disposed to the environment by reusing discarded plastic has also been assessed in the study. Production of about 9 million bricks from 930 brick fields, located in Savar, Kaliganj, Ropganj and Narayanganj, emit about 315 tons of carbon dioxide per year. The study showed that if 50% conventional brick can be replaced by Polli Brick (made of plastic), then carbon dioxide production can be reduced to 6.3% per year. Again, 51% of the generated plastic waste is recycled in Dhaka by Dhaka City Corporation. Hence, remaining 49% plastic, otherwise discarded to landfill, can be used to make Polli brick, resulting in 100% potential for volume reduction of the generated plastic waste in Dhaka.

University of Asia Pacific

Potential Artificial Ground Water Recharge Methodologies for Dhaka City

Submitted By

Akter Hosen Samu
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Spring, 2014

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CERTIFICATE OF APPROVAL

We hereby recommend that Thesis prepared by Akter Hosen Samu, Md.Sadab Hossain, and Tabassum Nasrin entitled "***Potential Artificial Ground Water Recharge Methodologies for Dhaka City***" be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

About 87% of current water supply, provided by Dhaka Water Supply and Sewerage Authority, (DWASA) is extracted from ground water. On the other hand, surface water being severely polluted, cannot be used as a water supply source. In this situation, heavy extraction of ground water causes significant depletion of the water table, at a rate of 2-3 m per year. To recognize this issue, the study assesses potential ground water recharge methods for two prominent urban hub, namely Dhanmondi and Mohammadpur, within the city. Eight recharge methods/ structures were studied against five selected criteria, such as – soil condition, rainfall condition, water requirement, effective porosity and impervious coverage. According to selection criteria, Ditch & Furrow System, Dug Well, Recharge Shaft, and Stream Augmentation methods may be used for artificial recharge purpose but dug well would be more preferable. Again, cost analysis showed that dug well would be more economical. Also, dug well showed the highest recharge potential among other methods. The study will be helpful to researchers, government agencies and students, in order to identify the potential methods to be used for ground water recharge.

EFFECT OF LIMESTONE POWDER ON MECHANICAL PROPERTIES OF CEMENT MORTAR

SPRING 2014

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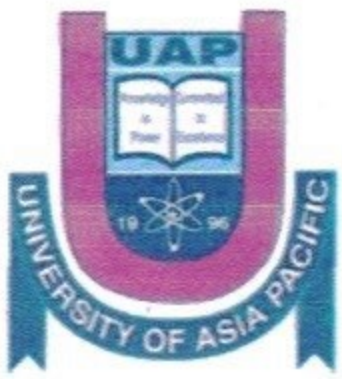

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis prepared by **Md. Mostofa Kamal, Nafiz Khan Majlish, and Md. Al Sohanur Reza** entitled **"Effect of limestone powder on mechanical properties of cement mortar"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Limestone powder used as a mineral admixture with cement to improve the physical and mechanical properties of cement concrete. It helps to increase the workability, stability, and durability of concrete. Until now, different codes permit different percentage of limestone powder in cement. Use of limestone can reduce the clinker requirement and save the environment. Effect of limestone powder (filler material) on the mechanical properties of cement mortar are studied. Mortars are made of different replacement of limestone with Portland composite cement (CEM II-BM) by using the w/c ratio 0.475. Compressive strength was tested at 3, 7, 14 and 28 days after curing of cement mortar. Test results showed that the maximum compressive strength was obtained for 15% limestone replacement at 28 days. Results also showed that the increasing of limestone replacement gradually decreases the compressive strength of mortar and test age has also effect on compressive strength. But these properties reduces at later ages for continuous limestone addition.

USE OF FLY ASH FOAMED CONCRETE FOR IMPROVEMENT OF ROAD PAVEMENT.

A Thesis on transportation engineering

Submitted by

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A thesis is submitted of the fulfillment of the requirements for the award of the degree of Bachelor of Science in Civil Engineering

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Certificate of Approval

We hereby recommend that the thesis prepared **by Tithi Bose Shukla Md. Masum Billah & Sharmin Sultana** entitled **"USE OF FLY ASH FOAMED CONCRETE FOR IMPROVEMENT OF ROAD PAVEMENT"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Foamed concrete has become most commercial material in construction industry. Fly ash is receiving more attention now since their uses generally improve the properties of blended cement concrete, cost saving and reduction of negative environmental affects. Fly ash is used as a fine aggregate. This paper describes an investigation into the foamed concrete in the improvement of road pavement. This project work is also discussed material of foamed concrete their properties and requirement. A paper is worked with different type of sand such as local sand and sylhet sand. All the data of foamed concrete test have been presented in the form of tables and XL group. The laboratory test result indicate that the compressive strength of foamed concrete were acceptable for improvement of foamed concrete. The making of foamed concrete with different type of sand provide to the adequate for the traffic load. The appropriate recommendations regarding use of well graded sand, proper water cement ratio and proper amount of fly ash.

JUTE FIBER MIXED WITH BITUMEN

A thesis on transportation engineering

Submitted by

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It is hereby declared that the report in this thesis 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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Certificate of Approval

We here by recommend that the thesis prepared by **Md. Rabiul Islam, SalakuzzamanKiron, Abdullah RafayatBaksh**entitled **"JUTE FIBER MIXED WITH BITUMEN"**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 objective of this study was to improve the properties of bitumen 60/70 grade with addition of Jute fibers in various ratios in the place of bitumen 80/100 grade in Bangladesh. It is expected to give a more firm mixture with better compressibility, stability and durability. The introduction of fiber is expected to provide more abrasive resistance and increase void tends to decrease bleeding with applied loads and compaction. The purpose of the work presents the study on stability, flow and volumetric properties of the jute fiber mixed with bitumen as 1% and 0.5%, and length of the fiber was 3mm, 4 mm. Optimum fibers content and optimum fiber length of jute fiber was used.

Bitumen is one of the most important materials for roads. Bangladesh has an area of 147,570 square kilometers and extends 820 kilometers north to south and 600 kilometers east to west. This country consists National Highway = 3544.06 km, Regional Highway = 4278.07 km, Zilla Road = 13,247.79 km, Total Road Length = 20,947.73 km. All of these roads use bitumen 80/100 grade for coating the surface. By using 60/70 grade of bitumen it can improve the aging resistance, higher fatigue life of mixes, Delay thermal cracking, and improve Temperature *susceptibility etc.*

100 Years Exposure Test on Carbonation of Concrete in Bangladesh

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We hereby recommend that the thesis prepared by **Nirupam Deb, Taj Muhammad Tanmoy, Sanjida Khanam, Mohiuddin Mohammed Towsif, Md. Ismail Hossain Siddiqui, Md. Abid Azad, and Fazle Rabbi** entitled **"100 years exposure test on carbonation of Concrete 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

The rate of carbon emission is increasing around the world day by day due to the Industrialization. Like many other mega city, amount of carbon emission in Dhaka city is increasing day by day as a result concrete carbonation become a major concern for the construction industries. Carbonation is a process by which concrete absorb CO_2 from atmosphere and affecting long term durability of concrete. A high carbonation rate is expected for concrete structures in Dhaka city that leads to corrosion over the steel bars in a short period of service life and subsequently results in early deterioration of structures. Corrosion is a major concern for durability of reinforced concrete structures in Bangladesh. A very few study is done to determine and understand the standard carbonation depth and process of concrete in our country. In this report 100 years exposure test on concrete carbonation the value of concrete carbonation depth using different variable and parameter is determined. in this report different parameter use e.g. Testing Age (Years), Cement Type, W/C Ratio, Fine Aggregate, Combined Sand (FM 2.4), Some Special Cases (Recycled Fine Aggregate, Stone Dust), FA/C Ratio, Exposure Location. From different exposure condition different result has been found and comparative study is done to evaluate the carbonation process and depth for different exposure condition.

Keywords:

Carbonation, Corrosion, Compressive Strength, Long term exposure, Mortar

CONSTRUCTION SAFETY CULTURE IN BANGLADESH

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ABSTRACT

The construction industry is considered to be one of the most risky sectors with frequent and high accidents rates and ill health problems to workers worldwide. Construction accidents have been causing many human tragedies, loss of life, productivity, and delay projects. The main reason for selecting this study is to check the status of construction safety performance in Bangladesh. The objectives of this research is thus to focus the standard of construction safety and its culture in Bangladesh particularly on construction firms, real estate and developers in Dhaka and Chittagong. The results show that there is still a lack of commitment from the government, companies' authority, contractors and also workers to improve safety performance on the construction sites. The recommendations are suggested to improve the safety culture on the construction sites, Government regulating authorizes to follow up the safety condition of the construction site by their routine visits, contractors should train the workers, promote the safety culture and follow up the safety performance as well as the workers should be awareness of safety issues in construction sites.

FACTORS FOR IMPLIMENTING INDEPENDENT POWER PRODUCER (IPP) PROJECT IN ASIA

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ABSTRACT

Development of Independent Power Producer (IPP) projects is essential for Asian countries due to huge shortage of electricity demand in this region and the governments are compelled to choose IPP projects to meet the current need of their population. An Attempt is thus taken to identify the factors governing the setup of IPP projects in Asia. In this connection, three cases in Asia are screened out for in-depth analysis on implementing IPP projects in Asia Some essential factors have been identified from these cases which is believed to be vital for successful implementation of an IPP project in Asia. The authors believe that the research findings should enable public as well as private sector clients to establish more efficient IPP projects in Asia.

INVESTIGATION ON EXISTING PEDESTRIAN SAFETY FACILITIES IN DHAKA CITY BASED ON PEDESTRIANS' OBSERVATION

A Thesis Prepared
By

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We hereby recommend that the thesis presented by **TANVIR AHMAD SIDDIKI, KAZI SAFIQUL ISLAM, MD. KAMRUL HASAN** and **REEDWANA SHAPLA** entitled **"INVESTIGATION ON EXISTING PEDESTRIAN SAFETY FACILITIES IN DHAKA CITY BASED ON PEDESTRIANS' OBSERVATION"** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Dhaka City, the capital of Bangladesh, is located in Dhaka District that is surrounded by rivers. Dhaka is located in central Bangladesh at $23°43'0''N, 90°24'0''E$, on the eastern banks of Buriganga River. Dhaka is a metropolis of 1528 km^2. Population density in Dhaka is over 10,000 per km^2 in the city area. The population in Greater Dhaka has already crossed 10 million and average annual growth rate is 7%. Over the last 10 years, the population of Dhaka has more than doubled. This growth has exceeded the demand for services in all sectors of society and the quality of life has been deteriorating. The city is now facing a crisis point when even small increases in activities and minor events cause wide-spread confusion, time wastages and potential danger to the people of the city. In Dhaka city pedestrians are the most vulnerable of all road users and require special facilities for their protection. The absence of a clearly defined system makes travel by this mode of travel unpleasant and hazardous. Some of the important factors which need to be addressed are; the lack of pedestrian first priority policy; the absence of continuous footpaths on both the main routes and the neighbourhood streets; poorly designed badly located and ill-advertised pedestrian crossings; encroachment on the footpath from traders and equipment and the absence of facilities for the movement of disabled persons, all contribute to a dangerous situation.

In the context of Bangladesh, pedestrians form the largest single user group. This is primarily because of the lack of sufficient transportation facilities and poor economic condition of the people. Besides these, day-by-day the pedestrian traffic of city is increasing rapidly.

There are 3 specific objectives in our thesis. Those are as: to find the factors that influencing pedestrian safety; evaluate the pedestrian safety in major arterial roads; recommend some possible improvement. A questionnaire survey was conducted topedestrian namely office worker, student, student parents, garments worker and of other occupations. The number of respondents of our survey are 200 persons in which 60 Students, 35 Garments workers, 15 Student parents, 60 Office workers, and 30 others.

Findings of this research show that:most of the pedestrian said that they are not feeling safe on road; most of the people are not using zebra crossing while they use road and also some of them have no idea about using zebra crossing; while some people are actually not interested to use footpath, foot over bridge or any other facilities provided on road. The result shows that most of the respondent

said they do not feel safe on road because of no application of traffic rules and lack of pedestrian facilities; pedestrian do not use footpath because of roadside hawker and insufficient place for walk; tiredness, lack of time and long distance to walk are the causes for not using foot over bridge; while most of the respondent replies that the condition of existing facility is poor.

The findings show that the present condition of existing facilities needs to be improved according to the respondents. It also shows that the pedestrian facilities are not adequate for these four locations like no application of traffic rules, poor condition of footpath, poor zebra crossings, poor drainage system, and uncontrolled traffic system. Awareness among the pedestrian should be increased and traffic rules should be applied strongly in case of the violating of traffic rules in order to provide a better pedestrian environment.

EFFECT OF GROUND IMPROVEMENT IN REDUCING SETTLEMENT OF STRIP FOOTING IN WEAK SOIL OVERLYING DENSE SAND

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We hereby recommend that the thesis prepared by Bulbul Ahammed, Md. Jakir Hossain, Md. Jahid Hasan, Md Al-Amin Basher entitled "Improvement of Existing ground for Settlement of Shallow Foundation " is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Soils with poor engineering properties are often encountered at shallow depths. Such soil layers are often found so weak that it can barely carry the pressure from the structure through the foundation. The thickness of the weak soil layer often exceeds the maximum possible thickness that can be replaced by a better quality soil. Therefore, while building any major structure or constructing on soils having allowable bearing capacity below about 40 kPa, pile and mat foundations are considered for supporting the structures. On the other hand, while building light structures shallow foundation is often selected if the structural load will not cause excessive settlement of the underlying soil layers. As it supports structures at a shallow depth below the ground surface, this type of foundations has limitations in their use in such locations having thick bed of weak soil near the ground. The selection of shallow foundation depends on different factors such as: the load-bearing capacity of soil, the magnitude of loads, the settlement of the underlying soil layers, the configuration of the structure, and other conditions that can occur in a project. Shallow foundation is usually be more economical type of foundation by a wide margin than the nearest alternative. In case of constructing light structures on the soils having allowable bearing capacity below about 240 kPa, a suitable ground improvement technique is applied, sometimes at little and sometimes at great cost, to overcome the limitations of selecting shallow foundation. Because, shallow foundation is usually be more economical type of foundation by a wide margin than the nearest alternative.

This study presents the data of five standard penetration tests conducted in Khulna Division, Bangladesh. All the SPT data show that there exists a 6-9 m deep bed of weak soil layer, near the existing ground level, overlying deep dense sand layers in the test location. For supporting a low contact pressure of 79 kPa at foundation base level, the settlement of a strip footing placed at 1.5 m depth was studied using a correlation software NOVOSPT. To limit the total settlement of the footing within maximum allowable settlement of 2.5

cm, two different strategies of ground improvement were examined. One of the strategies was placing of the footing in a 3 m thick compacted layer of good soil overlying the existing deposit. This is commonly practiced in Bangladesh but this study had not found it effective in reducing the settlement of the strip footing for the location under consideration. Therefore, this study recommends to improve the weak layer giving SPT N values at least 12, and then to place a compacted soil layer giving similar SPT N value over it. The footing can then be placed in the compacted layer of good soil. The total settlement of the footing on the soil after taking the proposed two stage measures was recalculated. This study has found the proposed measures effective in reducing the total settlement of strip footing significantly.

EFFECTS OF SOIL IMPROVEMENT ON THE BEARING CAPACITY OF STRIP FOOTINGS

Thesis

Submitted to the Department of Civil Engineering

UNIVERSITY OF ASIA PACIFIC

By

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We hereby recommend that the thesis presented by **Babul Hosen, S.M. Samiul Islam, & Mahmud Hasan** entitled **"Effects of Soil Improvement on the Bearing Capacity of Strip Footings"** is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Abstract

Soils with poor engineering properties are often encountered at shallow depths in Bangladesh. Such soil layers are often found so weak that it can barely carry the pressure from the structure through the foundation. The thickness of the weak soil layer often exceeds the maximum possible thickness that can be replaced by a better quality soil. Therefore, while building any major structure or constructing on soils having allowable bearing capacity below about 40 kPa, pile and mat foundations are considered for supporting the structures. On the other hand, while building light structures, shallow foundation is often selected if the structural load will not cause excessive settlement of the underlying soil layers. Shallow foundation is usually more economical type of foundation by a wide margin than the nearest alternative. In case of constructing light structures on the soils having allowable bearing capacity below about 240 kPa, a suitable ground improvement technique is applied, sometimes at little and sometimes at great cost, to overcome the limitations of selecting shallow foundation.

The bearing capacity of a strip footing was studied for the profiles, where a deep bed of weak soil having field SPT below 4, overlying a deep bed of dense sand layer using a correlation software NOVOSPT. In this respect, field SPT data was collected from five borehole locations of Khulna Division, Bangladesh. In this thesis, an effective way to satisfy the requirements of shallow foundation in a deep bed of weak deposit overlying dense sand has been proposed, based on the results of bearing capacity analysis. In this respect, the effectiveness of the principle, commonly practiced in Bangladesh, has also been examined and was found unable to satisfy the design requirements of shallow foundation.

USERS' OPINION ASSESSING THE ATTRIBUTES OF BUS SERVICE QUALITY IN DHAKA CITY

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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I hereby recommend that the thesis paper prepared by Saleh Ahmed Shamim, Rifatul Islam Razim, Md. Soharab Ali, and Md. Rejaul Karim entitled **USERS' OPINION ASSESSING THE ATTRIBUTES OF BUS SERVICE QUALITY IN DHAKA CITY** be accepted as fulfilled the requirement for the Degree of Bachelor of science in Civil Engineering.

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ABSTRACT

The environment of public transport in Dhaka City is characterized by traffic congestion and delays, inadequate traffic management, unaffordable and inaccessible public transport for majority of the people, high accident rates and increasing air pollution problems. It has seriously been deteriorated and in many respects has already reached in a crisis level. But in the bus based public transport resource is not the main hindrance. The main problem is operational weakness of the present resources. To find the deficiencies first of all it is necessary to evaluate the present operational modes.

Despite the crucial function of public buses plying in developing countries, their roles are disrupted for different reasons. Transportation system of Dhaka city is under huge challenge of managing growing number of private cars and non motorized vehicles. Traffic congestion had become an everyday scenario of this city. Policy maker consider increasing the number of public buses as solution in most cases. The objective in this thesis is to find out the drawbacks of bus service based on user perception.

The thesis reports the existing service and the users' opinion about the service level of public bus operating within the city. For this purpose, four different bus stoppage had been chosen and a total of 200 passengers of bus (50 from each stoppage) had interviewed with a pre-determined structured questionnaire to know their experience/satisfaction and opinion about the existing service and as well as their expectation. It was found that maximum respondents think the service does not provide enough safety and security, does not maintain proper vehicle scheduling while ticket counter are not sufficient and ladies seat are not available. The result shows that fitness of the bus is poor, buses are dirty, and seats are uncomfortable while bus fare seems fair. It was found that the bus drivers don't obey the traffic rules. To anticipate the future, the exploration regarding many related aspects with service quality of bus is essential.

ANALYSIS OF TWO-WAY RC SLAB UNDER IMPACT LOAD

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We hereby recommend that the thesis presented by **Ashraful Islam and Md. Jafar Ikbal** entitled **ANALYSIS OF TWO-WAY RC SLAB UNDER IMPACT LOAD** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

With a growing awareness to resist both dynamic and static loads, several structures need to be designed for impact loads. An accidental impact load can be caused by mishaps in industry as well as accidents stemming from transportation or man-made disasters.

The overall objective of the study is to investigate the dynamic behavior of reinforced concrete slab under impact loading with respect to displacement and time. This study investigates the effects of different types of applied impact loads and shock absorbing foams on the dynamic response and behavior of reinforced concrete slabs. Displacements vs. time relationship for all the specimens are studied. The numerical study is based on nonlinear dynamic analysis using the software ABAQUS, possibly the first such work in this country.

The numerical results are compared with results obtained from the field test data. Drop weight tests are performed on eight RC slab specimens (size 4ft × 4ft × 1in) loaded by two impactors (weighing 150 lb and 500 lb). The numerical results matched reasonably well with the field data in some cases, but not too well in some other cases, particularly ones with shock absorbing foams. This shows some possible room for improvement required in both the numerical and experimental works performed.

PRESENT STATUS OFTHEBURIGANGA RIVER

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ABSTRACT

For several decades, river pollution and fresh water depletion are viewed as one of the top environment problems in Asian region. The Buriganga River in Bangladesh is subject to sever pollution and considered as one of the worst polluted rivers in the World. Especially, the development of tannery industry at Hazaribagh that has contributed to Bangladesh economy is causing pollution and the disruption of the ecosystem. To the water shed environment. As a result, the environmental problems are getting worse. According to the Export promotion Bureau (EPB) of Bangladesh, export earnings from leather industry was US$401.64 million in 2009-2010. But Hazaribagh tannery city consisting of 196 tanneries is discharging hazardous effluents everyday directly to the to the Buriganga without any treatment. This is responsible for he high Biochemical Oxygen Demand (BOD) and low Dissolved Oxygen (DO) values in Buriganga water. Low DO value in Buriganga water and such relation is a crucial problem in any developing country that stresses on economic growth compromising environmental pollution. Inadequate waste water management systems, lack of sewerage and infrastructure facilities in on hand and lack effective pollution control measure and their strict enforcements may be largely responsible for this alarming problem and grave situation. When at the same time several dying industries at the river bank as well as the medical and dispensary wastes and solid wastes also produce irreversible hazards to Buriganga and surrounding environment. The pollution by the tanneries and health hazards caused by the pollution has also been investigated. Several government decisions has been made to revive the tolerant condition of Buriganga among which the shifting Tanneries from Hazaribagh to Saver area and subsidies to the toxic industries for establishing Effluent Treatment Plant(ETP) can be mentioned, but none of these projects have been implemented yet. That's why, Buriganga, the glory of Dhaka is under the threat of demolition and wiping out effect. The adjacent areas of Buriganga River like Keranigang and Kamrangirchar are also severely affected. At the end of this thesis, several proposals regarding the improvement of water quality of Buriganga River are highlighted.

University of Asia Pacific

Idea for a Brahmaputra River Basin Commission: Lessons from Mekong and Sava Rivers Basins

A Thesis

Submitted to the Department of Civil Engineering

UNIVERSITY OF ASIA PACIFIC

By

Md. Marufur Rahaman

Registration number: 10205065

In partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Under the supervision of

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UNIVERITY OF ASIA PACIFIC

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We hereby recommend that the thesis prepared by **Md. Marufur Rahaman** entitled ***"Idea for a Brahmaputra River Basin Commission: Lessons from Mekong and Sava Rivers Basins"*** 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 Brahmaputra is the 22nd longest river of the world. The Brahmaputra river has a total length of 2,880 kilometers. Total drainage area of the Brahmaputra River Basin is around 5,734,000 square km. The Brahmaputra River Basin is shared by China, India, Bhutan and Bangladesh. The course of the Brahmaputra has changed continually over time. But at this moment, the absence of integrated management of the Brahmaputra River Basin stands for an ongoing threat to future development in the Brahmaputra River Basin. Several studies show that integrated Brahmaputra River Basin management with effective participation of all riparian countries could ensure sustainable development in the whole region. This study analyzed Mekong and Sava Rivers Basins Commissions to understand how rivers basins are managed by riparian countries through formal commissions. Based on the experiences from Mekong and Sava Rivers Basins Commissions, this thesis provides a preliminary idea for a Brahmaputra River Basin Commission (BRBC). This commission could be instituted by all riparian countries of the Brahmaputra Basin (China, Bhutan, India, and Bangladesh). If implemented, proposed Brahmaputra River Basin Commission could potentially support the integrated development of the Brahmaputra Basin that promotes sustainable development of water and related resources for the riparian countries.

WATER PRICING FOR SLUM DWELLERS IN DHAKA METROPOLITAN AREA: IS IT AFFORDABLE?

Tahmid Saif Ahmed

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In partial fulfillment of the requirements for the degree of
Bachelor of Science in Civil Engineering

UNIVERSITY OF ASIA PACIFIC

DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by Tahmid Saif Ahmed, Abdullah Al-Hadi, Abdus Salam entitled 'WATER PRICING FOR SLUM DWELLERS IN DHAKA METROPOLITAN AREA: IS IT AFFORDABLE?' be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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26.01.2015

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Abstract

Like many other developing countries, Bangladesh is facing serious water management challenge to ensure affordable water supply for all, especially in urban areas. Both the availability and the quality of water are decreasing in the poor urban areas. Besides, the population situation of the country is getting worst in Dhaka, the capital of Bangladesh, which became one of the megacities in the world in terms of population and urbanization. The aim of this thesis is to address the following question: "Are slum dwellers in Dhaka city capable for paying for Dhaka Water Supply and Sewerage Authority (DWASA) services?". This study focused on three slums in Dhaka city namely Korail slum, Godown slum and Tejgaon slum to determine the current water price in selected slums and to compare it with water price of other cities of the world. A field study has been conducted during July and August 2014. It involves semi structured questionnaire survey and focus group discussions with slum dwellers and various stakeholders. For secondary data source, a wide range of books, peer-reviewed articles, researcher documents, related websites and databases have been reviewed. Result shows that slum dwellers are paying about 7 times higher than legal connection holder. Slum dwellers are paying about 23% of their average monthly income for domestic water supply, whereas in most of the countries, legal connection holders are paying less than 5% of their average monthly income for the same purpose. It is also observed that laws to prevent environmental pollution are rarely enforced. Overall service delivery is considered to be poor due to an inadequate tariff structure, high non-revenue water, lack of authority and commitment, inadequate management capacity, lack of sector coordination, inadequate investment, absence of effective decentralization, etc. The situation can be improved by higher investment, effective private sector participation, improved billing and revenue collection, structural reforms, establishing a regulatory body and finally converting DWASA into a truly service oriented commercial organization. Finally, it is observed that the slum dwellers in Dhaka City are capable for paying for DWASA.

Transboundary River Dharla:

Its Water availability and watershed people's Livelihood inside Bangladesh.

MD. MAHMUD HASAN

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CERTIFICATE OF APPROVAL

We hereby recommend, that the thesis presented by **MD. MAHMUD HASAN** entitled **"Transboundary River Dharla: Its Water availability and watershed peoples Livelihood inside Bangladesh"** be 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 contributes to understand the dependency of the people of the watershed of Dharla on the river. In few words Dharla River is a tributary of the Brahmaputra River, located in Bhutan, India and Bangladesh. Several impacts have focused on this study to get a clear view of the present situation. Also, recent hydrological data have analyzed to know the water availability.

The first stage of this work was to collect a large data set to characterize the nature and agricultural contexts of the Dharla watershed. The watershed has a contrasting topography, with mountains upstream and large plains downstream. It experiences high rainfall with a monsoonal pattern and an average of 2000 mm/year. The river flow is perennial, with a sustained flow during the dry season, high flows during the monsoon and recurrent flood events. The soils are sandy loam (upstream) to silty loam (downstream), with little permeability. The aquifers in the region are alluvial and the groundwater levels in the watershed are shallow and stable.

This study contributed to the development of a precise land use map which identifies the natural vegetation, the water bodies, the flood, the river bank erosion and the different cropping sequences in the agricultural land. Agricultural statistics were gathered at administrative levels for cropping sequences and crop yields. The irrigation in the watershed is predominantly from groundwater, with diesel pumps, to irrigate rice during the summer and potatoes during winter. This study has also expressed the effect of flood and people's condition, limitation, demand and the face of disaster.

Several surveys have been done in different issues like Flood, River Bank Irrosion, Crop, Siltation, Livinghood, Drought, etc. Those surveys and information shows the importance of Dharla as an transboundary river.

This paper ends by focusing the issues of the local people from this river and their future possibilities so that they may use this natural resource properly and without creating any environmental issues.

A STUDY ON CLIMATE CHANGE IMPACT ON THE LIVELIHOODS OF THE PEOPLE IN TANGUAR HAOR

A Thesis

Submitted to the Department of Civil Engineering

UNIVERSITY OF ASIA PACIFIC

By

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In partial fulfillment of the requirements for the degree of

BACHELOR OF SCIENCE IN CIVIL ENGINEERING

Under the supervision of

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UNIVERITY OF ASIA PACIFIC

Spring 2014

UNIVERSITY OF ASIA PACIFIC
DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by **Kamrul Islam Sajib, Intekhab Alam, Anamul Haque & Mehedi Hasan** entitled **"A study on climate change impact on the livelihoods of the people in Tanguar haor"** is accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Abstract

Bangladesh is generally viewed as a vulnerable country with respect to climate change because of its unique geographic location, dominance of flood plains, very low average altitude natural disturbance regimes, high population density, elevated level of poverty and overwhelming dependency on nature and its resources and services. Previous studies reveal that Surma-Kushiyara river system known as *haor* basin is projected to be under additional stress that climate change will cause to its temperature and rainfall pattern. Tanguar *haor* which is located in the north-eastern region of Bangladesh is characterized by large round shaped floodplain depressions and marshy lands. This research focuses on the climate change impacts on the environment, water resources, flood, fisheries, cropping patterns etc. that effects the livelihoods of the people living in the Tanguar *haor* area. Primary data has been collected from various government agencies (i.e., BMD, BWDB, BHWDB, IUCN) and through field level questionnaire. Secondary data has been collected from official documents, papers, books and reports. This study identified that changes in land use patterns, flash flood, flood, river bank erosion, water pollution and reduced fisheries are the usual hazards and risks associated with climate change impacting the livelihoods of the Tanguar *haor* communities. In conclusion, some recommendations were suggested for the community for mitigating and adapting with the climate change impacts and reducing climate change related vulnerabilities.

RAIN WATER HARVESTING IN UAP CITY CAMPUS

Spring 2014

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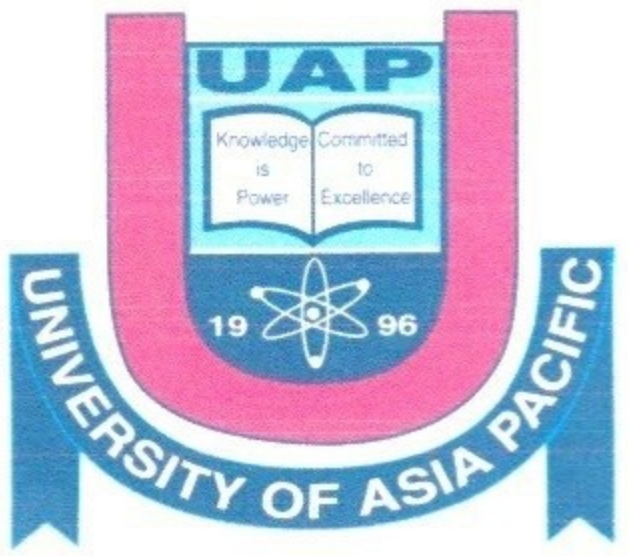

DEPARTMENT OF CIVIL ENGINEERING

UNIVERSITY OF ASIA PACIFIC

DHAKA

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by **NASIRUL ISLAM, PARTHA CHANDRA SARKER & MD. NAZMUL HUDA** entitled **"RAINWATER HARVESTING IN UAP CITY CAMPUS"** be accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

In recent time, a crisis of water supply takes place around the Dhaka city especially in the dry season (November to March). All level of people greatly suffers throughout this time. On the contrary, in the period of monsoon (April to October), a huge amount of unused safe, clear and pure rainwater is drain mostly as runoff or through existing drainage system and ultimately reach rivers surrounding Dhaka city. There is a large scope to utilize rainwater for different purposes by storing or direct recharging the aquifer. In Dhaka city, 80% of the total supplied water comes from groundwater and the remaining 20% comes from surface water. However, the water demand is increasing as the higher growth rate of population in Dhaka city. This large volume of groundwater use is creating extra pressure on ground water. Statistics shows the underground water level is depleting 34.58m per 10 year so it is declining more than 3m annually. Considering the population pressure on the city, water crisis in the city will be more acute in the near future unless alternate source of water is found. Surface water (rivers) around the city cannot be the solution considering its water availability throughout the year and its quality. In this backdrop, rainwater harvesting system may be considered as a sustainable solution. University of Asia Pacific city campus located at Green Road near Farmgate is selected for this study.

Study shows that the harvested rainwater can only meet the drinking, washing and sanitation demand. But provides significant supplementary support during monsoon season. From our study we found that, in the months of April to October we found significant results.

NUMERICAL AND SHAKE TABLE ANALYSIS OF STEEL STRUCTURES

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We hereby recommend that the thesis presented by **ANIK ALAMGIR, AYESHA SIDDIQUA, MD. MEHEDI HASAN** and **MAHFUZA TABASSUM** entitled **NUMERICAL AND SHAKE TABLE ANALYSIS OF STEEL STRUCTURES** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

This thesis presents the results of a study on the structural response of multistoried steel structures subjected to seismic ground motion. Nonlinear Dynamic Analyses of three steel building models are used in this study. The effect of deflection of structure is examined in this analysis. 'ETABS 13', computer software capable of performing nonlinear dynamic analysis, is used to perform most of the analysis in this study. The systemic parameters considered are geometric nonlinearity of structure (P-Delta), proportional damping, scale factor, number of out-put time steps, output time steps size.

Verification of ETABS 13 analysis with experiments is also an important part of this study. Laboratory experiments provide results that are compared to the analyses results and hence the efficiency of the software is evaluated. Three ground motions are used in this study to generate the record of displacement vs. time curves (using scaled El Centro ground motion data of various time durations). These ground motions are scaled to laboratory data prior to their applications. The numerical results matched reasonably well with the laboratory data.

EFFECT OF LIMESTONE POWDER ON MECHANICAL PROPERTIES OF CEMENT MORTAR

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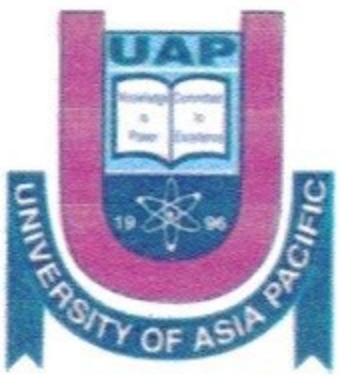

Department of Civil Engineering
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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis prepared by **Md. Mostofa Kamal, Nafiz Khan Majlish, and Md. Al Sohanur Reza** entitled **"Effect of limestone powder on mechanical properties of cement mortar"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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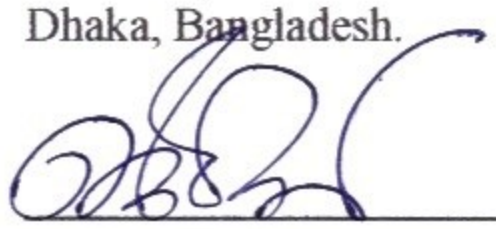

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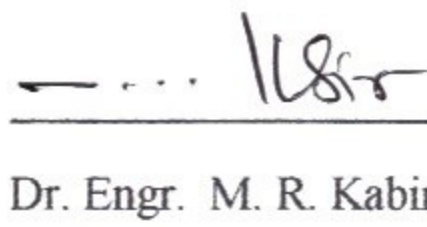

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ABSTRACT

Limestone powder used as a mineral admixture with cement to improve the physical and mechanical properties of cement concrete. It helps to increase the workability, stability, and durability of concrete. Until now, different codes permit different percentage of limestone powder in cement. Use of limestone can reduce the clinker requirement and save the environment. Effect of limestone powder (filler material) on the mechanical properties of cement mortar are studied. Mortars are made of different replacement of limestone with Portland composite cement (CEM II-BM) by using the w/c ratio 0.475. Compressive strength was tested at 3, 7, 14 and 28 days after curing of cement mortar. Test results showed that the maximum compressive strength was obtained for 15% limestone replacement at 28 days. Results also showed that the increasing of limestone replacement gradually decreases the compressive strength of mortar and test age has also effect on compressive strength. But these properties reduces at later ages for continuous limestone addition.

MECHANICAL PROPERTIES OF STEEL FIBER REINFORCED CONCRETE

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We hereby recommend that the thesis prepared by **Md. Farhad Hossain, Md. Ariful Haque, and Md. Mazharul Islam** entitled **"Mechanical Properties of Steel Fiber Reinforced 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

A detailed study on mechanical properties of steel fiber reinforced concrete was conducted. For this steel fiber concrete cylinder specimens of size 4" dia and 8" length were made with W/C=0.4 and aspect ratio 47 and64.For comparison, specimen were made with stone aggregate without using any fiber. After 28 day curing, the specimens were tested Under the Universal Testing machine (UTM) as per ASTM A-820 to determine the mechanical properties of concrete made with different percent of fiber. Based on the experimental results, a comparative study on mechanical properties of concrete made with different percentage of fiber and aggregate. Several relationships tensile strength, compressive strength, stress strain relation are also developed.

Keyword: steel fiber, aspect ratio, ductility, abrasion, fatigue strength.

COMPUTER AIDED ANALYSIS AND DESIGN OF A MULTI-STORIED RESIDENTIAL REINFORCED CONCRETE BUILDING

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University of Asia Pacific
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Certificate of Approval

The Project entitled **"Computer Aided Analysis and Design of a Multi-Storied Residential Reinforced Concrete Building"** submitted by H.M. Golam Samdani & Md. Noman Kamal Sabbir has been accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Bangladesh is a densely populated developing country. Everyday huge amount of construction works are undertaken. Nowadays most structures are RCC structures. The volume and types of works range from construction of six-storied residential building to multistoried market complex. Due to enormous amount of civil engineering works, the structural engineering has been developed in various dimensions in our country. The computer software is helping the engineers in solving the increasing problems very quickly and easily. Many popular programs are being used in this regard.

In order to compete in the ever growing market, it is very important for a structural engineer to save time. As a sequel to this, an attempt is made to analyze and design a multistoried building by using a software package ETABS. For analyzing a multistoried building one has to consider all the possible loadings and see that the structure is safe against all conditions. There are several methods for analysis of different frames like kani's method, cantilever method, portal method, and Matrix method. The present project deals with the analysis of a multistoried residential building of G+7 consisting of 4apartments in each floor. Thereafter, the loads are calculated namely the dead loads, which depend on the unit weight of the materials used (concrete, brick) and the live loads, according to the code (BNBC 1993). Lateral loads i.e. seismic and wind load as per BNBC 1993 are also considered in designing the building.

ETABS with its new features surpassed its predecessors with its data sharing capabilities with other major software like AutoCAD, SAFE and MS Excel. It is a very powerful tool which can save much time and is very accurate in designs. SAFE is also a powerful tool for foundation design and analysis, which can save much time and is very accurate in designs. Both are suitable for the design of a multistoried building.

COMPUTER AIDED ANALYSIS AND DESIGN OF A MULTI-STORIED COMMERCIAL REINFORCED CONCRETE BUILDING

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Certificate of Approval

The Project entitled **"Computer Aided Analysis and Design of a Multi-storied Commercial Reinforced Concrete Building"** submitted by Md. Mahadi Hasan & Md. Muntakimul Hasan has been accepted as fulfilling this part of the requirements for the degree of bachelor of Science in Civil Engineering.

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ABSTRACT

Dhaka is the largest city in our country. As it is rapidly developing the construction in the city is very costly. Now-a-days the construction of multi-storied building is common in our country. Manual calculation of a multi-storied building is very difficult and it may makes error in calculation and also takes long time to design. But using design software it is very easy to analyze and design a multi-storied building. Using design software, it reduce error and provides more accurate results and save time. If the building is designed by using software, it can also possible to make the design economically. There are many softwares in civil engineering fields such as ETABS, STAAD PRO etc. In this project, the building is designed using ETABS software.

The purpose of this major project is to analyze and design a structural system for an illustrative commercial building in Dhaka. The design process included an architectural layout, structural framing options using reinforced concrete, a flat roof, and a partial glass curtain wall. The work is completed in compliance with the ACI 318-11 and BNBC codes.

This report outlines the structural design of a reinforced concrete commercial building with one basement + 10 storied structure following BNBC 1993 codes. The framing arrangement and column locations of the building were provided based on architectural and structural requirements. The structure system of the building is a reinforced concrete frame with a two-way slab and beam floor system. This report covers the design process in the following order: the calculation of the expected loads on the structure, the design of the slab depth, the estimation of the column sizes, the design of the slab reinforcement, the design of the beam reinforcement for both flexural and shear, the calculation to check crack control, the calculation to check beam deflections and finally the design of the column reinforcement. Additionally, figures displaying the placement of the steel rebar in the structure are contained in the report.

ASSESSMENT ON AIR POLLUTION AND SOLID WASTE REDUCTION IN DHAKA CITY USING POLLI BRICK

SPRING 2014

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CERTIFICATE OF APPROVAL

We hereby recommend that the thesis presented by Sakhawath Hossain Rajon, Khokon Ahmed and Prodip Kumar Saha, entitled with **"ASSESSMENT ON AIR POLLUTION AND SOLID WASTE REDUCTION IN DHAKA CITY USING POLLI BRICK"** be accepted in fulfilling as a part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Abstract

Air pollution is one of the major environmental concerns around the globe. Rapid urbanization enhanced by population growth, accelerates the demand of new housing and hence increases the demand of brick construction. The growing number of brick fields throughout the country has exacerbated the air pollution scenario, especially in Dhaka and its nearby area. To reduce brickfield emission, this study has proposed an alternative to conventional brick, names as POLLI BRICK, which is already being used in many countries. The scope of reducing solid waste volume to be disposed to the environment by reusing discarded plastic has also been assessed in the study. Production of about 9 million bricks from 930 brick fields, located in Savar, Kaliganj, Ropganj and Narayanganj, emit about 315 tons of carbon dioxide per year. The study showed that if 50% conventional brick can be replaced by Polli Brick (made of plastic), then carbon dioxide production can be reduced to 6.3% per year. Again, 51% of the generated plastic waste is recycled in Dhaka by Dhaka City Corporation. Hence, remaining 49% plastic, otherwise discarded to landfill, can be used to make Polli brick, resulting in 100% potential for volume reduction of the generated plastic waste in Dhaka.

University of Asia Pacific

Potential Artificial Ground Water Recharge Methodologies for Dhaka City

Submitted By

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Spring, 2014

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We hereby recommend that Thesis prepared by Akter Hosen Samu, Md.Sadab Hossain, and Tabassum Nasrin entitled "***Potential Artificial Ground Water Recharge Methodologies for Dhaka City***" be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

About 87% of current water supply, provided by Dhaka Water Supply and Sewerage Authority, (DWASA) is extracted from ground water. On the other hand, surface water being severely polluted, cannot be used as a water supply source. In this situation, heavy extraction of ground water causes significant depletion of the water table, at a rate of 2-3 m per year. To recognize this issue, the study assesses potential ground water recharge methods for two prominent urban hub, namely Dhanmondi and Mohammadpur, within the city. Eight recharge methods/ structures were studied against five selected criteria, such as – soil condition, rainfall condition, water requirement, effective porosity and impervious coverage. According to selection criteria, Ditch & Furrow System, Dug Well, Recharge Shaft, and Stream Augmentation methods may be used for artificial recharge purpose but dug well would be more preferable. Again, cost analysis showed that dug well would be more economical. Also, dug well showed the highest recharge potential among other methods. The study will be helpful to researchers, government agencies and students, in order to identify the potential methods to be used for ground water recharge.

EFFECT OF LIMESTONE POWDER ON MECHANICAL PROPERTIES OF CEMENT MORTAR

SPRING 2014

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UNIVERSITY OF ASIA PACIFIC
DEPARTMENT OF CIVIL ENGINEERING

CERTIFICATE OF APPROVAL

We hereby recommend that the thesis prepared by **Md. Mostofa Kamal, Nafiz Khan Majlish, and Md. Al Sohanur Reza** entitled **"Effect of limestone powder on mechanical properties of cement mortar"** is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Limestone powder used as a mineral admixture with cement to improve the physical and mechanical properties of cement concrete. It helps to increase the workability, stability, and durability of concrete. Until now, different codes permit different percentage of limestone powder in cement. Use of limestone can reduce the clinker requirement and save the environment. Effect of limestone powder (filler material) on the mechanical properties of cement mortar are studied. Mortars are made of different replacement of limestone with Portland composite cement (CEM II-BM) by using the w/c ratio 0.475. Compressive strength was tested at 3, 7, 14 and 28 days after curing of cement mortar. Test results showed that the maximum compressive strength was obtained for 15% limestone replacement at 28 days. Results also showed that the increasing of limestone replacement gradually decreases the compressive strength of mortar and test age has also effect on compressive strength. But these properties reduces at later ages for continuous limestone addition.

USE OF FLY ASH FOAMED CONCRETE FOR IMPROVEMENT OF ROAD PAVEMENT.

A Thesis on transportation engineering

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ABSTRACT

Foamed concrete has become most commercial material in construction industry. Fly ash is receiving more attention now since their uses generally improve the properties of blended cement concrete, cost saving and reduction of negative environmental affects. Fly ash is used as a fine aggregate. This paper describes an investigation into the foamed concrete in the improvement of road pavement. This project work is also discussed material of foamed concrete their properties and requirement. A paper is worked with different type of sand such as local sand and sylhet sand. All the data of foamed concrete test have been presented in the form of tables and XL group. The laboratory test result indicate that the compressive strength of foamed concrete were acceptable for improvement of foamed concrete. The making of foamed concrete with different type of sand provide to the adequate for the traffic load. The appropriate recommendations regarding use of well graded sand, proper water cement ratio and proper amount of fly ash.

JUTE FIBER MIXED WITH BITUMEN

A thesis on transportation engineering

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Abstract

The objective of this study was to improve the properties of bitumen 60/70 grade with addition of Jute fibers in various ratios in the place of bitumen 80/100 grade in Bangladesh. It is expected to give a more firm mixture with better compressibility, stability and durability. The introduction of fiber is expected to provide more abrasive resistance and increase void tends to decrease bleeding with applied loads and compaction. The purpose of the work presents the study on stability, flow and volumetric properties of the jute fiber mixed with bitumen as 1% and 0.5%, and length of the fiber was 3mm, 4 mm. Optimum fibers content and optimum fiber length of jute fiber was used.

Bitumen is one of the most important materials for roads. Bangladesh has an area of 147,570 square kilometers and extends 820 kilometers north to south and 600 kilometers east to west. This country consists National Highway = 3544.06 km, Regional Highway = 4278.07 km, Zilla Road = 13,247.79 km, Total Road Length = 20,947.73 km. All of these roads use bitumen 80/100 grade for coating the surface. By using 60/70 grade of bitumen it can improve the aging resistance, higher fatigue life of mixes, Delay thermal cracking, and improve Temperature *susceptibility etc.*