Evaluation of Solid Waste Management Systems in Two Different Public Places in Dhaka City and Application of Barrel Composting

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 study was conducted to investigate the present solid waste management practices in two different institution buildings in two different places. Huge solid wastes are generated every day in these buildings but the waste management is not properly done because of their irregular waste management activities or unawareness. A major percentage of dumps that produced solid waste in their surroundings cause various hazards in human health and environmental problems. This improper waste management can be managed by the regularity of management work, building awareness among the people and improving waste treatment systems. It was revealed from the study that the problems exist in terms of lack of knowledge among people regarding solid waste management, lack of adequate budget for waste management, lack of available transport vehicles for waste management, lack of proper solid waste treatment plant etc. The total solid waste management system need to incorporate proper planning, creating awareness, developing infrastructure, providing logistic support and finally involving NGOs, CBOs, public in this process. This study was done by questionnaire survey in a well known shopping complex and a hospital premises. Several questions were asked on the solid waste management in these two institutions. The people who are involved with solid waste management in these two institutions were chosen to answer the questions. A sustainable solid waste management can be established which can lead the studied institutions to a healthy setting. Barrel compost can be used in these two institutions as the reduction and reuse process of bio-degradable waste. More over this waste can be use as a fertilizer for gardening or in the seedling. Money also can be earned by marketing this fertilizer. An operation on composting was done in this study using a composting barrel and different parameters eg. pH, temperature, volumetric change, moisture content etc. of the solid waste were measured with time related with composting. This parameters were measured on twenty seven days' laboratory work. Application potential of barrel composting in the institutions was also evaluated. Composting as a sustainable solution has been prescribed in this study for the management of solid waste in public places.

DYNAMIC ANALYSIS OF RC AND STEEL STRUCTURES AT ELEVATED TEMPERATURE

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ABSTRACT

Structural response at elevated temperatures is a topic of great interest to engineers. Mechanical properties of construction materials (e.g. steel and concrete) are temperature dependent. The modulus of elasticity, yield strength, proof stress and ultimate strength decreases with increase in temperature and increases at low temperature. In addition to these short-term effects, temperature can result in long-term consequences which may be detrimental.

The main objective of this thesis is to assess the behavior/response of a structure in elevated temperature or in fire. For this purpose typical 6-storied concrete and steel buildings are designed (using the software ETABS) as model structures. Section properties such as flexural rigidity (EI) and plastic moment (M_p) are determined up to the failure point, using FORTRAN programming language.

The 6-storied buildings are converted to Single Degree of Freedom (SDOF) systems to determine their first modal mass and modal stiffness. Changes in mechanical properties of concrete and steel with increase of temperature are studied. Lateral deflection of top slab for wind load at different elevated temperature is observed and found to increase accordingly. Deflection for earthquake motion with different time as well as elevated temperature is studied. Blast pressure increases drastically with the decreasing of stand-off distance and also increases with the increasing charge weight. For maximum load capacity of slab using ETABS, maximum vertical deflection was determined. Using these vertical deflections from dynamic analysis displacement with respect to time and temperature is obtained.

FERROCEMENT RETROFITTING OF CONCRETE STRUCTURES SUBJECTED TO DYNAMIC LOADS

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ABSTRACT

The demand for affordable housing is increasing day by day in our country. Nowadays it is a big challenge for civil engineers to construct a sustainable low cost building with high strength. Ferrocement (FC), Compressed Earth Block (CEB) and Sand Bag (SB) are the possible solutions of this problem. Ferrocement repair and rehabilitation systems can increase the strength of structure. It also has adequate resistance to fire, corrosion, impact and earthquake. CEB is completely natural, non-toxic and environment friendly, with excellent resistance to sound, fire and insect. The main benefit of CEB is its sustainability. The Sand Bag building systems are cheap, easily available, transferable and reduces CO_2 emission by up to 95% compared to brick. They can withstand rain, flood, wind or fire all of these hazards better than a conventional house. So, it is important to know the physical properties and construction procedure of these.

After a brief literature review of all three elements and discussion of their relative advantages, this study particularly analyzes Ferrocement slabs with different dimensions, reinforcement arrangements and RC column with and without Ferrocement coating. Nonlinear dynamic analyses are performed of the Ferrocement slabs for impact loading and FC-coated RC columns for earthquake ground motion, using computer programs written in FORTRAN. Parametric studies show the importance of reinforcements in the FC coatings, and their significant contribution particularly to under-designed/ poorly designed RC members.

NUMERICAL ANALYSIS AND SHAKE TABLE TEST OF SOIL AMPLIFICATION

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ABSTRACT

The effect of soil condition on earthquake response has presented in this thesis. Both experimental works and their numerical verification have been performed. Here soil is considered as linear elastic material and spring plate is used to make layered soil system. Six models of soil are used in this experiment, each model being subjected to three different durations of modified El-Centro earthquake ground motion in the Structural Mechanics and Strength of Materials Laboratory at UAP. Both displacement vs. time and acceleration vs. time data are collected. While displacements are recorded by paper-marker arrangements, Smartphone accelerometer is used to collect acceleration vs. time data. Numerical analysis is performed by Newmark-β method with a computer program written in FORTRAN. While the laboratory arrangement representing sub-soils as springs are quite novel, the use of Smartphone accelerometer to collect acceleration data is also new in Bangladesh.

From the observation of results soil amplification occurs in almost all soil condition; i.e. soil amplification factor is greater than unity in almost every case. The value of soil amplification factor depends not only soil properties (i.e. height of soil layer, shear wave velocity) but also ground motion properties (i.e. frequency). Experimental results match reasonably well with numerical results (both for displacement and acceleration) in every test case.

ANALYSIS OF WATER PRICING FOR DOMESTIC USE ATCHANDPUR MUNICIPALITY IN BANGLADESH

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Abstract

With rapid economic development, new challenges have been rising in Bangladesh. Even though Bangladesh is a riverine country, providing quality water at an affordable price is a major challenge for Bangladesh. In addition, ensuring efficient water supply network system is a big challenge for the responsible water authorities in all rural and urban area. This thesis aim is to find out the price of water per thousand liters in Chandpur Municipality area in Bangladesh. A field study was conducted in November, 2015. It involves semi-structured questionnaire survey and opinions from experts of the area. Secondary data has been collected from a wide range of books, peer-reviewed articles, related websites and journals. The study shows that people who receive water from Chandpur Municipality water department are paying around 6.5 taka for thousand liters of water whereas citizen of Dhaka City Corporation are paying about 8 taka per thousand liters of water. People who are not covered by the Chandpur Municipality water department collect water from tube-well and ponds. In uncovered areas due to lack of maintenance the water quality is not good that often contains heavy iron in water. The study shows a relation of water pricing with income of the local people. Results also show that citizen not covered by Chandpur Municipality water department are spending more money than covered areas. This study also finds that people from Chandpur water department covered areas are satisfied with water quality.

COMMON FAULTS OF CONCRETE CONSTRUCTION IN DHAKA CITY

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ABSTRACT

Typically, concrete construction related to many errors whatever the construction/structures type. Recently, concrete construction fault found in many concrete structures, which may be resulted from unskilled labor and dishonesty of owner. Lack of right supervision and maintenance of requirements for concrete structures. Therefore, due to the earlier mentioned issues, in Bangladesh, concrete construction faults is the obstacle of safety of human life and harmful for social economic condition. Hence the term "**Faults of Concrete Construction**" demand to be introduced among the people with great interest.

The main objective of this study is to identify common faults of concrete construction, In order to achieve the goals of the study, several under construction government and non-government buildings have been selected. The survey area is mainly focused on the information of poor construction process. Digital photography of error part in under construction structures such as clear cover, formwork, curing, segregation, lapping, cleaning, water cement ration, casting, placing etc. were observed.

In this study about 65% structures in government work and 35% structures in non-government. The 30% buildings have been surveyed in the study area. Most of the concrete fault found in beam, column, slab, foundation casting etc.

The results of the studies integrated into final report that part of the major faults in concrete construction in Dhaka city. The report give useful information for engineer, design farm, owner and labor.

Study on Concrete Deterioration of Building Structures in Dhaka City

A Thesis

Submitted to the Department of Civil Engineering

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ABSTRACT

Deterioration can destroy any building structure. Recently concrete deterioration is found in many building structures, which may be resulted from climate condition& other environmental factors and also from the limited availability of sustainable materials. Lack of repair and maintenance of concrete structure is seriously responsible for building deterioration. So in the densely populated country, concrete deterioration is the obstacle of safety of human life and harmful for social economic condition. Hence the term **"Concrete Deterioration of Building Structures"** demands to be introduced among the people with great interest.

The main objective of this study is to identify concrete deterioration of building structure of the selected area. The selected area has covered part of Dhaka city. The survey area is mainly focused on the information of deteriorated buildings such as structure type of building, plan irregularity, number of story, deteriorated spot etc. Digital photographs of deteriorated spot and front view of each building have been taken from different directions.

Distinct categories of buildings based on use purpose were made. According to this study about 60% buildings are residential building, 10% buildings are institutional buildings and 30% buildings are commercial & industrial buildings.

120 buildings have been surveyed in the study area. About 107 buildings are RCC, 9 buildings are load bearing wall and 4 buildings are other structure. Most of the deterioration found in wall. But slab, beam, column and others part of these buildings are also deteriorated randomly.

The results of these studies integrated into a final report that contains the present condition of building structure at Dhaka city. The report give useful information for emergency repair or mark as abandoned building as well as for the safety of human life and further investigations.

UNCONFINED COMPRESSIVE STRENGTH OF STABILIZED SOIL

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Abstract

Soil is the basic foundation for any civil engineering structures. It is required to bear the load without failure. In some places, soil may be weak which can't resist the oncoming loads. In such cases, soil stabilization is needed. Different soil improvement techniques are available; soil stabilization is one of them which is conducted to obtain the desired soil quality. The main objectives of soil stabilization are to increase the bearing capacity of soil, its resistance to weathering process and soil permeability. Soil stabilization is performed in three different ways: mechanical stabilization, chemical stabilization and polymer or alternative stabilization. In this study, the effects of two additives (lime and fly ash) on Dhaka clay are investigated. The effect of fly ash and lime on the geotechnical characteristics of clay-fly ash and clay-lime mixtures was investigated by conducting unconfined compression tests. In this investigation we will focus on strength variation for using lime and fly ash with variation of time. Searching for the best soil stabilizers to overcome problems occur by the soft soils are still being the main concern, not only to achieve the required soil engineering properties but also by considering the cost and the effect to the environment. In this regard, Atterberg limit test and standard proctor test results from previous study have been used in this experiment at University of Asia Pacific (UAP).

TOTAL QUALITY MANAGEMENT (TQM) OF UNIVERSITY OF ASIA PACIFIC (UAP) CIVIL ENGINEERING DEPARTMENT

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ABSTRACT

Total Quality Management (TQM) refers to management methods used to enhance quality and productivity in organizations and an integrated organizational effort designed to improve quality at every level. TQM in University of Asia Pacific (UAP) assess Civil Engineering (CE) department's activities towards students' satisfaction and identify civil engineering students' thoughts towards the department's governance, course curriculum, teaching and learning environment, and institutional infrastructure and facilities. The research on CE department was done only over 156 CE students by questionnaire survey, and authors have been found ten satisfactory sidesand ten unsatisfactory sides. The satisfactory sides are (1) extra-curriculum activities, (2) effective curriculum, (3) uses of technological devices, (4) fairness and transparency of academic decisions, (5) too heavy curriculum, (6) availability of teachers, (7) curriculum is effective in enhancing team-working abilities, (8) teachers provide additional practical ideas, (9) inspire student to become life-long learner, (10) Teaching and learning strategies inspires students, and the unsatisfactory sides are (1) wi-fi speed, (2) canteen environment, (3) food quality, (4)food menu, (5) food quantity, (6) indoor and outdoor healthcare facilities, (7) informative website, (8) library has adequate and up to date reference materials, (9) Students' opinion treated properly, (10) research findings are patented.It is believed that this research will be as a quality assurance guideline for enhancing higher education quality of UAP CE department.

SWOT Analysis On Civil Department Of University Of Asia Pacific

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ABSTRACT

There is no doubt that for an institution to actually remain stable, productive effort should be made to identify what constitute its strength, weakness, opportunities and threat, hence the acronym SWOT. It is the identification and careful analysis that would keep every productive institution going. If an institution does not make necessary effort to identify its strength, weakness, opportunities and threat, such institution is bound to fail in area of productivity as such institution will not be stable. The objective of this research is to find out the strengths, weaknesses, opportunities and threats of Department of Civil Engineering of University of Asia Pacific (UAP). The results show that condition of food quality, variety of food, food price, washroom facility, student capacity of library are very poor. On the other side, condition of well qualified faculty, follow the standard code in lab, motivation of faculty members, effective use of course materials, well maintenance of class schedule are excellent. The recommendations are suggested so that UAP can improve its strength and opportunities and reduce the weaknesses and threats which will help them to establish stable organization in the market.

Models of Apparent Cohesion for Unsaturated Soil

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ABSTRACT

Apparent cohesion is significantly different from effective Cohesion of saturated soil. Different shear of failure equations are available in the literature. All equations are empirical and semi-empirical. Araye (2014) developed a equation for predicting cohesion of unsaturated soil. Apparent Cohesion of unsaturated soil is the sum of saturated cohesion (c_{sat}) and the Δc cohesion contribution due to matric suction. For modeling different geotechnical problems in unsaturated soil profile, apparent cohesion is required as the design input as the determination of shear strength parameters in unsaturated state in the laboratory is time consuming and expensive. Araye (2014) developed an equation for predicting the increase in cohesion due to matric suction. In this study the equation given by Araye (2014) is validated using the soil data and lab test result from the literature. The experimental data of three different soil namely Price club, shelly and Asu from Huston and Huston (2014) are used for the verification of the Araye's (2014) equation. Predicted apparent cohesion values are found in good agreement with the experimental measured values for matric suction at middle of the secondary transitional zone.

Comparative Study of Traffic Signal Timing at Bata Signal

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ABSTRACT

Paratransit modes play a significant role in the transport sectors of developing countries since they are carried more than half of the total public transport demand in many cities. Rapid increase in population, per capita income, along with inadequate existing transport infrastructures has stimulated their usage as a cheap and convenient public transport mode. For this, Service quality and condition of paratransit are such important things to explore. In this article, public perception is expressed by user participation in rating mode's quality and condition. The aim of this research is to explore user perception about service quality of paratransit (i.e. tempo). This paper examines the quality of paratransit from the user's point of view. In this study, factor analysis (FA) is used to explore most significant components of paratransit from the transportation (QS) data. Factor analysis is very useful linear algebra technique used for dimensionality reduction. This technique tries to identify from a large set of variables, a reduced set of components which summarized the original data. This is done by identifying groups of variables which have a strong inter correlation. The main variables are transformed into a smaller set of components which have a strong linear correlation. In this study, 22 main variables are used and by the factor analysis two components are explored which are most significant and have strong correlation with others. It can be concluded that these two components are very significant for paratransit. By improving these components, the overall condition of paratransit can be improved and future existence of paratransit will be more acceptable in developing countries such as Bangladesh.

ANALYSIS AND DESIGN OF PADMA MULTIPURPOSE BRIDGE: A REVIEW

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The thesis titled "Analysis and Design of Padma Multipurpose Bridge: A Review", prepared and submitted by **Md. Jobaer Uddin**, **Palisa Arafin**, **Md. Al Mobin Sha Masum**, and **Md. Faisal Ahmad**, has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

A two storied multipurpose, four-lane road cum single-track rail bridge of 6.15 km long, with separate rail and road viaducts in both ends, having an approach road of 13.6 km is being constructed over river Padma to connect southwestern part of the country with the capital Dhaka. Once completed, it will be the longest bridge in south Asia. Feasibility Study estimated that it would boost country's Gross Domestic Product (GDP) by 1.2%.

The study is conducted to assess the adequacy of the structure using an independent computer aided simulation regarding load requirement, design criteria, and compare with ultimate load capacity.

To calculate independent pile capacity, proposed design parameters and criteria mentioned in detail design were considered. In addition, ultimate capacities of piles were estimated by considering recommended geotechnical parameters mentioned in 'Geotechnical Assessment-Final Report'. Later, a group analysis using 'Geocentrix Repute' was performed to develop a better model of the static soil structure interactions and compared with software package "PIGLET" that was adopted in detailed design. Arbitrarily selected five piers along the main river crossing were selected- two from Mawa side, two from Janjira side and one from mid-river, and analyzed to check the competency of pile foundation under adapted load cases in detailed design.

To ascertain the effectiveness of superstructure, an individual computer aided analysis was carried out using "MIDAS Civil". This software package was also adopted in detailed design to develop superstructure scheme. An arbitrarily selected module of from middle portion of the bridge was modeled to analysis superstructure. To determine behaviors of structures under various load effects, the proposed design criteria mentioned in detailed design were considered.

The result and analysis of this study suggest that substructure design of Padma Bridge appears to be conservative to a higher degree. Considering ultimate capacity F.O.S. (capacity to load ratio) varied approximately within 1.56 and 3.57 for different load cases.

PRODUCTION OF RICE VS. GROUNDWATER DEPLETION IN BANGLADESH DURING 1988-2014

FALL 2015

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In this study, substructure capacity was calculated using soil profile developed from borehole logs, whereas AECOM approximated underlying soil layers grossly. It was observed that, if actual soil layer distribution is taken into account, it provides larger resistance than grossly approximated soil profile. Therefore, the conclusion of study would provide a more reliable and economical substructure design. Besides, the study may be considered as a general reference to develop similar bridge scheme in Bangladesh

STUDY ON RETROFITTING OF SHORT COLUMN USING CARBON FIBRE-REINFORCED POLYMER (CFRP) WRAP

FALL 2015

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Certificate of Approval

We hereby recommend that the thesis prepared by Shohel Shahariyar Sumon, Faruq Ahamad and Md. Towhidul Islam entitled -Study on Retrofitting of Short Column Using Carbon Fiber-Reinforced Polymer wrap is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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Certificate of Approval

We hereby recommend that the thesis prepared by Mohammad Nowshad Akram, Md. Mosheur Rahman Shourov and M.A. Muhut entitled — **Production of rice vs ground water depletion in Bangladesh during 1988-2014** 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 purposes of this thesis research are to analyze the rice pattern of Bangladesh from 1988 to 2014 and its effect on groundwater table, finding possible solutions to attain sustainable usages of groundwater resources. With the increasing population the demand of rice production increases and for the surging rice production it needs excess amount of groundwater for the irrigation purposes, which leads to progressive lowering of groundwater table.In this study, production of rice verities which are Aus, Aman and Boro are being analyzed to observe the changing pattern of these crops and the groundwater table of multiple stations from 37 districts in Bangladesh are also being observed to see whether the groundwater level has been depleted or not.It has been found that, production of Aman is nearly constant over the years and Aus production is on the verge of declination. On the other hand, Boro production has increased significantly to meet the demand of rising population and for this increasing Boro production groundwater resources havebeen used insincerely, as a result groundwater level is depleted much.The significance of this study is to find the causes and possible solutions of groundwater depletion and alternate Boro production.

NON-STRUCTURAL ELEMENTS AND SAFETY TIPS IN EARTHQUAKE

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We hereby recommend that the thesis presented by **MOHAMMAD JALAL UDDIN** and **MD. AZHARUL ISLAM** entitled **NON-STRUCTURAL ELEMENTS AND SAFETY TIPS IN EARTHQUAKE** be accepted as fulfilling this part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Earthquake cannot be prevented but its hazards can be reduced by raising the awareness and preparedness about earthquake safety tips. Awareness could be increased in three steps- safety Before, During and After earthquake.

This study tries to analyze the stability of Non-Structural Elements (NSE) [e.g. Almirah, Electric Pole, Partition Wall and Air Conditioner (AC)] and adequacy of the survival tips during earthquake. (nonlinear dynamic analysis of impact loading test of wooden table). Where structural analyses of non-structural elements are performed by hand calculations, impact load analysis of Wooden Table is performed by a combination of the well-known structural analysis software ETABS and programming language FORTRAN.

From the analyses performed, the typical household Almirah analyzed here for stability is found to be stable in earthquake. The typical Boundary Wall is found to require 5-ft foundation to be stable in earthquake, while the typical Partition Wall is found to be at risk of getting debonded from the RC beams and columns, and is recommended to be anchored by adequate bolts. The typical Electric Pole is found to be stable with a depth of 5.5 ft below soil, and its cross-section is found adequate against bending failure by a wide margin. The household Air Conditioner is found to require only nominal bolt or weld connections to remain fixed to its supporting members and anchors.

Based on nonlinear dynamic analysis of timber table due to impact loading, the table is found unsafe for survival or as protective cover during earthquake. This is contrary to the recommendation of the 'Drop-Cover-Hold' concept of earthquake protection. The 'Triangle of Life' concept is found more reasonable in this context.

IRRIGATION PATTERN IN SAARC COUNTRIES DURING 1988-2013

FALL 2015

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We hereby recommend that the thesis prepared by Md Amirul Islam, M. Kamruzzaman Shehab & Md. Mamunur Rashid entitled "Irrigation pattern in SAARC countries during 1988-2013" is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

South Asian Association for Regional Cooperation (SAARC) countries comprise about 23 percent of the world population, and have 15 percent of the world's arable land and 80 percent of their total economy fully depends on agriculture sector. Agriculture is the predominant sector of economies in all SAARC countries. A vast majority of population in the region lives in rural areas and depends upon agriculture for livelihood. International Water Management Institute (IWMI) indicates that there will be a need for 17 percent more irrigation water to feed the world population by 2025, at the same time near about 2 billion people of the world will have to face absolute water scarcity during this period. This study analyses the water use and irrigation pattern changes in SAARC countries for the period during 1988-2013. It also compared the water use and irrigation pattern among the SAARC countries in terms of land use, water resources and use, cropping pattern to figure out the sustainable sources of irrigation among these countries. Data has been collected from AQUASTAT database from Food and Agriculture Organization (FAO). The findings of this study will be beneficial for the SAARC countries to achieve food security and improved nutrition and promote sustainable agriculture in line with goal 2 of the Sustainable Development Goals (SDGs).

CONTROLLING STRUCTURAL VIBRATION BY BASE ISOLATION

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We hereby recommend that the thesis presented by **MD. RAHAD HOSSAIN** and **SHARIFUL ISLAM** entitled **CONTROLLING STRUCTURAL VIBRATION BY BASE ISOLATION** 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 with and without base isolation subjected to seismic ground motion. Effectiveness of the base isolation system is demonstrated for two steel building models. Deflections of structure with and without base isolation subjected to seismic ground motion are examined. SAP2000 18 software is used for nonlinear dynamic analyses of structures subjected to ground motion from scaled El Centro earthquake.

Verification of SAP2000 18 analysis results with experiment results are also important part of this thesis. Laboratory experiment results are compared to the software results to know effectiveness of base isolation with a structure as well as accuracy of the analyses. The numerical results are compared for the Displacement vs. Time and Displacement vs. acceleration curves. 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 results found from both software analyses and laboratory tests are reasonably close overall, both quantitatively and qualitatively. It includes some excellent matches and some results which vary significantly. But the overall match implies that the procedure followed in the entire work is quite appropriate and the results are satisfactory. But acceleration results could be more accurate from this thesis. Acquiring the mobile phone data from the software 'VibSensor' was a challenge in that the results from 'high' and 'low' frequency data varied significantly.

Status of Turag River: Evaluation of Spatial and Temporal Variation of Water Quality and Ecological Risk Assessment

A Thesis Submitted by

Minhar Ahmed Khan

Md. Fazle Rabbi

Md. Zahir Uddin

In partial fulfillment of Degree in B.sc in Civil Engineering

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We hereby recommend that the thesis prepared by Minhar Ahmed Khan, Md. Fazle Rabbi & Md. Zahir Uddin entitled "Status of Turag River: Evaluation of Spatial and Temporal Variation of Water Quality and Ecological Risk Assessment" is accepted as fulfilling the part of the requirements for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

Now a day's river pollution is one of the most concerning issues for Bangladesh. Dhaka city is surrounded by many rivers and canals among which Turag, Buriganga, Dholeshwari and Balu are the most important ones. As the population is growing and the industrialization is also growing, these rivers receive partially treated and untreated sewage effluent, sewage polluted surface run-off and untreated industrial effluent from nearby residence and industrial areas. The rivers are being further polluted by indiscriminate throwing of household, clinical, pathological & commercial wastes and discharge of spent fuel and human excreta. For saving the river we should study the pollution status of our rivers.

This study identifies the major sources of pollution of Turag River and provides an assessment of the present status of water quality of Turag River based on analysis of water sample collected from September 2015 to February 2016. The study also identifies locations along the Turag River from where river water of acceptable quality may be available. This study also identifies about ecological problems and assessment. Samples were collected from 5 different locations along Turag River. We have tried to collect the sample from near the pollution sources and far from pollution sources to see the spatial variation and seasonal variation along the river stretch. And questionnaire survey was done for ecological risk assessment .We have analyzed the sample for 22 different parameters (pH, temperature, DO, BOD, COD, TDS, TS, turbidity, Phosphate, Nitrate, Ammonia etc.).

The highest BOD_5 value was found at 35.7 mg/L for location 4 in wet season. DO value was recorded 7.39 mg/L at location 3. Highest TDS value was found at 641 mg/L at location 5. Maximum concentration of ammonia was found at 8.16 mg/L at location 2. Nitrite value was found 49 mg/L at location 5 to be the highest. Faecal Coliform concentration was found at 1210 CFU/100 ml and Total coliform was found at 2180 CFU/100ml at location 2. Heavy metal concentrations were analyzed for location 2 and Cd was at 0.001 mg/L, Cr was found at 0.007 mg/L, Pb was found at 0.009 mg/L, and Zn was found at 0.09 mg/L.

This study analyzes trend of water quality of Turag River from 2006 to 2016, which is useful for the characterization of the environmental condition in the rivers. For preventing the river from pollution, further studies should extend the spatial characterization and implement pollution prevention and control strategies. Harmful and toxic substances should be prevented to be discharging into the river and as such, environmental threats should be eliminated before they turn into actual problems.

Retrofitting of Five Storied Building Using Different Bracing Pattern – A Numeric Study.

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We hereby recommend that the thesis presented by **Md. Abdul Bari, Mobarok Hossen Khan, Wakil Ahmed** and **Md. Sakibul Hasan** entitled Retrofitting of Five Storied Building Using Different Bracing Pattern – A Numeric Study be accepted as fulfilling this part of the requirement for the degree of Bachelor of Science in Civil Engineering

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ABSTRACT

Retrofit refers the up gradation of building structures. Main purpose of retrofitting is to strengthening the structure. There are various ways to retrofit structure. One of those is using bracings. The objective of the work is to compare the stability, deflection between braced and without braced 5 storied building. Analyze their behavior against earthquake and wind load and to find the most suitable bracing pattern among some specific pattern.

The main goal during earthquakes is to assure that building collapse doesn't occur and the risk of death or injury to people is minimized and beyond that to satisfy post-earthquake performance level for defined range of seismic hazards. Also seismic evaluation will determine which are the most vulnerable and weak components and deficiencies of a building during an expected earthquake. The seismic rehabilitation process aims to improve seismic performance and correct the deficiencies by increasing strength, stiffness or deformation capacity and improving connections. This study shows how to model a building in computer software and analyze its seismic resistance with linear methods and propose concentrically braced frame rehabilitation in order to increase the drift capacity. Generally, the structural retrofit of concentrically braced frames improved the seismic resistance of the building and it can be considered in the retrofit of moment frame structures to prevent the risk of structural collapse under the design load with much more confidence.

Here the model is analyzed by a computer software ETABS. Especially it is focused on the deflection and base shear of the structures for different bracing patterns. All the codes of loading condition are satisfied by BNBC. The model is braced in different pattern and analyzed for wind and earthquake load.

X bracing at base and 2^{nd} floor and V bracing at 4^{th} floor this pattern of bracing is the strongest against earthquake and wind load and the un-braced structure show maximum deflection.

EFFECT OF RECYCLED BRICK AGGREGATE ON SELF-COMPACTING CONCRETE: RHEOLOGICAL AND MECHANICAL PROPERTIES

FALL 2015

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Certificate of Approval

The thesis titled "Effect of Recycled Brick Aggregate on Self-Compacting Concrete: Rheological and Mechanical Properties", Submitted by: Suman Kanti Dey, Avijeet Kumar Ghosh, Md. Adil Sarker, and I.K.M. Bayzid. Session: Fall 2015 has been accepted as satisfactory in partial fulfillment of the requirement for the degree of Bachelor of Science in Civil Engineering.

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ABSTRACT

A detailed investigation was carried out to evaluate the effect of recycled brick aggregate (RBA) replacement on the rheological and mechanical properties of self-compacting concrete. The coarse fraction of virgin brick aggregates was replaced at 0%, 25%, 50%, 75% and 100% with recycled brick aggregate. In this study, all five mixes were made with constant water to cement (w/c) ratio of 0.40 and Portland combined cement of 450 kg/m^3.Viscosity modifying admixture (VMA) and super plasticizers (HWRA) were used to improve the rheology of the mix. The properties of RBA such as specific gravity, unit weight and abrasion value were tested. The fresh-state properties were executed by Slump Flow, V-Funnel, L-Box and Column Segregation test. About 60 cylinder concrete specimens of diameter 4 in and height 8 in were made. Concrete specimens were tested at 28 days to determine the compressive strength, tensile strength, stress-strain response and Young's modulus of hardened concrete.

The results of fresh-state test revealed that five mixes flow ability increased with the increment of percentage of RBA (except 50% RBA) and passing ability is also suitable but no influential increase in increment. In this study, it also executed that five mixes flow behavior treated as high viscous self-compacting concrete (around 730 to 760 mm) which has a tendency to produce segregation. 0%, 25%, 50% RBA replacement represent similar segregate resistance (>3%) but it was increased after 50% with the increased of % of RBA replacement.

The hardened properties results revealed that compressive strength of case 1 (0%), case 4 (75%) and case 2 (25%), case 5 (100%) indicate almost similar strength (3673 to 5081 Psi) but case 3 (50%) is lowered compared to others cases (approximately 25 to 30%). For tensile strength, case 1 (0%), case 4 (75%), case 5 (100%), case 2 (25%) and case 3 (50%) almost similar strength. Young's modulus result shown that case 1 (0%), case 2(25%), Case 4(75%) and case 5(100) almost same modulus of elasticity respectively. Stress strain indicates that all five cases follow a parabolic shape which means when the strain is increased, stress also increased.

COMPARE BETWEEN SITE AND LAB CONCRETE MIX-DESIGN

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We thereby recommend that the thesis presented by Al-Amin Mir Tushar,Shuvra Kantinath Mishu and Syed Arifur Rahman entitled **"COMPARE BETWEEN SITE AND LAB CONCRETE MIX-DESIGN"** 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 paper presents the summary of some research works carried out with an objective to compare between site and lab concrete mix-design. Due to the enormous demand of housing and infrastructures, a huge number of constructions can be seen in our country as well as the other country. Therefore, it is most essential to take some vital steps for the sustainable development of concrete construction work in whole over the world and mostly for the developments countries like Bangladesh. At the beginning in this research, it started with selecting the mix ratio for brick and stone concrete and the ratio was 1:1.5: 3 and 1:2:4. According to these ratios, the specified compressive strength for stone concrete is 4000 psi of 1:1.5:3 and 3000 psi of 1:2:4. On the other hand the specified compressive strength for brick concrete is 3000 psi of 1:1.5:3 and 2500 psi of 1:2:4. The first steps of procedure was visiting and collecting samples in 4inchx8inch size cylinders properly from the construction projects. Then it put for curing for 28 days. At same ratio and concrete was used in the lab for making sample meticulously. The procedure of making samples followed the specified rules by turns. After completing the curing session, the samples were tested by universal testing machine (UTM). The results of tested were calibrated by calibration equation. The compressive strength of stone of site and lab have acquired 3891.2 psi, 2352.6 psi, 4312.22 psi, 3488 psi for both of ratio 1:1.5:3 and 1:2:4 respectively. compressive strength of brick of site and lab have acquired 3318 psi, 2126.88 psi, 2905.82 psi, 2263 psi for both of ratio 1:1.5:3 and 1:2:4 respectively. Several important conclusions and recommendations were drawn based on these studies that will be play a vital role for further study of mix design in sustainable concrete constructions.

EFFECT OF COARSE AGGREGATE TYPE ON THE PHYSICAL AND MECHANICAL PROPERTIES OF CONCRETE

FALL 2015

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ABSTRACT

In Bangladesh, due to scarcity of natural stone aggregate, artificial brick aggregate is commonly used as a source of coarse aggregate. However, different aggregate possess different physical, mechanical and chemical properties. The properties of brick aggregate varies greatly with the natural stone aggregate. In addition to this, now a days, recycled aggregates (Brick and stone) are getting popularity in the construction industry especially for non-structural uses. Therefore it is necessary to understand the fundamental behavior of these classes of aggregate before using in the construction works.

A detailed investigation was carried out to evaluate the effect of aggregate type (brick chips, stone chips, recycled brick chips, and recycled stone chip) on the physical and mechanical properties of aggregates, and concretes, respectively. The physical evaluation includes the determination of specific gravity, unit weight, absorption capacity, and abrasion resistance. The mechanical properties involved determination of compressive strength, tensile strength, stress-strain response, and Young's modulus determination. To understand the aggregate effect properly, same mix design were used in every case. The stress-strain response was recorded for different loading condition (20%, 40%, 60%, 80%, 95%, and 100%) and the sample was evaluated for using Digital image processing to determine the, crack, porosity, interface, color variation among aggregates.

It was observed that the stone aggregate shows the best physical properties among all four classes of aggregate used. Interestingly, the absorption capacity of recycled brick chips was lower compared to the virgin brick chips. The compressive strength of stone aggregate concrete found to be higher compared to the other cases. The mechanical properties of brick aggregate concrete, recycled brick aggregate concrete, and recycled stone aggregate concrete was similar to each other. Highest percentage of surface void was observed for brick aggregate concrete which matches the observations regarding mechanical properties (lower compressive strength). Image processing tool can be very useful for evaluation of the surface texture, angularity, void evaluation and interface observations of brick aggregate and recycled aggregate evaluation.