Published Papers
Civil Eng. Dept.
Till 1st Semester 22-23

Item	Paper Abstract
1.	*Author: Mohammed Mustafa Al-Issa , Published Year: 1997* *Faculty: Engineering and Technology* **Abstract:** The behavior of skirted strip model footings founded on beds of uniform sands is investigated. The load - settlement relationships are determined for strip model footings rvith skirt depth to footing width ratio (DB) ranging from 0 to I.The results revealed that there is a significant increase in the bearing failure loads with increasing D/B ratio and this increase was more pronounced when the sand was in the dense state rather than in the loose state. The effeot of particle size (fine and coarse particles), on the failure loads was minimal. *Keywords: soil, skirted footings, sand*
2.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2013* *Engineering and Technology Journal, Volume 31 , No. 13* *Faculty: Engineering and Technology* **Abstract:** Stone columns technique is most commonly used in increasing bearing capacity, reduces and controls the compressibility and accelerates the rate of consolidation of soft saturated clay. During the last four decades, the technique has been utilized worldwide and proved successful results. Several modifications have been proposed to increase the efficiency of this technique such as addition of additives, use of special patterns of reinforcements, encasing the stone columns with geonet or geogrid to provide extra confinement that enhances the bearing capacity and reduces the settlement drastically without compromising its effect as a drain. The present paper focuses on the behavior of soft saturated clay reinforced with ordinary and geogrid encased stone columns. The investigation was performed both experimentally through small scale models and through numerical techniques. The influence of relative density of the back fill material and the presence of the encasement are the main parameters investigated. Ordinary stone columns revealed an increase of 20% in the carrying capacity when the relative density of the backfill stone aggregates increased from 23% to 71%, furthermore the efficiency of the encasement was more pronounced at lower relative density. *Keywords: numerical analysis, geogrid encasement, bearing improvement ratio, soft clay, stone columns, relative density*
3.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2013* *First International Conference for Geotechnical and Transportation Engineering, University of Technology - Baghdad - Iraq* *Faculty: Engineering and Technology* **Abstract:** Due to the higher increase in the oil industry activities in Iraq, since there are a little information of the environmental status of the areas around the refinery locations, and the concerns of a possible environmental pollution that will cause health and life threats to living organisms, this study was carried out. To understand the status of heavy metals pollution in areas inside and surrounding Al-Daura refinery activities, (17) testing locations were chosen, ten locations outside the refinery and seven locations inside it. One additional location was chosen in a rural (control) area, in the University of Baghdad, to compare between the heavy metals concentration in the study area and a sample from the rural area not affected by the pollution. The soil samples have been taken from (5 and 60 cm) depth from the top surface of the soil. Three samples were taken from each depth for each location to take an average of

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	results. All the samples of soil were taken during the period from Dec/2010 to Feb/2011. The experimental work has been includes the heavy metals concentrations, such as Zinc, Nickel, Lead and Cadmium, have been measured at each selected depth for each testing locations. The results indicate that the mean concentration of Zn and Ni is (62.4 µg/g) and (100.5 µg/g) respectively and this values exceeded the mean allowable value by (Alloway, 1995; Kabata-Pendias and Pendias, 1992). The most concentrations of Zn, Ni and Pb, with some exceptions, accumulate at the top soil and decrease with the depth except Cd. *Keywords: Soil Pollution*
4.	*Author: Abdallah Ali Khaled Odeibat, Published Year: 2015* *Faculty: Engineering and Technology* **Abstract:** Skewed bridges are commonly used structure;this study has investigated the effect of skew angle on the stresses affecting corners of three equal spans T-beams continues skew bridge and the effect of number of spans on these stresses.Nine three-dimensional finite element models with skew angles between (zero and 70o) with span length of (25m)were modeled using CSi Bridge software, all models were subjected to AASHTO HL-93 loading specifications. Analysis results showed that stresses on deck slab and corners increase with the increase of skew angle;transverse moments could be calculated by AASHTO approximate methods and should be multiplied by the proper fold value from tables in chapter four, where longitudinal moments reaches (72%) of transverse moments. Due consideration should be taken to torsional moments at end zones, where they reaches (82%) of transverse moments with extension of (0.34L) from supports at obtuse corners and (53%) with extension of (0.26L) at acute corners. Moreover, results show that maximum positive and negative bending moments in girders decrease with increase of skew angle, and the location of maximum positive moments moves toward obtuse corners supports in exterior and interior girders. However, shear forces increase with increase of skew angle except near acute corners in exterior and first interior girders; where shear forces decrease with increase of skew angle. Whereas; results also show that as skew angle increase, reactions increase at obtuse corners and decrease at acute corners, where maximum reaction values were concentrated interior girders supports. Comparing this study results with previous study of two-span bridge results,it shows an alternate effect of number of spans on deck slab stresses, girders moments and shear and reaction forces. *Keywords: Skew, bridge, corners , continues, angle*
5.	*Author: Mohammad Khairi Younes, Published Year: 2016* *Waste management , 55* *Faculty: Engineering and Technology* **Abstract:** Solid waste prediction is crucial for sustainable solid waste management. The collection of accurate waste data records is challenging in developing countries. Solid waste generation is usually correlated with economic, demographic and social factors. However, these factors are not constant due to population and economic growth. The objective of this research is to minimize the land requirements for solid waste disposal for implementation of the Malaysian vision of waste disposal options. This goal has been previously achieved by integrating the solid waste forecasting model, waste composition and the Malaysian vision. The modified adaptive neural

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	fuzzy inference system (MANFIS) was employed to develop a solid waste prediction model and search for the optimum input factors. The performance of the model was evaluated using the root mean square error (RMSE) and the coefficient of determination (R2). The model validation results are as follows: RMSE for training = 0.2678, RMSE for testing = 3.9860 and R2 = 0.99. Implementation of the Malaysian vision for waste disposal options can minimize the land requirements for waste disposal by up to 43%. *Keywords: Solid waste forecasting; Adaptive neuro-fuzzy inference system; Landfill area estimation; Area conservation*
6.	*Author: Mohammad Khairi Younes, Published Year: 2015* *Mathematical Problems in Engineering, 2015* *Faculty: Engineering and Technology* **Abstract:** Landfill siting is a complex, multicriteria decision-making problem that needs an extensive evaluation of environmental, social, land use, and operational criteria. Integration of a median ranked sample set (MRSS) and an analytic network process (ANP) has been implemented to rank the associated criteria and select a suitable landfill site. It minimizes the uncertainty and the subjectivity of human judgments. Four groups of experts with different backgrounds participated in this study, and each group contained four experts. The respondent preferences were ranked in a 4-by-4 matrix to obtain the judgment sets for the MRSS. These sets were subsequently analyzed using ANP to obtain the priorities in the landfill siting criteria. The results show that land topology and distance from surface water are the most influential factors, with priorities of 0.18 and 0.17, respectively. The proposed integrated model may become a promising tool for the environmental planners and decision makers. *Keywords: Solid waste management, multi criteria decession making, median rankes set sample, Analytical netwrok process*
7.	*Author: Mohammad Khairi Younes, Published Year: 2015* *Environmental monitoring and assessment, 12* *Faculty: Engineering and Technology* **Abstract:** Most of the developing countries have solid waste management problems. Solid waste strategic planning requires accurate prediction of the quality and quantity of the generated waste. In developing countries, such as Malaysia, the solid waste generation rate is increasing rapidly, due to population growth and new consumption trends that characterize society. This paper proposes an artificial neural network (ANN) approach using feedforward nonlinear autoregressive network with exogenous inputs (NARX) to predict annual solid waste generation in relation to demographic and economicvariables like population number, gross domestic product, electricity demand per capita and employment and unemployment numbers. In addition, variable selection procedures are also developed to select a significant explanatory variable. The model evaluation was performed using coefficient of determination (R2) and mean square error (MSE). The optimum model that produced the lowest testing MSE (2.46) and the highest R2 (0.97) had three inputs (gross domestic product, population and employment), eight neurons and one lag in the hidden layer, and used Fletcher-Powell's conjugate gradient as the training algorithm. *Keywords: Solid waste forecasting . Artificial neural network . Solid waste*

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	management . ANN forecasting
8.	*Author: Mohammad Khairi Younes, Published Year: 2015* *Environmental Engineering Research, 20(3)* *Faculty: Engineering and Technology* **Abstract:** Solid waste production increases due to population and consumption increments. Landfill is the ultimate destination for all kinds of municipal solid waste; and is the most convenient waste disposal method in developing countries. To minimize investment and operational costs and society's opposition towards locating landfills nearby, proper landfill sizing and siting are essential. In this study, solid waste forecasting using Autoregressive Integrating Moving Average(ARIMA) was integrated with government future plans and waste composition to estimate the required landfill area for the state of Selangor, Malaysia. Landfill siting criteria were then prioritized based on expert's preferences. To minimize ambiguity and the uncertainty of the criteria prioritizing process, the expert's preferences were treated using integrated Median Ranked Sample Set (MRSS) and Analytic Hierarchy Process (AHP) models. The results show that the required landfill area is 342 hectares and the environmental criteria are the most important; with a priority equal to 48%. *Keywords: AHP, ARIMA, Environmental criteria priorities, MRSS, Solid waste generation*
9.	*Author: Mohammad Khairi Younes, Published Year: 2015* *Journal of the Air & Waste Management Association, 65* *Faculty: Engineering and Technology* **Abstract:** Solid waste prediction is crucial for sustainable solid waste management. Usually, accurate waste generation record is challenge in developing countries which complicates the modelling process. Solid waste generation is related to demographic,economic, and social factors. However, these factors are highly varied due to population and economy growths. The objective of this research is to determine the most influencing demographic and economic factors that affect solid waste generation using systematic approach, and then develop a model to forecast solid waste generation using a modified Adaptive Neural Inference System (MANFIS). The model evaluation was performed using Root Mean Square Error (RMSE), Mean Absolute Error (MAE) and the coefficient of determination (R2). The results show that the best input variables are people age groups 0-14, 15-64, and people above 65 years, and the best model structure is 3 triangular fuzzy membership functions and 27 fuzzy rules. The model has been validated using testing data and the resulted training RMSE, MAE and R2 were 0.2678, 0.045 and 0.99, respectively, while for testing phase RMSE =3.986, MAE = 0.673 and R2 = 0.98. Implications: To date, a few attempts have been made to predict the annual solid waste generation in developing countries. This paper presents modeling of annual solid waste generation using Modified ANFIS, it is a systematic approach to search for the most influencing factors and then modify the ANFIS structure to simplify the model. The proposed method can be used to forecast the waste generation in such developing countries where accurate reliable data is not always available. Moreover, annual solid waste prediction is essential for sustainable planning. *Keywords: Solid waste forecasting . Artificial intelegance . ANFIS*
10.	*Author: Mohammad Khairi Younes, Published Year: 2014*

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	Journal of the Air & Waste Management Association, 64 *Faculty: Engineering and Technology* **Abstract:** Knowing the fraction of methane (CH4) oxidized in landfill cover soils is an important step in estimating the total CH4 emissions from any landfill. Predicting CH4 oxidation in landfill cover soils is a difficult task because it is controlled by a number of biological and environmental factors. This study proposes an artificial neural network (ANN) approach using feedforward backpropagation to predict CH4 oxidation in landfill cover soil in relation to air temperature, soil moisture content, oxygen (O2) concentration at a depth of 10 cm in cover soil, and CH4 concentration at the bottom of cover soil. The optimum ANN model giving the lowest mean square error (MSE) was configured from three layers, with 12 and 9 neurons at the first and the second hidden layers, respectively, log-sigmoid (logsig) transfer function at the hidden and output layers, and the Levenberg-Marquardt training algorithm. This study revealed that the ANN oxidation model can predict CH4 oxidation with a MSE of 0.0082, a coefficient of determination (R2) between the measured and predicted outputs of up to 0.937, and a model efficiency (E) of 0.8978. To conclude, further developments of the proposed ANN model are required to generalize and apply the model to other landfills with different cover soil properties. Implications: To date, no attempts have been made to predict the percent of CH4 oxidation within landfill cover soils using an ANN. This paper presents modeling of CH4 oxidation in landfill cover soil using ANN based on field measurements data under tropical climate conditions in Malaysia. The proposed ANN oxidation model can be used to predict the percentage of CH4 oxidation from other landfills with similar climate conditions, cover soil texture, and other properties. The predicted value of CH4 oxidation can be used in conjunction with the Intergovernmental Panel on Climate Change (IPCC) First Order Decay (FOD) model by landfill operators to accurately estimate total CH4 emission and how much it contributes to global warming. *Keywords: methane oxidation, landfill methane, ANN,*
11.	*Author: Mohammad Khairi Younes, Published Year: 2013* *Asian Journal of Chemistry, 17* *Faculty: Engineering and Technology* **Abstract:** Municipal solid waste management is a critical environmental challenge facing the development. Solid waste (SW) characteristics change with time due to changes in the population's consumption and lifestyle. Characterization of SW helps the decision makers take the sustainable actions. This is the first study that introduces integrated solid waste management principles in Zarqa. The results indicate that the total SW generation is approximately 299 tons/day, with a generation rate of 0.69 kg/ capita per day. By 2030, it is expected to reach 446 tons/day, with a generation rate of ca. 0.75 kg/capita per day. The organic fraction is 48.9 %, while the other main components like paper and cardboard and plastics are 13.3 and 15.2 %, respectively. The heat content is between 2,121 and 2,905 kcal/kg. A high organic content requires special considerations for waste handling and disposal. Moreover, it gives preference to composting over other heat recovery techniques. *Keywords: Solid waste management, Solid waste characterization, Solid waste generation.*
12.	*Author: Mohammad Khairi Younes, Published Year: 2015*

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	Asian Journal of Atmospheric Environment, 8 *Faculty: Engineering and Technology* **Abstract:** Migration of methane (CH4) gas from landfills to the surrounding environment negatively affects both humankind and the environment. It is therefore essential to develop management techniques to reduce CH4 emissions from landfills to minimize global warming and to reduce the human risks associated with CH4 gas migration. Oxidation of CH4 in landfill cover soil is the most important strategy for CH4 emissions mitigation. CH4 oxidation occurs naturally in landfill cover soils due to the abundance of methanotrophic bacteria. However, the activities of these bacteria are influenced by several controlling factors. This study attempts to review the important issues associated with the CH4 oxidation process in landfill cover soils. The CH4 oxidation process is highly sensitive to environmental factors and cover soil properties. The comparison of various biotic system techniques indicated that each technique has unique advantages and disadvantages, and the choice of the best technique for a specific application depends on economic constraints, treatment efficiency and landfill operations. *Keywords: Methane emissions, Methane oxidation, Mitigation, Methanotrophic bacteria, Cover soils*
13.	*Author: Mohammad Khairi Younes, Published Year: 2014* *Statistical and Operational Research International Conference , Malaysia* *Faculty: Engineering and Technology* **Abstract:** Generally, solid waste handling and management are performed by municipality or local authority. In most of developing countries, local authorities suffer from serious solid waste management (SWM) problems and insufficient data and strategic planning. Thus it is important to develop robust solid waste generation forecasting model. It helps to proper manage the generated solid waste and to develop future plan based on relatively accurate figures. In Malaysia, solid waste generation rate increases rapidly due to the population growth and new consumption trends that characterize the modern life style. This paper aims to develop monthly solid waste forecasting model using Autoregressive Integrated Moving Average (ARIMA), such model is applicable even though there is lack of data and will help the municipality properly establish the annual service plan. The results show that ARIMA (6,1,0) model predicts monthly municipal solid waste generation with root mean square error equals to 0.0952 and the model forecast residuals are within accepted 95% confident interval. *Keywords: Solid Waste Forecasting , ARIMA , Solid Waste Management , Solid Waste Generation*
14.	*Author: Mohammad Khairi Younes, Published Year: 2015* *the Second International Statistical Conference 2014 (ISM II), Kuantan-Malaysia* *Faculty: Engineering and Technology* **Abstract:** Integrating environmental, social, political, and economical attributes enhances the decision making process. Multi criteria decision making (MCDM) involves ambiguity and uncertainty due to various preferences. This study presents a model to minimize the uncertainty and ambiguity of human judgments by means of integrating the counter stakeholders with median ranked sample set (MRSS) and Analytic hierarchy process (AHP). The model uses landfill site selection as a MCDM

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	problem. Sixteen experts belong to four clusters that are government, private, institution, and non-governmental organisations participated and their preferences were ranked in four by four matrix. Then the MRSS and the AHP were used to obtain the priorities of landfill siting criteria. Environmental criteria have the highest priority that equals to 48.1% and the distance from surface water, and the faults zones are the most important factors with priorities equal to 18% and 13.7% respectively. In conclusion, the hybrid approach that integrates counter stakeholders MRSS, and AHP is capable of being applied to complex decision making process and its outputs are justified. ***Keywords:*** *Multi Criteria Decision Making, Analytic Hierarchy Process, Ranked Sample Set, landfill Site Selection*
15.	***Author: Mohammad Khairi Younes, Published Year: 2017*** ***5th International Conference on Waste Management, Ecology and Biological Sciences (WMEBS-2017), Istanbul- Turkey*** ***Faculty: Engineering and Technology*** **Abstract:** Solid waste management is a major challenge for societies especially in the developing countries. For municipalities solid waste management consumes more than half of the allocated financial resources. However, the number of immigrants has been increased rapidly in the recent years due to political instability around the world. Sudden population increase due to immigration will confuse the decision making process and overburden the current infrastructure. Thus there is a great demand to develop a scientific approach to absorb such sudden increments and to properly develop future plans. In addition, most of the immigrants hosting societies are developing countries, that are classified as poor to mid income countries which overburdens them. This study aims to highlight and analysis the impacts of immigration on the solid waste management in the hosting communities. In addition, it will make recommendations to minimize the refugee impacts. In order to collect the data for estimating the human and financial impacts an internet research and stakeholders interviews were performed. Solving the political conflicts under the umbrella of the United Nation and giving the support for the people in their home countries will minimize the immigration movements thus reduces the refugee impacts. ***Keywords:*** *Solid Waste Management, Refugee and Solid Waste, Refugee Impacts on Solid Waste*
16.	***Author: Mohammad Khairi Younes, Published Year: 2017*** ***Air, Soil and Water Research, 10*** ***Faculty: Engineering and Technology*** **Abstract:** Safe drinking water is crucial for the well-being of current and future generations. This study aims to evaluate the quality of potable water in Baghdad city. Furthermore, this study compares the quality of tap and bottled water. Baghdad city was divided into 4 districts based on the water source, and 40 water samples were collected from each district. Moreover, the most popular bottled water brands were sampled and compared with the tap water samples. The quality of the analyzed potable water samples varied based on the water source. The total dissolved solid (TDS) levels exceed the palatable (>600 ppm) water levels in some districts. In addition, the concentration of sulfate was relatively high in both tap and bottled water and ranged from 200 to 330 ppm. The bottled water quality was within the acceptable

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	limits set by the World Health Organization, but the TDS levels were relatively high. The hardness, Cl−, Pb2+, and bacteria contents in both tap and bottled water were within the standard limits. Finally, it is important to conduct radiological analyses in the future to investigate the effect of wars on Iraqi water resources. ***Keywords:** Bottled water, tap water, water quality analysis*
17.	*Author: Mohammad Khairi Younes, Published Year: 2018* *International Journal of Engineering & Technology, 7* *Faculty: Engineering and Technology* **Abstract:** This study describes the implementation of analytical hierarchy process [AHP] in pavement multi-criteria selection problem solving. The practice of expressing flexible pavement distress priority is widely accepted. However, an insistent demand exists for a technique that allows decision makers to determine their priorities, rational weights of the importance of pavement distress priority and the ranking of these factors. In this study, AHP is adopted in selecting the best level of distress in flexible pavements in Malaysia as an example of a tropical region. Knowledgeable and experienced experts in flexible pavement maintenance at jabatan kerja raya [JKR] and Kumpulan Ikram Sdn Bhd [IKRAM] were interviewed; as pairwise comparisons, their inputs were structured. Four criteria are set as follows: cracking, surface defects, surface deformations and patching and potholes. These criteria developed into a few other sub-criteria. Results show that cracking is the most significant factor [0.5500], followed by surface deformations [0.2300], patching and potholes [0.1600] and surface defects [0.0600]. Thus, cracking has the most significant distress among the four factors. ***Keywords:** Analytic hierarchy process; Flexible pavement; Pavement maintenance; Pavement deterioration*
18.	*Author: Mohammad Khairi Younes, Published Year: 2018* *Environmental Engineering Research , 23(1)* *Faculty: Engineering and Technology* **Abstract:** Air quality and pollution have recently become a major concern; vehicle emissions significantly pollute the air, especially in large and crowded cities. There are various factors that affect vehicle emissions; this research aims to find the most influential factors affecting CO_2 and NO_x emissions using Adaptive Neural Fuzzy Inference System (ANFIS) as well as a systematic approach. The modified ANFIS (MANFIS) was developed to enhance modelling and Root Mean Square Error was used to evaluate the model performance. The results show that percentages of CO_2 from trucks represent the best input combination to model. While for NO_x modelling, the best pair combination is the vehicle delay and percentage of heavy trucks. However, the final MANFIS structure involves two inputs, three membership functions and nine rules. For CO_2 modelling the triangular membership function is the best, while for NO_x the membership function is two-sided Gaussian. ***Keywords:** Air pollution, Air quality index, ANFIS, Traffic congestion, Transportation emissions*
19.	*Author: Mohammad Khairi Younes, Published Year: 2018* *Journal of Solid Waste Technology and Management, 44(2)* *Faculty: Engineering and Technology* **Abstract:** Landfill gas (LFG) emissions and methane (CH_4) oxidation were

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	investigated in a landfill locat-ed in tropical climate in Malaysia to measure spatial and seasonal variations in CH4 and carbon dioxide (CO2) emissions, the capacity of CH4 oxidation in the landfill cover soil, seasonal varia-tion of CH4 oxidation, and the impact of CH4 oxidation on composition of LFG emissions. The measurements were conducted within eight months during the rainy and dry seasons. CH4 and CO2 emissions were measured using a fabricated static flux chamber. The averages of CH4 and CO2 emissions were determined using the geospatial average (g/m2/d) with lesser error. The combination of the gas concentrations (CH4 and CO2) below the cover soil and the surface CH4 and CO2 fluxes at four stations were utilized to determine the average CH4 oxidation capacity (%). The results of the study showed that CH4 and CO2 emissions were not spatially uniform and ranged from 0 to 1,602 g/m2/d and 5 to 2,753 gm-2 d-1 in both seasons. In addition, higher CH4 and CO2 emissions and lower CH4 oxidation capacity were observed in the rainy season in contrast to the dry season. *Keywords: CH4 oxidation, landfill cover soils, LFG emission, seasonal variation, spatial varia-tion, methane oxidation*
20.	*Author: Mohammad Khairi Younes, Published Year: 2018* *A&WMA's 111th Annual Conference & Exhibition , Hartford, Connecticut; USA* *Faculty: Engineering and Technology* **Abstract:** Wastewater treatment using Biological filter is an emerging technology. Nowadays, date palm (Phoenix dactylifera) production and processing are increasing all over the world due to its nutrition content. Date pit is one of the most important date processing by product and it represents around 10% of fruit weight. This study aims to evaluate the feasibility of using a date pit's activated carbon in a biological filter to enhance the bio-filtration process and reduce the concentration of chemical oxygen demand (COD) in the effluent water. A date pits pyrolysis was implemented to produce a charcoal activated carbon, and then it has been crushed and activated by heat. Finally, three filtration columns were prepared, one with silica sand only, the second is with silica sand and commercial coconut activated carbon and the third is with silica sand and date pit activated carbon. The date pits filter shows relatively better performance of COD and pH removal. However, more research and tests are recommended on larger scale. Moreover, further test and analysis are required to determine the optimum dosage and particle size. *Keywords: solid waste management, date pits*
21.	*Author: Mohammad Khairi Younes, Published Year: 2018* *Environmental monitoring and assessment, 10* *Faculty: Engineering and Technology* **Abstract:** Landfill leachate is one of the sources of surface water pollution in Selangor State (SS), Malaysia. Leachate volume prediction is essential for sustainable waste management and leachate treatment processes.The accurate estimation of leachate generation rates is often considered a challenge, especially in developing countries, due to the lack of reliable data and high measurement costs. Leachate generation is related to several variable factors, including meteorological data, waste generation rates, and landfill design conditions.Large variations in these factors lead to complicated leachate modeling processes. The aims of this study are to determine the key elements contributing to leachate production and then develop

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	an adaptive neural fuzzy inference system (ANFIS) model to predict leachate generation rates. Accuracy of the final model performance was tested and evaluated using the root mean square error (RMSE), the mean absolute error (MAE), and the correlation coefficient (R). The study results defined dumped waste quantity, rainfall level, and emanated gases as the most significant contributing factors in leachate generation. The best model structure consisted of two triangular fuzzy membership functions and a hybrid training algorithm with eight fuzzy rules. The proposed ANFIS model showed a good performance with an overall correlation coefficient of 0.952. *Keywords: Landfill leachate . Input optimization . ANFIS modeling system . Sanitary landfill*
22.	*Author: Mohammad Khairi Younes, Published Year: 2018* *Fresenius Environmental Bulletin, 27* *Faculty: Engineering and Technology* **Abstract:** Transportation is the main contributor for air pollution especially in large and crowded cities. Vehicle emissions are affected by various traffic factors.In this study, an evaluation of the most influencing factors on air pollution due delay at signalized intersections will be conducted in a systematic way and by the help of Adaptive Neural Fuzzy Inference System (ANFIS). The model performance has been performed using Root Mean Square Error (RMSE). The results show that the best inputs to model CO are delay, percentage of passenger car and percentage of turning left vehicles. While for NOX modelling the optimum inputs are volume over capacity ratio and percentage of passenger car. The structure of ANFIS was modified to enhance the model and reduce the complexity. However, such systematic approach may be applied for various environmental and transportation applications to determine the most influencing factors and thus properly manage it. *Keywords: Air Pollution, Transportation Emissions, Air Quality Index, ANFIS, Traffic Congestion*
23.	*Author: Mohammad Khairi Younes, Published Year: 2019* *Symmetry, 11 no (2)* *Faculty: Engineering and Technology* **Abstract:** Forecasting solar radiation has recently become the focus of numerous researchers due to the growing interest in green energy. This study aims to develop a seasonal auto-regressive integrated moving average (SARIMA) model to predict the daily and monthly solar radiation in Seoul, South Korea based on the hourly solar radiation data obtained from the Korean Meteorological Administration over 37 years (1981–2017). The goodness of fit of the model was tested against standardized residuals, the autocorrelation function, and the partial autocorrelation function for residuals. Then, model performance was compared with Monte Carlo simulations by using root mean square errors and coefficient of determination ($R2$) for evaluation. In addition, forecasting was conducted by using the best models with historical data on average monthly and daily solar radiation. The contributions of this study can be summarized as follows: (i) a time series SARIMA model is implemented to forecast the daily and monthly solar radiation of Seoul, South Korea in consideration of the accuracy, suitability, adequacy, and timeliness of the collected data; (ii) the reliability, accuracy, suitability, and performance of the model are investigated relative to those of established tests, standardized residual, autocorrelation function (ACF), and partial

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	autocorrelation function (PACF), and the results are compared with those forecasted by the Monte Carlo method; and (iii) the trend of monthly solar radiation in Seoul for the coming years is analyzed and compared on the basis of the solar radiation data obtained from KMS over 37 years. The results indicate that (1,1,2) the ARIMA model can be used to represent daily solar radiation, while the seasonal ARIMA (4,1,1) of 12 lags for both auto-regressive and moving average parts can be used to represent monthly solar radiation. According to the findings, the expected average monthly solar radiation ranges from 176 to 377 Wh/m2. *Keywords: Forecasting; Time series modelling; ARIMA; SARIMA; Solar energy; Green energy; Photovoltaic systems; South Korea; Seoul*
24.	*Author: Mohammad Khairi Younes, Published Year: 2019* *IET Renewable Power Generation, 2019* *Faculty: Engineering and Technology* **Abstract:** Given that solar radiation is unpredictable, an accurate solar energy prediction model must be developed. This study aimed to evaluate the changes in solar radiation over the past 37 years in Seoul city. The capability of the adaptive neuro-fuzzy inference system (ANFIS) to forecast solar radiation using chaotic time series inputs was analysed. Results demonstrate the capability of ANFIS to provide a relatively good monthly solar prediction model with a normalised root mean square error of 0.22%, a root mean square error of 55.4, and a coefficient of determination of 0.8. The Jarque–Bera test was implemented as well to test the null hypothesis for the normal distribution of standardised residual. Results support the null hypothesis with P-value = 0.222, which indicates the normal distribution of the standardised residual and its goodness. The standardised residual shows that the model can effectively predict solar radiation on a monthly basis. *Keywords: regression analysis; normal distribution; solar power; mean square error methods; fuzzy neural nets; fuzzy reasoning; time series; solar radiation; power engineering computing*
25.	*Author: Mohammad Khairi Younes, Published Year: 2018* *The Journal of Solid Waste Technology and Management , 44 (4)* *Faculty: Engineering and Technology* **Abstract:** Rapid economic development and urbanization has caused rapid increase of waste generation worldwide. The Municipal Solid Waste (MSW) generation is expected to double by 2025. This rapid increase needs to be tackled to reduce the generation rates along with the environmental impacts it imposes. Disposal of waste in landfills results in the generation of huge amounts of Greenhouse Gases (GHG), negative impacts on human health, air and water pollution. Solid waste generation increments, rising demand for energy and preservation of fossil fuels, caused an increase in the popularity of Waste-to-Energy (WTE) technologies as the solution for waste managing problems and energy demands. Waste-to-Energy technologies convert the waste into energy and minimize the amount of waste sent to landfills. The aim of this paper is to present the process and specific aspects of WTE technologies along with their advantages and disadvantages. It illustrates that the waste and process must be closely matched to achieve proper conversion of waste and better efficiency of a WTE technology. This study also highlighted some thermochemical

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	WTE facilities which can recover both energy and materials from waste. The continuous developments being made in process efficiency and process control of WTE facilities are expected to enhance the commercial feasibility of these conversion processes in the near future. ***Keywords:*** *BIOCHEMICAL TECHNOLOGIES; FEEDSTOCK; THERMOCHEMICAL TECHNOLOGIES; WASTE MANAGEMENT; WASTE TECHNOLOGIES; WASTE-TO-ENERGY*
26.	***Author: Ahmad Jasim Dabdab, Published Year: 2019*** ***Geotechnical and Geological Engineering - An International Journal , Published online.*** ***Faculty: Engineering and Technology*** **Abstract:** Abstract: Gypseous soil is one of the important high salt content soils in aired and semiarid areas. The failure problems of this soil occur due to the softening of soil and the dissolution of gypsum during leaching (if the flow is continuous). A significant lack of knowledge existed in this research area regarding the effects of leaching on the engineering properties and behavior of gypseous soil in both natural and treated conditions. In this paper, a series of consolidated drained triaxial permeability-leaching tests, under isotropic compression considering three confining pressures (i.e. 100, 200 and 300 kPa), has been carried out to study the effect of leaching on the geotechnical properties and behavior of gypseous soil. A high gypsum content sand soil with little fines was used in this study. Besides, dihydrate calcium chloride was used as an additive to improve the geotechnical properties of soil. The chemical additive percentages are 2.5% and 5.0% by weight of the dry soil. According to the test results, upon leaching, a large reduction in the cohesion of natural soil has been recorded, while the angle of internal friction approximately remained constant. Moreover, the natural soil became more compressible when subjected to leaching under isotropic condition. The inclusion of additive led to a reasonable reduction in permeability, leaching strain, and dissolution of gypsum, while, the shear strength parameters of treated soil were unaffected upon leaching ***Keywords:*** *Gypseous soil _ Consolidated drained triaxial _ Isotropic compression _ Permeabilityleaching tests _ Soil treatment, calcium chloride*
27.	***Author: Ahmad Jasim Dabdab, Published Year: 2019*** ***Journal of Geotechnical Studies , , Volume 4 Issue 1.*** ***Faculty: Engineering and Technology*** **Abstract:** The behavior of soil appropriate to earthquake and maritime problems may studied by performing alternating cyclic simple shear and triaxial tests .The main purpose of this present research Is to evaluate the strength reduction of saturated untrained clay soils under direct shear cyclic stress. The test results revealed that such reduction exists and it increased with increasing cyclic stress amplitude , confining pressure , the number of loading cycles and with decreasing sample thickness . The results indicate that there is a lower limit to the cyclic stress ratio below which cyclic loading has a negligible effect on clay softening . It is observed also that the direct cyclic strength is greater than the Triaxial cyclic strength which conforms with the published results . ***Keywords:*** *Clay , Laboratory tests . Direct Shear , Cyclic Loading , Strength Softening*

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28.	*Author: Ahmad Jasim Dabdab, Published Year: 2018* *Journal of Geotechnical Studies, Volume 3 Issue 3* *Faculty: Engineering and Technology* **Abstract:** The piers of the rail-way and high-way bridges of the New Hindia barrage in IRAQ are resting on clusters of large diameter bored piles. Verification of design was required to prove conformity with technical specifications. A test pile of 1.8 m diameter and 17.7 m depth was employed. The test was further utilized to get better understanding of the behavior of such kind of pile. The pile was provided with three electrical load cells. The foundation soils are mostly sand. It was found that the pile was successfully designed and more than two third of the working load was resisted by shaft friction. *Keywords: : In situ test, Sand, Bored pile, Load transfer*
29.	*Author: Mohammed Mustafa Al-Issa , Published Year: 1998* *13th southeast Asian Geotechnical Conference, Taiwan - Republic of China* *Faculty: Engineering and Technology* **Abstract:** A full scale model of an expansive soil was constructed, and its behavior was monitored. Laboratory tests were performed on the same soil to predict the swelling of the soil. A comparison between the results of the field model and the laboratory tests was conducted, and a correlation was proposed to predict the behavior of an expansive soil. *Keywords: Heave , Expansive Soil*
30.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2000* *3rd Scientific Engineering Conference, Army Engineering College, Baghdad - Iraq* *Faculty: Engineering and Technology* **Abstract:** The present paper is focused towards investigating the effect of particle size of sand and the degree of packing (relative density) on the ultimate bearing capacity of a strip footing founded on a layer of sand. Model tests simulating plain strain conditions were used. The results showed that at loose state, the fine size exhibited higher load at failure, while in the medium dense and dense states, the medium size provided the maximum load at failure. *Keywords: Sand, Bearing Capacity, relative Density*
31.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2000* *Al-Muhandis Journal - Iraqi Engineers Union, Volume 4 , Dec. 2000* *Faculty: Engineering and Technology* **Abstract:**الطرق المستخدمة لتقييم نوع و مقدار الانتفاخ المتوقع للترب المنتفخة تنوعت بين استخدام الطرق غير المباشرة (بالاستفادة من واحدة او اكثر من الخواص الفيزياوية للتربة)، الطرق المباشرة بأستخدام جهاز فحص الانضمام، تنفيذ موديلات حقلية، او استخدام التمثيل الرياضي لمحاكاة تصرف التربة. بالاضافة الى ذلك فقد اقترحت عدة معادلات وضعية تربط بين خواص التربة و قابلية التربة الانتفاخية. العمل الحالي يربط بين قابلية التربة الانتفاخية و بعض الخواص الفيزياوية البسيطة للتربة من خلال معادلة وضعية جديدة. المعادلة المستنبطة تستند الى نتائج فحوصات الانتفاخ التي اجريت على ثلاث انواع من التربة و التي تم فحصها تحت تأثير احمال مسلطة مختلفة و كثافات جافة اولية و نسب رطوبة اولية مختلفة و بعدد نماذج يبلغ (81) نموذج. المعادلة المقترحة من هذا العمل لها معامل توافق مقبول يبلغ (0.87). *Keywords:*تربة منتفخة ، توقع مقدار الانتفاخ
32.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2008* *Engineering and Technology Journal, Volume 26, No. 9*

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	Faculty: Engineering and Technology **Abstract:**إن الأعمدة الرملية او الركامية تعتبر من الاساليب الناجحة لتحسين لترب الطينية الضعيفة مـن ناحية زيادة قوة تحملها وتقليل انضغاطيتها ، وان سبب نجاحها يعود الى سهولة تنفيذها ورخـص تكاليفها وقد أنتشر استعمالها في السنوات الاخيرة في مناطق متعددة مـن العـالم مثـل انكلتـرا واليابان. في هذا البحث تم اجراء سلسلة من التجارب المختبرية استخدام نماذج صـغيرة مـن الاعمدة بقطر (38 ملم) وبعمق (180 ملم) غرزت في طبقة طينية ضعيفة تـم تحضـيرها داخل حاويات حديدية. لقد استخدمت نسب مختلفة من النورة او السمنت، او كلاهما معا لتثبيـت الاعمدة لغرض زيادة كفائتها. اجري فحص التحميل على كل عمود لغرض معرفة قو التحمـل القصوى وقد تم تحديد كفاءة كل مضاف عن طريق مقارنة قوة التحميل القصوى للترب المعالجة مع الترب غير المعالجة (qu/qt) وكانت هذا النسب بحدود (7.2 (للترب المعالجـة بـالحجر المكسر ، (5 ، 4 (للترب المعالجة بالحجر المكسر المثبت مـع (5) ((% نورة على التوالي. كذلك كانت النسبة بحدود (4 ، 5.3 (للترب المعالجـة بـالحجر المكسر المثبت مع (5) ((%سمنت ، وكانت النسبة حوالي (7.3 ، 3.3 (للترب المعالجـة بالحجر المكسر المثبت مع (5] [(5.2% %نورة + 5.2 %سمنت] (10] [(% 5 %نورة + 5 %سمنت] على التوالي. *Keywords:*تربة طينية ضعيفة ، تثبيت التربة ، اعمدة الركام
33.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2008* *Engineering and Technology Journal, Volume 26 , No 10* *Faculty: Engineering and Technology* **Abstract:** For a given foundation to perform to its optimum capacity, one must ensure that the load per unit area of the foundation does not exceed a limiting value, thereby causing shear failure in soil. This limiting value is the ultimate bearing capacity, qu. The classical bearing capacity theories rely on the superposition of three separate bearing capacities – a technique that is inherently conservative – but they also rely on tabulated or curve-fitted values of the bearing capacity factor, $N\gamma$, which may be unconservative. Further approximations are introduced if the footing is circular (multiplicative shape factors are used to modify the plane strain values of , Nc, Nq and $N\gamma$) or if the soil is non-homogeneous (calculations must then be based on some representative strength). By contrast, the method of stress characteristics constructs a numerical solution from first principles, without resorting to superposition, shape factors or any other form of approximation. In this paper, the validation of the method of stress characteristics is tested by solving a wide range of bearing capacity problems. The results are compared with classical bearing capacity theories; namely, Terzaghi, Myerhof, Hansen and Vesic methods. It was concluded that the bearing capacity predicted by the method of stress characteristics for the case of a circular footing in clay ranges between (3.7 – 4.0) greater than Terzaghi, Meyerhof, and Vesic methods. This means that the method is not conservative for this case and can be dependent for economic design of foundations. The bearing capacity predicted by this method increases linearly with (D/B). For all values of the angle of friction, ϕ, the method reveals bearing capacity values for smooth footings greater than Terzaghi and Hansen and smaller than Meyerhof and Vesic theories. Considering the foundation to be rough, the method gives bearing capacity values greater than all other methods. The difference increases as the angle of internal friction (ϕ) increases. This makes the method unreliable for rough foundations. *Keywords: Soil Behavior, Bearing Capacity*
34.	*Author: Mohammed Mustafa Al-Issa , Published Year: 2009* *Engineering and Technology Journal, Volume 27 , No 14* *Faculty: Engineering and Technology* **Abstract:** Soft clays are widely spread in Iraq particularly in its southern

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	Mesopotamian plain. As many sites within these regions may be used for vital projects; an adequate solution has been found out to improve such clays using stone column and dynamic compaction methods. For this purpose, the present paper has presented the laboratory measurements of the properties of such clays and their settlements at different applied stresses. Thirteen soil model tests have been made, at 27% water content and 9 kPa undrained shear strength, to examine their behaviors under loading .The tested models include : (1) model for untreated soil ; (3) models for soil treated with stone columns (1,2 and 3 columns) with 30mm in diameter and 180mm length ; (9) models for soil treated with dynamic compaction using drop weights 2 , 3 and 5kg at three different drop heights (500 , 750 , and 1000mm) . For dynamic compaction, the behavior of soil stress - settlement reflects two stages for 2 and 3 kg drop weights with slow and rapid settlements respectively. Whereas , three stages were identified using 5kg drop weight with slow, medium and quick settlements. No considerable effect of drop height and no noticeable improvements have been indicated with soil model treated by dynamic compaction except for weight drop of 5kg but with less improvement ratio compared with stone columns model test. Whereas, the behavior of stress settlement using stone columns reflects three stages with slow, rapid and slow (again) settlements . In comparison with untreated soil, the maximum cumulative settlement improvement ratios were 69% and 178% at applied stress of 30 kN/m2 for soil models treated with dynamic compaction (5kg drop weight) and 3 stone columns respectively . ***Keywords: Soft clay ; Stone column ; Dynamic compaction***
35.	***Author: Mohammed Mustafa Al-Issa , Published Year: 2014*** ***Engineering and Technology Journal, Volume 32 , Part (A)*** ***Faculty: Engineering and Technology*** **Abstract:** Stone or sand columns are most widely used to improve the engineeringproperties of soft saturated soils. In principles, sand columns technique is very closeto the well-known stone columns technique and the only difference is the backfillmaterials. The present work focuses on implementing sand columns in soft soil of differentdiameters, different relative densities considering both floating and end bearing types.The model tests were performed inside a steel container (600mm x 600mm and 500 mm in height). Sand columns of diameters ranging between 22mm to 50mm were constructed in beds of soil of undrained shear strength ranging between (15-20) kPa. Each individual sand column was loaded vertically through a rigid circular footing of diameters between 28.6mm to 64.7mm provided an area replacement ratio (as) of (0.6),the ratio of column depth to the column diameter (L/D) was (6). The model test results revealed good improvements of the load carrying capacity of the columns ranging between (1.3 to 1.9) and significant reduction in the settlement over the untreated soil ranging between (0.18 to 0.47). End bearing columns exhibited better results than floating columns and the diameter of column has no effect on bearing capacity as the (as) and (L/D) are constants. ***Keywords: Sand columns, Soft soil, Floating, End bearing***
36.	***Author: Mohammed Mustafa Al-Issa , Published Year: 2014*** ***Engineering and Technology Journal, Volume 32 , Part (A)*** ***Faculty: Engineering and Technology*** **Abstract:** The research aims to employ microwave remote sensing techniques to

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	classify soil with the traditional classification method and to detect buried pipes in soil and compare the results. The three- band IKONOS image and the one band QUICK BIRD image for the study area were used in this study; in addition a topographic map for Baghdad city was used also in this study. followed by field investigations including activities such as survey operations in the area using the GPS device and collecting soil samples from certain positions. Then the properties of soil are determined, this includes determination the physical properties of soil to be used according to the (USCS), Microwave experimental setup has been operated to work with x band for studying the reflection coefficient of these waves from the moisture content and the texture change of soil. Also an experiment has been done to detect the pipes in soil by using (iron, plastic) pipes material with different diameters to determine and study the changes in reflection coefficient The main results of the study that the spatial merge between the three- bands image (IKONOS) and the one band image (QUICK BIRD) produces a new color image with high resolution for the study area which is considered the best in giving explanation to visual sensing of the kind of soil and it has been found that the soil of the study area is predominated by silt and clay. ***Keywords:*** *Soil and Remote Sensing, Buried Materials Detection*
37.	***Author: Ahamad Shuraydeh Alfraihat, Published Year: 2017*** ***International Journal of Civil Engineering and Technology (IJCIET), ISSN Print: 0976-630*** ***Faculty: Engineering and Technology*** **Abstract:** ABSTRACT Additives are commonly used by many constructions. It can reduce pollution and benefit a developing circular economy and binding properties. Rubberized Hot Mix Asphalt (HMA) is more elasticity than (HMA) mad from conventional (HMA). It also shows a greater resistance to aging, crack, rut, and skid. Laboratory tests performed to assess the engineering properties, to determine the stability and resistance to plastic flow of bituminous mixtures using the marshal apparatus. The results were compared with experiments of marshal with0%,10%,!5%,and20%,25%,30% rubber ,second test we determine the stability and flow from filler with rubber Versus (vs),and without rubber. The rate of filler and Asphalt was 5%. Then results were compared .The authors found that the rubberized asphalt is more effective with surface resistance, than conventional pavement. The authors notice that the best percentage rubber was 25% on this percentage stability increased at first, and then decreased, when reached the optimum ***Keywords:*** *Key word: Asphalt Performance, Rubber Particles, Bituminous Concrete, Pavements, Stability and Flow.*
38.	***Author: Ala Taleb Obaidat, Published Year: 2019*** ***Advances in Structural Engineering, , First Published 17*** ***Faculty: Engineering and Technology*** **Abstract:** The effectiveness of near-surface-mounted carbon-fiber-reinforced polymers on strengthening and repair of self-compacted concrete slabs was investigated experimentally and numerically. Twenty slabs were cast (10 one-way and 10 two-way) and tested under four-point load. Strengthening and repair effectiveness was investigated on slabs using near-surface-mounted carbon-fiber-reinforced polymer strips with straight and inclined orientation. Repair was performed on eight slabs using near-surface-mounted carbon-fiber-reinforced polymer strips with an

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	orientation based on the best cost/capacity ratio, with two preloading levels: 35% and 50% of the ultimate load of the control slab. The results showed that using near-surface-mounted carbon-fiber-reinforced polymers increases the ultimate strength of one-way strengthened self-compacted concrete slabs (45%–163%) for both strip orientation, with the straight orientation performing better. Also, the cracking load and stiffness increased, while deflection decreased. The increase in ultimate strength for strengthened two-way slabs was 15% to 17%. The ultimate deflection and toughness of the two-way strengthened slabs increased 43% and 34%, respectively. Using near-surface-mounted carbon-fiber-reinforced polymers restored the load capacity of repaired one-way and two-way slabs but was more effective for one-way slabs. The repaired one-way slabs regained up to 223% of the control slabs' ultimate strength, with a significant increase in stiffness (296%). The repaired two-way slabs regained up to 116% of the control slabs' ultimate strength. The strength was higher in the case of the 50% preload compared to 35% preload. The finite element model shows somehow a reasonable capability of predicting the experimental behavior with a gap in terms of the stiffness and the maximum load. *Keywords: near-surface-mounted carbon-fiber-reinforced polymers, one-way slabs, self-compacted concrete, strengthening and repair, two-way slabs*
39.	*Author: Ala Taleb Obaidat, Published Year: 2018* *Engineering Structures Journal, Elsevier, Volume 183, 1059-107* *Faculty: Engineering and Technology* **Abstract:** Reinforced masonry (RM) shear walls with boundary elements have been recently presented as a more ductile alternative to RM rectangular shear walls. Evaluating the complete (i.e. including the post-peak branch) compression stress-strain behavior of the confined and unconfined masonry is essential for predicting the seismic response of the RM walls with boundary elements. Recently, the authors investigated the effect of various volumetric ratios of transverse reinforcement, vertical reinforcement ratios, and grout strength on the axial stress-strain behavior of reinforced masonry boundary elements (RMBEs). However, all the specimens had a specific height to thickness ratio (i.e., AR = 5). This study presents the observed stress-strain relationship of seventeen half-scale fully grouted unreinforced and RMBE specimens, built using C-shape blocks, tested under concentric compression loading up to failure. Thus, quantifying the effect of various aspect (height to thickness) and confinement ratios on the RMBEs peak stress, strain corresponding to peak, and post-peak behavior. The results indicate that, as the hoop spacings and/or aspect ratio decreases, the peak stress and post-peak strains increase. Moreover, this study presents a stress-strain empirical model capable of predicting the RMBE stress-strain response by computing the confined and unconfined masonry stress-strain behavior. The model is calibrated using the experimental data of thirty-three RMBE specimens, tested in this study and literature. The proposed model presents an efficient tool that can be implemented in different analytical/numerical packages. *Keywords: Aspect ratio Boundary elements Concrete block Confinement Shear walls C-shape Reinforced masonry Stress-strain behavior Stress-strain masonry model*
40.	*Author: Ala Taleb Obaidat, Published Year: 2018* *ASCE Structural Engineering Journal, 144(8): 04018119* *Faculty: Engineering and Technology*

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	Abstract: Reliable material stress-strain relationship is the cornerstone of any analysis process. Unlike reinforced concrete, limited studies focused on the stress-strain behavior of confined reinforced masonry. Reinforced masonry boundary elements (RMBEs) added at the masonry shear wall ends allow placing of at least four longitudinal reinforcement bars restrained by transverse hoops and thus introducing confinement to the wall's most stressed zone. This study presents the observed stress-strain relationship of 30 C-shaped half-scale fully grouted unreinforced and reinforced masonry boundary element specimens tested under concentric compression loading. The effect of changing hoop spacing, longitudinal reinforcement ratio, and the strength of grout on the axial stress-strain behavior of RMBE is investigated. This study quantifies and correlates the effect of these parameters on the RMBE peak stress, strain corresponding to peak, and postpeak behavior. Finally, this study investigates the capability of three existing stress-strain models in predicting the RMBE stress-strain relationship. Enhancement in both peak and postpeak stress-strain behavior were observed by decreasing the hoop spacing, increasing the longitudinal reinforcement ratio, and increasing the grout strength. The studied models overestimated the enhancement in the RMBE strength, significantly overestimated the enhancement in the RMBE strain capacity, and did not capture the postpeak stress drop. This study emphasizes the need for a new stress-strain model that can predict the RMBE response considering various confinement effects. ***Keywords:*** *RMBE*
41.	 **Abstract:** The seismic performance of reinforced masonry (RM) walls can be enhanced by integrating confined boundary elements at the end zones of the wall. The evaluation of the compression behavior of the boundary elements is essential to the reliable assessment of displacement ductility and the seismic performance of the walls. Complementary to the experimental evaluation of the compression behavior, finite element numerical simulations are particularly useful in assessing the influence and sensitivity of various design parameters. In this study, experimental and numerical investigations are conducted to evaluate the compression stress-strain behavior of confined C-shaped reinforced concrete masonry block boundary elements (C-RMBEs). Compression tests are conducted on 16 full-scale confined C-RMBEs with different configurations of confinement reinforcement. A finite element modeling (FEM) procedure using the ABAQUS software is employed to simulate the compression behavior of a C-RMBE. The FEM procedure is validated with experimental results on a full-scale confined C-RMBE. Comparative compression stress-strain curves and damage progression are presented and discussed. The study shows the significance of the confinement reinforcement in the improvement of the compression strain capacity of the C-RMBE. Moreover, the proposed FEM procedure provides a good approximation of the compression stress-strain behavior in the elastic and inelastic regions and captures the influence of the confinement reinforcement ratio on the compression response of the C-RMBE. ***Keywords:*** *Reinforced concrete masonry walls Boundary elements Confinement Finite element ABAQUS Stress-strain Damage plasticity*

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42.	*Author: Ala Taleb Obaidat, Published Year: 2015* *11th Canadian Conference on Earthquake Engineering, Victoria, BC, Canada.,* *Victoria, BC, Canada.* *Faculty: Engineering and Technology* **Abstract:** Reinforced concrete masonry structural walls are commonly used as lateral force resisting systems for existing buildings in seismic regions. Recent North American code provisions for seismic design of masonry structures introduced the use of special reinforced concrete masonry structural wall systems with column-like boundary elements for improved ductile performance under severe ground motion levels. The characterisation of the compression behaviour of the boundary elements is essential for the reliable evaluation of the ductility capacity of walls. This paper presents an experimental investigation on the compression stress-strain behaviour of pilaster block reinforced boundary elements. Seventeen full-scale pilaster block boundary elements were tested under concentric axial compression load. Confinement of the grouted core is provided by transverse reinforcement in the form of seismic hoops with different diameters and spacing. The influence of different configurations of the confinement reinforcement on the compression strain ductility is presented. The results showed that the confinement reinforcement increased the strength by the range of 1.2 to 1.3 times the strength of the unreinforced elements. On the other hand, confinement increased the ultimate strain capacity at 50% strength degradation by the range of 1.52 to 3.37 times of the unreinforced boundary elements. The results of this testing program are particularly useful for the evaluation of the ductility capacity of reinforced masonry walls with boundary elements. *Keywords: Reinforced Masonry walls; Boundary elements; Confinement; stress-strain*
43.	*Author: Ala Taleb Obaidat, Published Year: 2004* *• K.A. Bani-Hani, A.T. Obaidat. (2004). "A Genetic Evolution Algorithm for Structural Optimization. The Fourth International Conference on Engineering Computational Technology". Lisbon, B.H.V. Topping (Editor), Civil-Comp, DOI:10.4203/ccp.80.96.,* *Faculty: Engineering and Technology* **Abstract:** Genetic *Keywords: Genetic*
44.	*Author: Mohammad Khairi Younes, Published Year: 2020* *2020 The 3rd International Conference on Sustainable Development of Water and Environment , Inha University, South Korea* *Faculty: Engineering and Technology* **Abstract:** Environmental issues usually have various aspects; criteria and it involves many stakeholders from various backgrounds and level. It is characterized as multi-criteria decision-making problem that requires extensive environmental, financial, social, operational and technical evaluations. Furthermore, the various background of involved stakeholders and conflict of interest complicate the decision-making process. The Median Ranked Set sample (MRSS) and Analytic Hierarchy Process (AHP) were integrated in this research. MRSS was used to enhance the weighting process and to minimize inconsistency and conflict of interest during the stakeholder's involvement. The stakeholders were divided into four groups in which four experts to form 4-by-4 matrix. the environment got the highest importance followed by social and economic

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	criteria, respectively. Furthermore, the most important criteria are outflow emissions (importance weight = 0.27) followed by public acceptance (importance = 0.22). The introduced integrated model may offer a promising tool to improve the decision-making process and help the environmental planners in term of reduction uncertainty and subjectivity of human judgments. ***Keywords:** Multi Criteria Decision Making, Analytic hierarchy Process, Ranked Set sample.*
45.	***Author: Ahamad Shuraydeh Alfraihat, Published Year: 2019*** ***Home> International Review of Civil Engineering (IRECE), Vol 10, No 5 (2019*** ***Faculty: Engineering and Technology*** **Abstract:** This study is focused on studying the effect of synthetic short fibers on the mechanical properties of ultra lightweight aggregate concrete (ULWAC). Both non-structural and structural fiber-reinforced ULWAC were considered. The data were collected from different studies, including 15 design papers submitted by universities in the USA and Canada to ASCE National Concrete Canoe Competition (NCCC) with 23 different ULWAC mixes. The data were analyzed, and new modified equations to determine the modulus of elasticity and modulus of rupture were proposed that could improve the accuracy of the current ACI equations. The statistical parameters of fiber reinforced structural ULWAC were determined, and high cost was associated with this type of concrete. Ductility indices for plates and beams, that have the capability to exhibit strain-hardening prior to failure, were calculated using energy-based method, and they were above the minimum required value of 3. Finally, a new model was proposed to predict the complete stress-strain behavior of fiber reinforced ULWAC under axial compression ***Keywords:** Ductility; Elasticity; Fibers; Rupture; Structural Ultra Lightweight Concrete*
46.	***Author: Ala Taleb Obaidat, Published Year: 2020*** ***Journal of Building Engineering, Journal of Building*** ***Faculty: Engineering and Technology*** **Abstract:** This study aims to investigate the behavior of repaired circular reinforced concrete (RC) columns exposed to temperature considering the effect of spacing between CFRP ropes, area of CFRP ropes and degree of temperature. Nine circular column specimens with diameter of 185 mm and length of 800 mm were constructed and tested. The experimental RC column specimens were divided into three groups. The first group consisted of three circular RC columns not exposed to temperature, the second group consisted of three circular RC columns exposed to 400 �C and the third group consisted of three circular RC columns exposed to 600 �C. In each group, the first column was not repaired and used as control specimen, while the second and third RC column specimens were repaired with one layer of CFRP ropes at spacing of 100 mm and two layers of CFRP ropes at spacing of 200 mm, respectively. Results showed that the repaired circular RC columns damaged by heat up to 400 �C for 3 h with one layer of 100 mm spacing and two layers of 200 mm spacing exhibited load capacity of about 40% and 23%, respectively, of the load capacity of the control specimen. On the other hand, the load capacity of rehabilitated short circular RC columns damaged by heat up to 600 �C for 3 h with one layer of 100 mm spacing and two layers of 200 mm spacing were 88% and 64%, respectively, compared to the control specimen. CFRP effectiveness increases when decreasing

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	the spacing between the CFRP ropes, which leads to a better effective lateral confining pressure. Complementary to the experimental work, a validated numerical finite element model was employed to investigate the effect of different parameters used in the experimental investigation on the stress-strain behavior of RC circular columns. Results of the numerical model showed good agreement with the experimental results. *Keywords: Heat damaged Strengthening Repairing Carbon fiber reinforced polymers CFRP Short-term exposure Finite element ABAQUS Stress-strain Unrepaired column specimens*
47.	*Author: Ala Taleb Obaidat, Published Year: 2019* *International Journal of Civil Engineering, International Journa* *Faculty: Engineering and Technology* **Abstract:** This paper presents experimental and finite element model (FEM) on reinforced concrete (RC) beam behavior strengthened by near-surface mounted (NSM) carbon fiber-reinforced polymer (CFRP) strips subjected to pure torsional loading. Seven rectangular reinforced concrete RC beams of 250 mm 9 250 mm 9 1600 mm were constructed and tested considering the effect of length, inclination, arrangement of longitudinal and scheme of NSM-CFRP strips. The outcomes of the tests indicated remarkable enhancement in the behavior of torsional strengthened beams using NSM-CFRP strips. In general, the beams strengthening with inclined CFRP-NSM strips exhibited an increase in torsion moment strength and angle of twist more than the beams strengthening with vertical CFRP-NSM strips. The experimental measured results are validated with a 3D numerical simulation carried out using nonlinear finite element (FE) modeling. Finally, it can be seen that the calculated numerical torsional moment–angle of twist behavior is in agreement with the experimental results for all RC beams. *Keywords: Reinforced concrete beam Angle of twist Torsion Strengthening NSM-CFRP Finite element method Plasticity*
48.	*Author: Ala Taleb Obaidat, Published Year: 2020* *Journal of Building Engineering , Journal of Building* *Faculty: Engineering and Technology* **Abstract:** Experimental work was conducted to investigate the behavior of repaired and strengthened reinforced concrete (RC) rectangular columns by flexible near surface mounted –carbon fiber reinforced polymer (NSM-CFRP) cord. Thirteen RC column specimens were tested under axial load. Eight specimens were preloaded up to 70% of the maximum axial load and repaired using NSM-CFRP cord with different configurations, spacing, anchoring location, and groove size while the last one was repaired using CFRP sheet. Test results showed that the NSM CFRP cord technique is more efficient in increasing compressive strength than CFRP sheet. Repairing RC columns with NSM CFRP cords provided up to 171% increase in axial load capacity, while repairing with fully two layers of CFRP sheet provided up to 138% increase in axial load capacity, compared to the control columns. The study showed that significant gains in axial strength can be achieved by using larger width to depth ratio and smaller spacing between CFRP cords. Also a modified design model to predict the capacity of repaired columns using NSM-CFRP cord was proposed. Accuracy of

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	the proposed model was checked against the test results. Capacity prediction using the proposed model showed good agreement with the experimentally strengthened or repaired columns, which means the modified design model is capable of predicting the load of NSM-CFRP cord columns. ***Keywords:*** *Concrete column Near-surface mounted CFRP cord Preloading Strengthening Repair*
49.	***Author: Ala Taleb Obaidat, Published Year: 2020*** ***Faculty: Engineering and Technology*** **Abstract:** This study investigated the behavior of repaired circular reinforced concrete RC columns exposed to temperature considering effect of spacing between CFRP ropes, number of layers of carbon fiber reinforced polimers CFRP and degree of temperature. Six circular RC specimens divided into two groups with diameter of 185 mm and length of 800 mm were tested. First and second groups consisted of three RC columns exposed to temperature degree of 400°C and 600°C, respectively. In each group, the first column used as control specimen, the second and third RC columns were repaired using one layer and two layers of CFRP ropes, respectively. The results showed that the repaired RC columns damaged by heated up to (400°C and 600℃) with one layer of spacing 100 mm and two layers of spacing 200 mm exhibited load capacity about (140% and 188%) and (123% and 164%), respectively as control specimen. Hence, one layer of CFRP rope at spacing of 100 mm was more effective than two layers at spacing of 200 mm. In addition, as the exposure temperature of fire increases, the regained capacity of the repaired column increase. ***Keywords:*** *FRP rope, Heat Damaged, Circular column*
50.	***Author: Mohammad Khairi Younes, Published Year: 2020*** ***Journal of Water Chemistry and Technology, 43*** ***Faculty: Engineering and Technology*** **Abstract:** Environmental issues, including wastewater treatment plant siting, usually have various aspects of criteria and 6 it involves many stakeholders from various backgrounds and levels. It is characterized as multi-criteria decision-making 7 problem that requires extensive environmental, financial, social, operational and technical evaluations. Furthermore, the 8 various background of involved stakeholders and conflict of interests among them complicate the decision-making 9 process. The Median Ranked Set sample (MRSS) and Analytic Hierarchy Process (AHP) were integrated in this 10 research to improve the decision-making process. MRSS was used to enhance the weighting process, to minimize 11 inconsistency, uncertainty as well as conflict of interest during the stakeholder's preferences determination, while AHP 12 was used to determine the final priorities of the evaluation criteria. The stakeholders were divided into four groups in 13 which four experts are in each to form 4-by-4 matrix. The results show that the environmental criteria got the highest 14 importance followed by social and economic criteria, respectively. Furthermore, the most important criteria are outflow 15 emissions (importance weight = 0.27) followed by public acceptance (importance weight = 0.22). Furthermore, the best 16 decentralized option for wastewater treatment in rural area is based on cluster level and by using the activated sludge as 17 a wastewater treatment technology with suitability index equals to 4.26 and 4.22, respectively. While, the modified septic 18 tank is best treatment option (with suitability index =

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	3.85) for wastewater treatment on household level. The introduced 19 integrated model may offer a promising tool to improve the decision-making process and will help the environmental 20 planners in term of uncertainty reduction and subjectivity of human judgments. **Keywords:** *Decentralized Wastewater Treatment, Multi Criteria Decision Making, AHP, RSS.*
51.	*Author: Mohammad Khairi Younes, Published Year: 2020* *Asian Journal of Atmospheric Environment, 14* *Faculty: Engineering and Technology* **Abstract:** Emissions from motor vehicles are the primary source of air pollution, especially in congested urban centres. However, through effective traffic management, it has been found that the level of pollution can be significantly reduced, facilitating the mobility of urban arterials. This study aims to quantify the extent of traffic emissions and to identify the influence of traffic management to improve air quality and reducing traffic emissions. An Adaptive Neuro-Fuzzy Inference System (ANFIS) model was developed to estimate the extent of traffic emissions (NO_2 and $PM10$) at certain intersections. Then, a traffic management simulation software was also used to simulate traffic and to build a traffic improvement scenario at these intersections. This was followed by measuring the improvement in air quality due to traffic management modification, analysed using the developed ANFIS model. The results showed that reducing the delay at certain intersections may reduce NO_2 and $PM10$ significantly. The proposed hybrid model increased the forecasting accuracy and improved the perception between the relationship between traffic characteristics and pollutant emissions. Additionally, it facilitates the work of city planners and helps decision making regarding urban air quality. **Keywords:** *Traffic management, Air pollution, Vehicle emissions, Air quality index, ANFIS*
52.	*Author: Mohammad Younes Published Year: 2021* *International Journal of Safety and Security Engineering, 11* *Faculty: Engineering and Technology* *Abstract:* Traffic accidents present a serious problem for both developed and developing countries and have become an urgent matter to tackle in all large metropolitan areas. This study aims to perform a deep comprehensive analysis of the traffic accidents issue in Istanbul, one of the world's most populous cities. The accidents were classified and its intensities were presented on Istanbul map using a GIS tool. Furthermore, the performance of Negative Binomial Regression analysis and Adaptive Neuro-Fuzzy Inference System (ANFIS) model was assessed. Data collection of independent variables included distribution of trips, percentage of street parking, rate of car ownership, street density and population density. Trips were divided into three categories, passenger car, minibus and bus trips. The results showed that four legs intersection got the highest proportion of accidents among the other types with (40%). It also demonstrated that increasing both the percentage of bus trips and the percentage of street parking will decrease the traffic accident rate. Furthermore, the implementation of ANFIS model increased the accuracy of forecasts and reduced errors more than the regression model. **Keywords:** GIS and traffic, ANFIS, traffic modeling, traffic regression analysis, traffic

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	accidents
53.	*Author: Ala Taleb Obaidat, Published Year: 2021* *Faculty: Engineering and Technology* **Abstract** Previous studies showed that near-surface mounting (NSM) strengthening technique with rigid CFRP materials have potential advantages over the externally bonded reinforcing (EBR) one, therefore, it becomes efficient methodology for concrete strengthening. However, rigid NSM CFRP cannot be wrapped around a deteriorated structural element; the need for the existence of flexible material has appeared. Therefore, in this study the flexible NSM-CFRP (cord) is investigated as strengthening technique instead of rigid NSM-CFRP. The aim of this study are to recognize the parameters affecting the bond performance between carbon fiber reinforced concrete (CFRP) cord and concrete. These parameters are cords' bonded length, the ratio between cord's width and depth, concrete compressive strength, number of CFRP cords used, and the distance separating cords in multi-cord specimens. Fifty-four concrete prisms were cast from 25 MPa and 50 MPa concrete compressive strengths. Thirty-eight prisms reinforced by a single cord with various cord sizes were prepared. Twelve and four specimens were reinforced with two and three cords, respectively. In the case of multi-cord specimens, a unified bond length and cord's aspect ratio were carried out. The main parameter to be studied in this case is the cords' separating spacing. The test results indicated that increasing (NSM-CFRP) cords bonded length, concrete compressive strength, number of applied CFRP cords, the spacing between cords and reducing cords' aspect ratio (width/depth ratio) cause an increment in the pull-out force, and then a better strengthening is achieved. Rupture was the predominant failure mode for specimens with the same bond and equal cord dimension, while debonding of the CFRP cords is the most frequent failure mode for multi-cords specimens with greater spacing. **Keywords**: Near-Surface Mounting (NSM), carbon fiber reinforced polymer (CFRP), Cord, Debonding, Pullout load.
54.	*Author: Ala Taleb Obaidat, Published Year: 2021* *Faculty: Engineering and Technology* **Abstract** This research aims to evaluate the potential using of recycled asphalt pavement aggregate (RAP), recycled concrete aggregate (RCA) and silica fume (SF) in production of roller compacted concrete (RCC). Thirty RCC mixes were casted in whichnatural aggregates (NA) were totally replaced by RAP and RCA with (90% and 10%), (80% and 20%), (70% and 30%), (60%and 40%), (50% and 50%), (40% and 60%), (30% and 70%), (20% and 80%) and (10% and 90%), respectively, and cementwas partially replaced by SF in 2% (2.5% and 5%). The tested mechanical and physical properties of RCC mixes were the compressive strength, tensile splitting strength, the modulus of elasticity, the modulus of rupture, and the density. Thedurability feature was monitored through the water absorptions of the RCC. Test results showed that partial replacement of cement with 2.5% and 5% SF has improved the mechanical properties of conventional RCC mixes, as well as, decreasing the dry

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	density of RCC mixes and the water absorption of conventional RCC. Replacing the NA aggregates with RCA and RAP in RCC mixtures has decreased the mechanical properties such as compressive, splitting strength, flexural strength and modulus of elasticity. Even though the RCC reached the required compressive stress which would be used for public traffic or dams. Finally, as the high RCA content increased the water absorption increased which is the most significant indicator for durability of material, while the high RAP content decreased the water absorption. **Keywords** Silica fume · Recycled asphalt pavement aggregate · Recycled concrete aggregate cement · Roller compacted concrete · Durability · Environmental impact · Mechanical properties
55.	*Author: Ala Taleb Obaidat, Published Year: 2021* *Faculty: Engineering and Technology* **Abstract** This paper presents experimental and numerical study to investigate the flexural behaviour of strengthened RC beams using three CFRP techniques. Considered main variables were CFRP technique, amount of CFRP NSM and rope and cost/increase in strength effectiveness. Results indicate that using CFRP rope and sheet increased significantly maximum load and maximum strain of RC beams. Average increase in strength and maximum strain were 76.3% to 143.5% and 206% to 246% as the control RC beam. Moreover, RC beams strengthened with CFRP rope exhibited strength approximately similar to ones strengthened with CFRP strip. The cost/increase in strength ratio of specimens strengthened by CFRP rope is 61% higher than the ratio of specimens strengthened by CFRP NSM strip. Hence, the specimens strengthened by one layer of CFRP rope is the most economic techniques based in cost/increase in strength ratio even though it exhibited maximum load less than the specimens strengthened with two layers of CFRP rope or strip. CFRP rope was 40% lower than CFRP strip when same strengthening Effect was achieved. Finally, complementary to experimental work a finite element model FEM was developed to investigate the flexural behaviour of beam. The FEA model showed somehow good agreement with the experimental results.
56.	*Author: Ala Taleb Obaidat, Published Year: 2021* *Faculty: Engineering and Technology* **Abstract** Reinforced masonry shear walls (RMSW) with masonry boundary elements (MBE) are rectangular walls with integrated MBEs at the wall extremities. The compressive stress-strain behaviour of the MBE prisms built using C-shaped blocks (C-MBEPs) varies from that of regular stretcher prisms due to the continuity of the grout core and the higher grout-to-shell area ratio. Few studies have investigated the stress-strain behaviour of MBEs built using C-shaped blocks. This study evaluates the compressive stress-strain behaviour of half-scale fully grouted C-MBEP and its constituents (i.e., masonry shell and grout core). In total, 8 fully grouted masonry prisms, 6 un-grouted masonry shells, and 18 grout cores were tested under concentric displacement-controlled compression loading. The test matrix is composed of two aspect ratios: two and five, and normal and high grout strengths. In addition, the effect of grout core treatment, i.e., air and wet treatment, was examined.

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	Similar to masonry prisms made from stretcher blocks, the superposition of the load-displacement relationship of the grout core and the masonry shell was found not comparable to that of the grouted C-MBEP Prisms built with similar grout and masonry blocks.
57.	*Author: Ala Taleb Obaidat, Published Year: 2021* *Faculty: Engineering and Technology* **Abstract** Bearing capacity is significant value in pile design. Various approaches have been introduced to estimate the axial pile capacity. These approaches have restrictions and accordingly did not implement uniform and precise estimation of axial pile capacity. To add a value of the effort to achieve a proper and accurate relationship of a cone penetration test, including axial pile capacity, the Artificial Neural Networks (ANN) method is employed in this paper, which can be applied in cases where the relationship between the input parameters is unknown. In this paper, ANN was used to predict the bearing capacity of bored and driven piles. The present study uses the neural network approach to develop a model that can be adopted to predict bearing capacity values using ANN Techniques and can comfortably accommodate new data as this becomes available. ANN was used to predict the bearing capacity of bored and driven piles. The data, which is used as inputs accompanied by CPT. Furthermore, three artificial neural network models were generated. All models show that ANN provides a more accurate result by comparing it with the available CPT method. **Keywords**: Bearing Capacity, ANN, CPT
58.	*Author: Ala Taleb Obaidat, Published Year: 2022* *Faculty: Engineering and Technology* *Abstract* Harmful environmental effect caused by the manufacturing of oil and cement is such problems as landing use, waste, and water and air pollution. To minimize this environmental harmful effect, cement could be partially replaced with waste such as oil shale ash. Aim of this study is to specify the properties of mixing material, and the durability and mechanical and technological properties of roller compacted concrete and new roller compacted green concrete, as well as presenting new meaningful regression relationships between the properties. The roller compacted green concretes substitute 10%, 20%, 30%, and 40% of cement with oil shale ash. The experimental results showed that using OSA has retarded the mechanical properties of roller compacted green concrete. Even though the retarding in compressive strength, splitting strength, and flexural strength of roller compacted green concrete was between 18%-42%, 27%- 37%, and 3%-61% respectively, when compared to roller compacted concrete, the roller compacted green concrete reached the required compressive stress which would could be used for public roads, dams, and airport runways. The durability property was satisfactory in roller compacted green concrete compared to control roller compacted concrete. The results also revealed that 10% replacement of cement with oil shale ash presents similar positive physical and durability properties along with the mechanical properties summarized. As an upcycling model, the study replaced common cement with oil shale ash, up to

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	10% in the roller compacted green concrete, would forcefully help reduce the aforementioned harmful environmental effect caused by the manufacturing of oil and cement. Keywords: Oil shale ash; Supplementary cementitious material; Sustainable roller compacted concrete; Microstructure; Durability; Elasticity
59.	*Author: Ala Taleb Obaidat, Published Year: 2022* *Faculty: Engineering and Technology* *Abstract* A Finite Element (FE) and an Artificial Neural Network (ANN) model were developed to investigate the effect of different parameters, such as the space between stirrups and the diameter of longitudinal steel, on the behavior of circular Reinforced-Concrete (RC) columns confined with fiber reinforced polymer (FRP) sheets using the actual hoop rupture strain of the FRP. The FE model was accomplished using the FE software ABAQUS 6.13 which incorporates the nonlinear behavior of concrete material, the bilinear stress–strain curve of steel, and the linear elastic behavior of FRP. It was found that there is a good agreement between the FE model (FEM) results and the experiments. The ANNs were trained and tested on an experimental database from the literature. The database contains the experimental ultimate FRP strain, and the ultimate load results of 92 FRP confined circular RC columns. The ANN results agreed well with the FEM results. The neural network results were carried out to develop empirical equations to predict the effective rupture FRP strain and the ultimate load for circular confined RC columns with R2 of 0.912 and 0.932, respectively. The proposed equations estimate the ultimate strain from experimental works of the FRP with a small error up to 20%. In addition, the predicted results from the proposed equations exhibited good accuracy compared with previous guidelines and experimental and FE results from the literature, and it can be easily used in engineering designs as well. Keywords Fiber reinforced polymer (FRP)ConcreteColumnConfinementFinite element analysis (FEA)Artificial neural network (ANN)