



**Perceived Level of The Law on Occupational Health and Safety No. 6331 by  
Engineers**

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Today, together with the growth and improvement of the industry, the size of the constructions has got enormous and much more complex than ever before. This, of course, has brought up huge construction organizations and high construction technologies together. As the construction durations become shorter, the speed and intensity of works have extremely increased. Technological changes have introduced new hazard types. All those have created enough reasons and conditions for the work accidents and ill health to be risen up. Of course, in many countries, authorities described heavy health and safety laws and regulations corresponding to the new situations.

In this thesis, the main purpose is; to determine the perceived level of the law on occupational health and safety No. 6331 by engineers in construction sector. The knowledge and sources are examined by a survey. Results are obtained and analyzed by using the SPSS (Statistical Package for the Social Sciences) software.



## **Effect of Blast Furnace Slag and Scrap Tire Rubber on Concrete Properties**

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One of the major environmental challenges facing municipalities around the world is the disposal of worn out automobile tires. To address this global problem, several studies have been conducted to examine various applications of recycled tire rubber (fine crumb rubber). Examples include the reuse of ground tire rubber in a variety of rubber and plastic products, thermal incineration of waste tires for the production of electricity or as fuel for cement kilns, and use of recycled rubber chips in asphalt concrete. Unfortunately, generation of waste tires far exceeds these uses. This paper emphasizes another technically and economically attractive option, which is the use of recycled tire rubber in portland cement concrete with blast furnace slag.

In this study, two types of concrete mixtures were prepared as normal concrete with scrap tire and blast furnace slag blended concrete with scrap tire. The strength class of the concrete mixtures is chosen as C30/37. In experimental studies 11 different type of concrete specimens were produced in dimension with 15 cm cube and 10x10x50 cm prismatic shape. The physical and mechanical properties of the concrete specimens are determined and compared with the reference traditional concrete specimen. It is aimed to utilize scrap tire wastes in concrete mixture in order to reduce the environmental pollution.



**Keywords:** Scrap tire, Blast furnace slag, Concrete, Compressive strength, Flexural strength



## **Solar Car Design and Geometry Improvement by Computational Fluid Dynamics**

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Aerodynamics is the science that studies the effects of forces of the overall air flow. If air is flowing around a solid body or the solid body is moving in stationary air, air acts according to the laws of aerodynamics. The determination characteristics of the force, moment and pressure acting on a moving vehicle in the air, and therefore the determination of the aerodynamic characteristics of the flow around the vehicle is one of the basic engineering problems. The total pressure with the principle of conservation of energy in air flow which does not enter the vehicle's motion space can be easily calculated. However, if the air velocity varies, dynamic pressure will change and the calculations will become difficult to perform. Effect of air flow at different speeds at every point on the vehicle changes the dynamic pressure. The horizontal and vertical forces caused by this relative motion of air and the pressure distribution on the entire surface of the car are the lift force and drag force. It is important to keep these forces at an optimum level for vehicle safety, speed and fuel consumption

Drag force is a one of the aerodynamics forces that is parallel to relative velocity of air and the road, opposite to the direction of motion of the vehicle. The torque delivered by the engine counterbalances the drag force. So, the drag force affects significantly the fuel consumption. Fuel consumption of a vehicle at different speeds depends on the engine power (the power which is required to resist the drag force). The lift force is the aerodynamics force that is perpendicular to direction of the vehicle (normal to the road). If the lift force is low, road handling of vehicle and motion on the curve become easier. But, this situation increase the frictional force between the road and the wheels and also as a result the fuel consumption increases. So, our aim is to investigate the current geometry of the SUNATOLIA, provide improvements in the geometry by which establish a decrease in the drag force and keep lift force at optimum level by aerodynamic considerations.

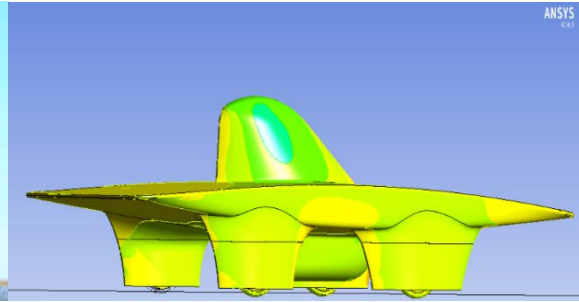
There are important and costly wind tunnel tests for determination of forces, pressures and moments on the vehicle and geometry design in accordance with aerodynamics laws. Due to difficulties and the cost, we used a numerical method, namely the computational fluid dynamics (CFD) using the ANSYS software to define the aerodynamic characteristics of the vehicle by numerically simulating the flow around the car. Aerodynamic calculations were performed as a result of the model built by the iteration of differential equations via fined volume method. Model results were also visualized to enable flow simulation. Modifications on the geometry of the solar car were then determined to optimize the performance of the car in terms of drag and lift forces. These modifications are being implmeneted by the solar team as



well. We expect that our findings will result with better performance for SUNATOLIA in solar car competitions.



**Figure 1.** Sunatolia 2



**Figure 2.** Sunatolia 2 CFD results ( Pressure

Contour)

**Keywords :** Aerodynamic, Drag Force, Lift Force, CFD, Solar Car



**THE EFFECT OF SILICA FUME ON FLY ASH BASED GEOPOLYMER MORTAR'S  
MECHANICAL PROPERTIES**

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Alkaline activated geopolymer binders producing by activating natural and industrial mineral materials. Lately, the studies of usability of geopolymer are increasing because of environmental, economical and technical advantages of geopolymer.

In this study, the samples which contains %5,%10,%15,%20 silica fume and the rest of percentages are fly ash, produced for determining the effect of silica fume on fly ash based geopolymer mortar's mechanical properties. The activators Sodium hydroxide and Sodium silica which has the ratio 1/2.5 are used for activating in the mix. The samples rests 24 hours in 60°C wet cure oven and they waits till the experiment day in the cure pool. The samples are used for compressive and bending experiment on prismatic and cubic samples according to TS 196-1, tensile splitting strength experiment on cubic samples according to TS-EN 12390-6 and spread experiment on every sample according to TS-12350-5 in 3,7 and 28.day.

The results of experiments show that when the amount of Silica fume increases compressive and bending strength are decreasing and the tensile splitting strength is increasing.



WAREHOUSING SYSTEM PROJECT

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Due to the it's ductility, the structural engineering profession has been using the STEEL as a construction material. All around the world, many buildings have been constructed in the area (Warehousing) of high seismic activities. These buildings are designed to resist lateral loads arising from earthquakes by old standards (TDY 98). Warehousing systems have been made by using precast elements in 1990's widely. From the experience of the latest earthquakes most of precast buildings collapse or severe damaged. Beginning the 2000's, to avoid collapse and lose financial invest; steel structures became more of an issue. For this purpose, in this term project an industrial building in Bilecik is designed as steel structure. The building has a rectangular base in plan view having the area of 1010 m<sup>2</sup>. The total height of the building is 9.20 m. The building is in the first earthquake zone and soil type assumed Z3. All loads are defined according to TS 498, TS 648 and Turkish Earthquake Code. Section moments, shear and normal forces are calculated SAP2000 and Comosys.

The study mostly focuses on connection detail design of steel structures which is based on capacity design ratio. During design of connection details, Stalbau, LRFD, and ASD is used as reference.



## **Investigation Factors Affecting Productivity in Construction Projects**

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Productivity in construction is one of the most important issue for the construction industry. This thesis analyzes the engineers' opinion about factors affecting productivity in construction projects. 30 civil engineers, mostly from Eskişehir, were selected in this study. A questionnaire, based on factors affecting productivity in construction projects, is used to survey the applications and collect the data for the analysis. I used "SPSS" statistical analysis program to analysis collected data to make my interests. Considering these analyses, factors affecting productivity of the construction firms will be discussed and try to define "what are the most important factors in construction project?"





DÜŞÜK DAYANIMLI BETONLARIN ELASTİSİTE MODÜLÜNÜN  
BELİRLENMESİ

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Türkiye sıklıkla yıkıcı depremlere maruz kalmaktadır. Bunun yanı sıra, kısa zaman aralıkları ile yaşanan depremlerden dolayı can kayıplarının yaşandığı ülkelerden biridir. Şuan var olan ve yaşamın devam ettiği birçok betonarme yapıda, acilen güçlendirme çalışmalarına ihtiyaç duymaktadır. Bu yapıların hasar görebilirliğini etkileyen birçok faktör olmakla beraber, Türkiye’de yapı stokunun ciddi bir kısmında var olan düşük beton sınıfı ana ve en yaygın problemidir. Son yıllarda yapılan çalışmalar, ortaya konulan yönetmelikler ve bu yönetmeliklerde mevcut binaların değerlendirilmesi ve güçlendirilmesi kısmında yapılan değişiklikler sonrası, sismik değerlendirme ve güçlendirme uygulamalarının sayısı artmıştır. Bu noktada elastisite modülü, betonarme yapıların yapısal değerlendirme ve güçlendirme çalışmaları için önemli bir parametreyi oluşturmaktadır. Elastisite modülü üzerine yapılan varsayımlar önem arz etmekle beraber, yönetmeliklerde ortaya konulan elastisite modülü değerleri deneysel çalışmalar sonucu normal dayanımlı betonlar için elde edilmiş olup, aynı elastisite modülü teorisi düşük dayanımlı betonlar için geçerli olmayabilir. Bu çalışma kapsamında, hazırlanan 60 adet beton numunesi, düşük dayanımlı betonların elastisite modülünü belirlemek için test edilmiştir. Düşük dayanımlı beton grupları üzerine yapılan testler sonucu beton numunelerinin karakteristik özellikleri belirlenerek, düşük dayanımlı beton gruplarının gerilme-şekil değiştirme grafikleri üzerinde elastisite modülü için değerlendirmeler yapılmıştır. Yapılan çalışmalar sonucu elde edilen elastisite modülü değerleri, ulusal ve uluslararası yönetmeliklerle kıyaslanarak yeni bir formül önerisi geliştirilmiştir.



## NUMERICAL MODELING OF WIND LOADS ON TALL BUILDINGS

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Today the number of skyscraper, high rise building, tower etc. of tall buildings really stand out in developed and developing countries. Tall buildings resist to wind load and this resistance depends on how much rigid they are. In fact, while the tall buildings are designed, wind effect is one of the most important parameters. As the height of building rises, wind loads increase exponentially or as a function of logarithm. With proposed project, we responded to the need of a company from sector by using CFD and simulating wind loads on tall buildings. The model is formed in detail by taking into account the proper turbulence model. Especially unsteadiness in velocity and pressure in time is being explored. Expectation is to reach at results that are directly applicable. There is not enough CFD expertise especially in civil engineering area. CFD is a method which provides solving numerically the fluid mechanics problems. Their solutions have long processes on computer platform with numerical approaches. It is provided that by using methods such as finite differences, finite elements, and finite volumes solution with complicated and long-termed problems depend on computer performance as rapidly and effective. With this method, turbulence flow around the building geometry, low pressure points, and negative pressure situations will be detected. The aim is determination of critical wind loads that affect the high rise buildings ( unsteadiness changing with time), determination of turbulence flows due to geometry of high raise buildings and low-high pressure points and determination of changing of wind direction and magnitude related with local conditions. When the project is completed, wind loads acting on tall buildings are going to be evaluated which conditions that are generating critical situations . For such conditions, precautions are needed during the structural design procedure. Depended on that, the most important motivation of project team, as a result of using CFD method deliberately, is being experienced with the critical wind loads and their determination.



## **EVALUATION OF REINFORCED SLOPES WITH SOIL REINFORCEMENTS**

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In geotechnical engineering, especially road construction and deep excavation, using different supporting excavation methods for solving to encountered slope stability problems. The most preferred soil reinforcement from these methods, provides to easiness to application and economically. In this project, for consider to behavior of supported slopes with geotextiles, geogrids and steel strips, making experiments on slope models in laboratory. With these experiments, 0.25, 0.50, 0.75 and 1 kg/cm<sup>2</sup> statics load cases, finding failures surface and factor of safety for each cases. Helping with plaxis program designing slopes, depends on loads and angle of slope, making comparison between stresses –strain diagrams. These stress and strain try to decrease using geotextile, geogrid and steel strip, try to increase soil bearing capacity. Experimental model and analytic models by being compared, results submitted.



RESEARCH ABOUT MOMENT RESISTING STEEL FRAMES ACCORDING TO  
DESIGN SPECIFICATIONS FOR BUILDINGS IN SEISMIC REGIONS 2007

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This study investigates the design procedure of the concentrically steel braced frames according to Design Specifications for Buildings in Seismic Regions 2007. Analytical studies are performed with a 5-storey (4 normal+ 1 roof) steel building with high ductile eccentrically braced frames. The building is in the first earthquake zone. Soil type is assumed as Z1. Current building is constructed as reinforced concrete building having the quality of concrete as BS 35 concrete is used. These materials are chosen the same with the current building in the new designed building and for the steel parts; St52 steel material is used for columns ( $\sigma_a=355 \text{ N/mm}^2$ ,  $E=206182 \text{ N/mm}^2$ ,  $\sigma_{em}=212 \text{ N/mm}^2$ ,  $\tau_{em}=122 \text{ N/mm}^2$ ), beams and braces and St37 steel quality is used for plates. High strength bolts (ISO 10.9;  $\sigma_a=900 \text{ N/mm}^2$ ) are chosen for steel connections.

In this study, seismic design of steel structures, properties of steel frame systems and types of steel frame systems mentioned. After giving some information about the design of ductile steel frames, design procedure of ductile steel frames according to Design Specifications for Buildings in Seismic Regions 2007 is searched. The model of the structure and its analysis are created using SAP V16.0 computer program. The parts of the structure are designed and connection calculations are made using the results taken from this computer software and the above mentioned specifications. Autocad 20xx program is used for themanufacturing drawings.

At the end, provisions in the current design codes that are relevant to seismic design of braces and results of the study are mentioned.



## PERCEPTIONS AND ATTITUDES OF ENGINEERS REGARDING MOBBING IN CONSTRUCTION INDUSTRY

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The purpose of this study is to state the process and dimensions of mobbing in public and private construction industries and to indicate the civil and corporate ways of struggle for victims of psychological harassment, molesters and its negative impacts.

Former studies indicate that mobbing in the workplace occurs occasionally. Implementation of mobbing differs according to the positions, gender, ethnicity, ages and experience levels of employees together with the economical levels of societies. In the first stage of this study, mobbing has been comparatively observed among employees and in superior-subordinate relationship in construction industry. A basic difference has occurred between mobbing and sexual harassment in the construction industry. It is emphasized with a survey, which is to determine if the participants were exposed to mobbing, with extremely clear questions. In the second stage of this comparative study, the differences on the basis of gender, work experience, age, ethnicity and position have been perceived and displayed with analyses. To understand the leadership styles of the engineers, a questionnaire was surveyed, 30 participants were interviewed for this study with proper questions; to understand the leadership behaviors of men and women engineers. Results are obtained and analyzed by using the SPSS (Statistical Package for the Social Sciences) software. In spite of the basic differences in work experience, position, ethnicity and gender, it has been displayed that there is no differences in mobbing levels between the public and private sectors but there are some differences in the frequency of mobbing.



**A COMBINED SYSTEM OF  
HYDROPOWER PLANT AND WIND POWER PLANT**

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Energy resources are divided into two groups: renewable and non-renewable. Non-renewable sources are defined as used and recurrent in a short time interval. The usage rate of this source is high and therefore the exhaustion of the resources are expected within the next 50 years. In addition, non-renewable energy sources unavoidable give damage to the environment. Fossil fuel combustion reaction with the carbon in the atmosphere causes the accumulation of CO<sup>2</sup> and CO compounds. Accumulation of these gases in the air cause global warming. All these factors has led to the use of renewable energy sources that do not harm the environment, not generate waste and can be continuously reused. Water (hydroelectric) energy is the one of the most commonly used renewable energy sources. The wind energy is another kind of renewable sources which is spreading nowadays. Wind Power Plant (WPP) cannot produce energy continuously because of changing meteorological conditions. Therefore, energy from wind power is generated when it is possible and the remaining deficit is compensated from hydropower. In this study, a combined system of Hydroelectric and Wind Power Plant working together is analyzed. Sündiken Mountains in Eskişehir region is selected for Wind Power Plant location and currently used Gökçekaya HES is selected for Hydroelectric Power Plant. Water cycle characteristics of the region and the prevailing wind conditions are taken into account. Environmental effects are investigated using Geographic Information Systems (GIS) platform. A simple optimization scheme is evaluated within the combined Hydroelectric and Wind Power Plant system.



RESEARCH ABOUT ECCENTRICALLY STEEL BRACED FRAMES ACCORDING TO  
DESIGN SPECIFICATIONS FOR BUILDINGS IN SEISMIC REGIONS 2007

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The seismic performance of low-rise steel buildings with eccentrically braced frames (EBFs), designed in accordance with the Design Specifications for Buildings in Seismic Regions 2007 is evaluated. Such buildings possess features such as a flexible roof diaphragm and non-structural partitions.

Analytical studies are performed with a 6-storey (5 normal+ 1 roof) steel building with high ductile eccentrically braced frames. The building is in the first earthquake zone. Soil type is assumed as Z2. Current building is constructed as reinforced concrete building having the quality of concrete as BS 35 concrete is used. These materials are chosen the same with the current building in the new designed building and for the steel parts; St52 steel material is used for columns ( $\sigma_a=355$  N/mm<sup>2</sup>,  $E=206182$  N/mm<sup>2</sup>,  $\sigma_{em}=212$  N/mm<sup>2</sup>,  $\tau_{em}=122$  N/mm<sup>2</sup>), beams and braces and St37 steel quality is used for plates. High strength bolts (ISO 10.9;  $\sigma_a=900$  N/mm<sup>2</sup>) are chosen for steel connections.

A three-dimensional structural model is developed that considers linear seismic behavior of eccentrically braced frame, the strength, and stiffness contribution of the cladding, and the flexibility, strength and distributed mass of the floor diaphragm. In this study, seismic design of steel structures, properties of steel frame systems and types of steel frame systems mentioned. After giving some information about the design of ductile steel frames, design procedure of ductile steel frames according to Design Specifications for Buildings in Seismic Regions 2007 is searched. The model of the structure and its analysis are created using SAP V16.0 computer program. The parts of the structure are designed and connection calculations are made using the results taken from this computer software and the above mentioned specifications. Autocad 2013 program is used for the manufacturing drawings.

At the end, provisions in the current design codes that are relevant to seismic design of braces and results of the study are mentioned.



## **SHEET PILE APPLICATION IN PORSUK RIVER TO PREVENT LIQUEFACTION**

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In this study, liquefaction problem around the Porsuk River prevented by using sheet pile, and buildings in this place are protected. Samples are taken from around Porsuk River then laboratory experiments are performed in the ground. Survey report has been prepared from experiments.

Liquefaction has been detected at sand area where at 15 meters below the ground. Determination of sheet pile type and length according to calculations.





## ÇOK KATLI BETONARME YAPILARDA KÖŞE VE KENAR KOLONLARIN GÜÇLÜ KOLON-ZAYIF KİRİŞ İLKESİNE GÖRE İNCELENMESİ

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Yapı elemanlarının deprem etkileri gibi yanal yükler altında elastik ötesi deformasyona uğrayarak enerji tüketmesi plastik mafsallaşma olarak adlandırılır. Betonarme yapılarda plastik mafsallaşmaların yeri çok önemlidir. Çünkü bunlar binada aşırı deformasyona sebep olabilir. Betonarme yapılarında iki önemli plastik mafsall mekanizması vardır. Bunlardan biri kirişlerde meydana gelen kiriş mekanizması, diğeri ise kolonlarda meydana gelen kolon mekanizmasıdır. Güçlü kolon- zayıf kiriş tasarım felsefesi ile sismik enerjinin kirişlerde tüketilmesi amaçlanır. Bu tasarım ilkesi ile yapılarda, kolonların moment kapasitesinin kirişlerinkisinden daha büyük olması sağlanır.. Tez çalışmasında, bu ilkenin 2007 deprem yönetmeliğine uygun olan ve düzenli olan yapılar üzerinde çalışılmıştır. Güçlü kolon-zayıf kiriş durumunu sağlayabilmek için, kolonların ve kirişlerin donatıları  $M_c \geq 1.2 * M_b$  formülüne uygun bir şekilde yerleştirilmiştir. Bu araştırma özellikle bir kiriş ve 2 kolonun bağlandığı köşe ve kenar birleşim bölgeleri için gerçekleştirilmiştir.. Her ne kadar Türk Deprem Yönetmeliği'ne göre güçlü kolon zayıfkiriş şartı sağlanmış olsa da, kolon ve kiriş moment kapasiteleri ayrı ayrı ele alındığında, kirişlerin kolonlardan biraysel olarak daha güçlü olduğu durumlar ile karşılaşılmaktadır. Bu durumu irdeleyebilmek için , SAP2000 programında zaman tanım aralığında doğrusal olmayan analizler gerçekleştirildi.



Hesaplamalar sonucunda, plastik mafsallaşmaların kolon veya giriş uçlarında olup olmadığı incelendi. Sonuç olarak deprem yönetmeliğindeki güçlü kolon zayıf giriş ilkesinin incelenen her durumda uygun olduğu görülmüştür.



## **FLOOD MODELING OF DİREKLİ BASIN USING HEC-RAS**

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Throughout history, civilizations have been established next to the water supply to make people's lives qualified. However, this situation has brought some disadvantages with the advantages. Regions have economically and socially damaged by possible flood events. For this reason, importance of controlling the water resources like a river and lake, is increasing day by day. Aim of this study is to determine the potential floodplain in the 1288 meters of Karakoyun Creek on Direkli Basin. This study is important because Karakoyun Creek is passing through Şanlıurfa city center. In this study, HEC-RAS hydraulic modeling and analysis software has been used. HEC-RAS is one of the most commonly used programs for one dimensional river analysis, data storage and management. Geometric data in this study consist of 27 cross sections. As hydrological data 2, 5, 10, 25, 50, 100, 500 and 1000 years of return periods are used. Different scenarios are examined by considering new structures on the river, water surface profiles are investigated and some suggestions are made to take precautions for flooding.



**TORSIONAL AMPLIFICATIONS IN ISOLATOR DISPLACEMENTS DUE  
TO ASYMMETRIES IN THE SUPERSTRUCTURE**

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Isolator displacement is one of the basic parameters considered in the design of seismically isolated structure. It is well known that torsion adversely affects the response of conventional structures, as well as base isolated ones. The aim of this study is to investigate the amount of amplification in the isolator displacements due to asymmetry in superstructure and to assess the accuracy of simplified methods in prediction of those amplified displacements. Torsional response of isolated structures was investigated by means of three different eccentricity levels. They are 5%, 10% and 20% mass eccentricity in both of the horizontal directions to satisfy bi-directional eccentricity. The maximum isolator displacements for each ground motion were obtained from Finite Element Analysis (FEM) program namely, OpenSees. Maximum isolator displacements obtained for 5%, 10% and 20% mass eccentricity conditions were compared with the ones obtained for the structure with no eccentricity. The results showed that the amplification of maximum isolator displacements is a function of the eccentricity in the superstructure. The amplification of maximum isolator displacements increases when eccentricity increases. Also, the Simplified method of analysis described for the estimation of isolator displacement for eccentric cases was evaluated. As a result, provided simplified method is valid for the investigated structures.



## **PILE FOUNDATION DESIGN**

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Piles are structural members that are made of steel, concrete and timber. Some of the conditions that are required for pile foundations. When the upper soil layers is highly compressible and too weak to support the load transmitted by the superstructure, piles are used to transmit the load to underlying bedrock. When bedrock is not located at a reasonable depth below the ground surface, piles are used to gradually transmit the structural load to the soil. When subjected to horizontal forces, pile foundations can resist by bending, while still supporting the vertical load transmitted by the superstructure. Piles are sometimes used for foundations to resist the uplifting force.

Soil samples taken from the project area for making experiments. Due to these experiments soil parameters, boring log and soil investigation report were prepared. According these report and selected structure, a solution was suggested pile foundation. There was a problem of eccentricity in the selected building. The building was divided into three blocks with dilatation, and each block was solved in itself to eliminate the eccentricity problem. The bearing capacity of mat foundation and the piles were calculated with respect to soil parameters and selected structure. Cost analysis of pile foundation system were



evaluated. Piles size are selected according to the cost and their bearing capacities. In these calculations STA4CAD, AUTOCAD and PLAXIS 2D software programs were used.

As a result, according to calculations, the piles which have 100 cm diameter and 18 m length were selected to place under the mat foundation. 176 piles are placed totally. Total price of construction of piles is 490.100 TL. Piles are placed with respect to eccentricity of the structure.



## **THE EFFECT OF HYDRATED LIME IN ASPHALT CONCRETE MIXTURES**

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Hydrated lime has been added to hot mix asphalt pavements over the years, improving the asphalt concrete mixtures in many ways. Although it has been shown repeatedly that the use of Hydrated Lime in asphalt concrete mixtures is beneficial, confusion still exist about the appropriate method of adding Hydrated Lime to the mixtures to achieve the optimum modification of Hydrated Lime.

The reasons why hydrated lime is so effective in asphalt mixtures lie in the strong interactions between the major components, i.e. aggregate and bitumen. Hydrated lime modifies the surface properties of aggregate, allowing for the development of a surface composition (calcium ions) and roughness (precipitates) more favorable to bitumen adhesion.



## **ANCHORED SHEET PILE WALL DESIGN AND SOIL LIQUEFACTION**

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In this thesis, firstly the general literature review about sheet pile walls, anchor and soil liquefaction was done. Sheet pile walls are used in waterfront structures or soil profile under the high ground water level to protect the excavation area from water. Sheet pile walls are also used in deep excavation support systems against soil movement. In this project, theoretical calculations to determine the depth of penetration and maximum bending moment of sheet pile wall were done. Then required cross section of sheet pile wall was selected and anchor calculations were done. All design was completed with manual and it was simulated and checked with Plaxis – 2D program. Finally, soil liquefaction problem was researched. Then shaking table test was performed by using the Toyoura sand in the laboratory.





**AMPLIFICATIONS IN ISOLATOR  
DISPLACEMENTS DUE TO ASYMMETRY IN THE  
SUPERSTRUCTURE**

**Gabat YERDEGÜL**

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Eccentricity is one of the parameters considered in the design of seismically isolated structures. The aim of this study is to determine the effect of asymmetry in the superstructure on torsional response of isolated structures. The influence of degree of eccentricity on isolation system was analyzed by considering 5%, 10% and 20% eccentricities. Analyses were conducted by considering a series of isolation periods and bi-directional excitations to determine torsional response of isolated structures. The analyzed structure is a three-story building where a total of 35 isolators were implemented. The 3-story isolated building was subjected to bi-directional excitations by means of structural analysis program Opensees. The amplifications in maximum isolator displacements were computed based on the response of isolated structure with no eccentricity. The results showed that the amplification of maximum isolator displacements is a function of the eccentricity in superstructure.



**PERCEPTIONS OF ENGINEERS REGARDING  
6331 NO. HEALTHY & SAFETY LAW**

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In this thesis, No. 6331 Occupational Health and Safety Law focused on the perceived level by managers / engineers. Occur almost daily occupational accidents and worker deaths in the construction industry gradually improve worker health and safety is more important. Employers and employees as a result of this occupational accidents and worker deaths; economic, social, legal, etc. are faced with many problems. Therefore, occupational health and safety practices have become an indispensable application of the construction company. In this study, the Occupational Health and Safety Law of theoretical and practical application are examined. Occupational accidents causes, workers' deaths, results and impacts are described. A survey was conducted on the practical application of the OSH Law with the participation of about 30 construction companies. The results obtained will be analyzed using the SPSS software.



## **CAM LİFLİ BETONUN MEKANİK ÖZELLİKLERİNE VE ŞEKİL DEĞİŞTİRME KAPASİTESİNE ÇELİK LİFİN ETKİSİ**

**Mehmet Akif AYDIN**

Danışman : Yard.Doç.Dr. Muhsin YALÇIN

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Geleneksel beton yeterli basınç dayanımına sahip olmasına rağmen özellikle çekme dayanımı ve şekil değiştirme kapasitesi oldukça düşüktür. Betonun çekme dayanımını ve şekil değiştirme kapasitesini iyileştirmek için farklı türde ve şekilde lif katkıları kullanılmaktadır. Cam ve çelik lif en yaygın kullanılan lif türleri arasındadır.

Bu çalışmada sabit oranlı cam lifli betonun mekanik ve şekil değiştirme özelliklerine farklı oranlarda çelik lif kullanımının etkisi araştırılmıştır. Çelik lifler beton hacmine kütsel olarak %0, %1, %2, %3 ve %4 oranlarında olmak üzere toplam 5 seri beton üretilmiştir. Her bir seri; 10x10x50 cm kiriş, 10x20 cm ve 15x30 cm silindir numuneden oluşmaktadır. Şahit ve çelik lifli numunelerde TS EN 12390-3'e göre basınç, TS EN 12390-6'a göre yarmada çekme, TS EN 13791'e göre ultra ses dalgası hızı ve TS EN 12390-5'e göre dört noktalı eğilme deneyleri yapılmıştır. Kiriş numunelerde dört noktalı eğilme deneyi sırasında veri toplama sistemi yardımıyla yük ve sehim değerleri alınmıştır. Deneyler, silindir numuneler 7 ve 28 gün, kiriş numuneler 28 ve 56 gün suda kür sonrasında yapılmıştır.

Sabit oranlı cam lifli beton karışımına çelik lif katılması basınç dayanımında önemli artış meydana getirmediği belirlenmiştir. Ancak artan çelik lif oranına bağlı olarak yarmada çekme, eğilme dayanımında ve şekil değiştirme kapasitesinde önemli oranda artışlar gözlenmiştir.



**TORSIONAL AMPLIFICATIONS IN ISOLATOR DISPLACEMENTS DUE TO  
ASYMMETRY IN THE SUPERSTRUCTURE**

**Ibrahim Adow Idow**

Danışman : *Assoc.Prof.Gökhan Özdemir*

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Eccentricity is one of the parameters considered in the design of seismically isolated structures. The aim of this study is to determine the effect of asymmetry in the superstructure on torsional response of isolated structures. The influence of degree of eccentricity on isolation system was analyzed by considering 5%, 10% and 20% eccentricities. Analyses were conducted by considering a series of isolation periods and bi-directional excitations to determine torsional response of isolated structures. The analyzed structure is a three-story building where a total of 35 isolators were implemented. The 3-story isolated building was subjected to bi-directional excitations by means of structural analysis program Opensees. The amplifications in maximum isolator displacements were computed based on the response of isolated structure with no eccentricity. The results showed that the amplification of maximum isolator displacements is a function of the eccentricity in superstructure.



**ANALYSIS of THE CHANNELS IN THE SEDIMENTATION BASIN BY  
USING COMPUTATIONAL FLUID DYNAMICS METHOD**

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In order to work on a real fluid dynamics problem and to find a solution to it, ESKI (Eskişehir Water and Sewerage Administration) was visited by project members. As a conclusion of this visit, too much sedimentation was beheld in distribution channels of clarification basins. Thanks to this visit, it has been aimed to minimize the sedimentation by generating hydraulic effects in where the sedimentation occurs. It has been supposed to think that low level of velocity in the flow causes the sedimentation also it is needed to be done some modifications in where the sedimentation occurs.

Sedimentation is a physical water treatment process using gravity to remove suspended solids from water. There are two integral parts used for getting rid of undesired sedimentation. These terms are settling basins and clarifiers. Settling basins are ponds constructed for the purpose of removing entrained solids by sedimentation. Clarifiers are tanks built with mechanical means for continuous removal of solids being deposited by sedimentation.

In this work, main purpose has been aimed to obtain the minimum level of sedimentation also to redesign distribution channel which is located in a definite section of clarification basin by using Computational Fluid Dynamics (CFD) method. It has been supposed to be done by modifying the geometry thus turbulence happened as a result of modification in geometry is going to be solution for the sedimentation. In this Project, stream line flow is going to be examined at two phases as fluid and air.



**INVESTIGATING THE RELATIONSHIP BETWEEN ORGANIZATIONAL  
CULTURE AND PRODUCTIVITY IN CONSTRUCTION COMPANIES**

**Özgür ÇELİK**

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The Organizational Culture Assessment Instrument (OCAI) is based upon the Competing Values Framework. Each quadrant is named after its most recognisable characteristics: Family or Clan, Adhocracy, Market and Hierarchy. Cameron and Quinn have named the quadrant that lies in between 'internal focus and integration' and 'flexibility and discretion' the Clan quadrant. 'Clan' has a bit of a negative sound or emotional value, and it can just as good be called 'Family'. The questionnaire is divided in six clusters. Each part consists of four statements amongst which the respondents are to divide one hundred points. The four statements are linked to the four quadrants. The first phrase can be placed in quadrant A (Family), the second phrase can be placed in quadrant B (Adhocracy), etc. To the left in the graph, the organization is internally centered (what is important for us, and how do we want to work?), and to the right the organization is externally focused (what is valuable for the outside world, the clients, and the market?). At the top of the graph, the organization desires flexibility and discretion, while at the bottom the organization values the opposite: stability and control. Productivity is a performance measure that includes efficiency and effectiveness. An organization will be productive, if it achieves its goals and does so by transferring inputs to outputs effectively and efficiency. Efficiency also refers to the degree to which an organization is able to more cost- and time-effectively. The scope of this research study will include operational productivity using perceived organizational performance.



## **SİLİS DUMANI KATKILI ÇİMENTO HARÇ NUMUNELERİNİN MEKANİK ÖZELLİKLERİNE LİF TÜRÜNÜN ETKİSİ**

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Çimento harcı, çimento, ince agrega ve su bileşenlerinden oluşan ve betona dayanım kazandıran bir beton fazıdır. Geleneksel çimento harcının mekanik özelliklerini iyileştirmek amacıyla mineral katkıları ve doğal veya yapay lif türü malzemeler kullanılmaktadır.

Bu çalışmada, %5 silis dumanı katkıları çimento harcının mekanik özelliklerine çelik ve cam lifin etkisi araştırılmıştır. Silis dumanı katkıları çimento harç karışımına, 12mm uzunluğunda cam lif %0, %0.5, %0.75, %1 ve 15 mm uzunluğunda çelik lif %0, %0.5, %1, %2 oranlarında ilave edilmiştir. Lif türünün silis dumanı katkıları çimento harcının mekanik özelliklerine etkisine belirlemek amacıyla 40x40x160mm prizma ve 70x70x70mm küp numuneler üretilmiştir. 3, 7 ve 28 gün kür edilen prizma numunelerde TS EN 196-1'e göre eğilme ve basınç deneyi, küp numunelerde TS EN 12390-6'e göre yarmada çekme deneyi yapılmıştır.

Deney sonuçlarına göre çimento harcına lif katılmasının basınç, eğilme ve yarmada çekme dayanımında artış meydana getirdiği gözlenmiştir. Liflerin katılması ile yarmada çekme ve eğilme dayanımındaki artışın daha fazla olduğu belirlenmiştir. Özellikle çimento harcının mekanik özelliklerine çelik lifin etkisinin daha fazla olduğu gözlenmiştir.



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### **SABİT AKARSU BAĞLAMA PROJESİ TASARIMI**

Bu final projesinde, bir akarsu üzerinde sabit bir bağlama projesi (küçük bir regülatör gibi) dizayn edilmiştir. Çevirme yapısı olarak da isimlendirilir. Bağlamalar, su seviyesini yükseltmek ve belirli bir yöne çevirmek amacıyla inşa edilen su yapısıdır. Bu yapıların esas fonksiyonu her zaman ve her şartta istenilen miktarda suyu, istenilen yere çevirmek ve su teminini sağlamaktır. Bir bağlamanın tasarlanması, tıpkı bir baraja benzer.

Bu projede öncelikle, ihtiyaç debisine göre, su alma yapısı projelendirilmiş ve bağlamanın memba tarafında olması gereken maksimum su kotu hesaplanmıştır. Bu kot yardımı ile bağlamanın kret kotu bulunmuştur. Akarsu takveg kotu bilindiği gibi bağlamanın yüksekliği hesaplanmıştır.

Özet olarak daha sonra sırası ile aşağıdaki çalışma yöntemi izlenmiş ve proje hesapları tamamlanmıştır.

1. akarsu enkesiti çizilmiş ve akarsu anahtar eğrisi bulunmuştur.
2. İsale kanalı, su alma yapısı ve çökeltim havuzu boyutlandırılmıştır.
3. Hidrolik profil, statik profil ve düşüm yatağı boyutlandırılmıştır.
4. Alttan sızma hesapları yapılmış ve sızmaya karşı gerekli önlemler alınmıştır.
5. Düşüm yatağının tipi seçilmiştir.
6. Bağlamanın statik hesapları yapılmıştır.
7. Bütün hesaplar tahkik edilmiştir.

### **THE DESIGN PROJECT OF A FIXED DIVERSION WEIRS**

In this final project, a fixed diversion weirs (like a small regulator) project was designed on a river. This is also known as the diversion weir structure.

Diversion weir is a structure that built across a river to raise the water level and to divert water to certain direction.

The principal functions of these structures, always and in all circumstances, are to provide the desired quantity of water to desired location and to supply enough water. Designing a diversion weir similar to like a small dam.

In this project, primarily, the intake structure was designed according to the needed discharge from the river and the maximum raised water level at the upstream side was calculated. The height of the diversion weir are calculated due to the thalveg level of the river bed is known.

In summary, then as with the following operating procedures followed and project accounts has been completed.





1. The cross section of the river has been drawn and rating curve of the river has been determined.
2. Transmission channel, water intake structure and settling basin were designed.
3. Hydraulic profile, static profile and the stilling basin of the diversion weir were designed.
4. Calculations of the seepage under the diversion weir were carried out and the necessary measures taken against seepage.
5. The type of energy dissipation of the basin is selected.
6. Static calculations of the diversion weir is made.

All accounts have been



## **MODELLING RETAINING WALLS BY USING SAP2000**

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In this study, behavior of retaining walls constructed in clay with different cohesion and different heights has been determined under static and dynamic loads. Earth gravity and cantilever retaining walls model in SAP2000 program with 5 m and 10 m heights. Result of SAP2000 program compare with Plaxis 2D software program. As a result this study is an example of modelling retaining walls in SAP2000.



**OPTIMAL CAPACITY DESIGN OF A RUN OF RIVER  
HYDROPOWER PLANT WITH ECONOMIC ANALYSES: CASE I**

**PA AMAT MANNEH**

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Run-of-the-river hydro couples the natural potential energy of water, eliminating the need to burn coal or natural gas to generate the electricity needed by consumers and industry. As global warming continues to be a treat, the use of this type of a renewable energy is becoming common in most part in the world. The purpose of the project is to determine potential of hydro energy production of the run-of-river plant. Firstly, a flow duration curve is obtained using the streamflow data records. Then, a tail water rating curve and the power-duration and energy-power curves are determined. The annual investment, operation/maintenance cost are calculated for different installed capacities. A firm energy of 1919.10 MWh corresponding to 222.59 KW power is estimated. The marginal cost – marginal benefit and total cost-total income relation are determined using the Energy-Power curve. An optimal capacity of 1.2 MW corresponding to 6015.88 MWh energy are estimated with economic analyses. With an economic life of 40 years, an optimal design flow of 4.42 m<sup>3</sup>/s corresponding to 25% of time is obtained using optimization method. With this optimal design flow, a 1.2 MW turbine power using Francise turbine with a net head of 32.23 m is found suitable for the plant. With the results from the cash flow diagram, the plant will start making profit after 10 years of operation.



**YÜKSEK FIRIN CÜRUFU KATKILI KALSİYUM ALÜMİNATLI  
ÇİMENTONUN MEKANİK VE DURABİLİTE ÖZELLİKLERİNİN  
BELİRLENMESİ**

**Rıdvan TALİ**

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Kalsiyum Alüminatlı Çimento (KAÇ), 6 ve 24 saatlik erken dayanımları değerleri Portland Çimentosu'na göre çok daha yüksek olan bir çimento türüdür. Isıl direnci, asit dayanıklılığı ve sülfat dayanımı daha yüksek olmakla birlikte maliyetinin yüksek olması dezavantajıdır.

Bu çalışmada TS EN 196-1'e göre 3/1/0.5 kütle oranında sırasıyla kum, çimento ve su kullanılarak şahit ve %2.5, %5 ve %10 yüksek fırın cürufu (YFC) katkılı harç numuneleri hazırlanmıştır. YFC katkılı KAÇ harç numunelerinin mekanik ve durabilite özelliklerini belirlemek için 4x4x16 cm prizmatik, 5x5x5 cm ve 7x7x7 cm küp numuneler üretilmiştir. 3, 7 ve 28 gün kür sonunda prizma numunelerde TS EN 196-1'e göre eğilme basınç deneyi; 5x5x5 cm küp numunelerde ASTM C 109'a göre basınç deneyi; 7x7x7 cm küp numunelerde yarmada çekme deneyi yapılmıştır.

Deneyler sonucunda YFC'nin KAÇ harç numunelerinin mekanik özelliklerinde önemli bir değişiklik meydana getirmediği gözlemlenmiştir. YFC'nin belirli orana kadar KAÇ ile yer değiştirilerek kullanılmasının ekonomik fayda sağlayabileceği belirlenmiştir. Optimum fayda %5 YFC ile KAÇ'ın yer değiştirilmesi ile elde edilmiştir.



**TOTAL QUALITY MANAGEMENT APPLICATIONS  
IN SMALL-MEDIUM SIZED CONSTRUCTION COMPANIES**

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This thesis focuses on Total Quality Management (TQM) applications in small-medium sized construction companies. Total Quality Management purposes that satisfy the need of clients by all personnel and equipment in a company. I am going to research if or how TQM is applied by small-medium sized construction companies in Turkey. To do that a questionnaire is prepared to ask engineers and architects who are personnel in that construction companies. Approximately 30 authorities fill in the questionnaire to be concluded results more comprehensible. Results will be obtained and analyzed by using SPSS software and other statistical tests (ANOVA, t-test).



## **PILE FOUNDATION DESIGN**

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In this thesis, firstly boring holes are drilled at specific points of construction side to take disturbed and undisturbed samples. After analyzing the samples in laboratory, properties of soils and depth of soil classes are obtained due to depth of samples. Geotechnical calculations such as risks of settlement, soil bearing capacity and risk of liquefaction potential shows the soil should be improved with pile foundation that is a method of deep foundation within the scope of soil improvement. Pile foundations are the part of a structure used to carry and transfer the load of the structure to the bearing ground located at sufficient depth below ground surface. While pile foundations was designed to decrease the settlement and increase the allowable bearing capacity of the soil layers were taken into account. Jet-Grout method is applied to require layers to eliminate the negative skin friction on the pile surface.

Chosen piles are a meter in diameter and 24 meters in length. They are located according to the aim of minimizing the eccentricity of the structure. The chosen systems were analyzed with STA4CAD and PLAXIS2D programs and comparisons of the results are made with these observations.



**DESIGN OF AN INCLINED WATER INTAKE STRUCTURE USING  
COMPUTATIONAL FLUID DYNAMICS METHOD**

**Onur Hilmi KOÇYİĞİT, Mehmet Emin UYANIK, Tuncay FİDAN**

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Design and hydraulic calculations of the civil engineering water structures are generally carried out with the empirical manuals. These manuals are obtained by experimental studies and involves generalized assumptions and coefficients about the hydraulic calculations. These assumptions cannot be always reliable for specific designs due to unique conditions of planning structure. In this study, a water structure is modelled with Computational Fluid Dynamics method and results are compared with the classic empirical engineering calculation methods. For this purpose, ALTER International Engineering and Consulting Services Ltd. Company is visited to identify and analyze a realistic hydraulic problem of an existing water structure. A water intake structure built for supplying drinking water is recommended by the company to analyze flow characteristics and probable design improvements.

Design of a water intake structure can be possible by determining discharge conditions for different water levels at the dam pond. The dam pond water level is directly affected by seasonal changes so the studied water intake structure is designed with double water intake gate to increase the productivity of the structure. Simulation, modelling and analyzing of the inclined water intake structure for different head conditions are carried out with the CFD method by using ANSYS CFX software. Hydraulic performance of the water intake structure at the different water levels are examined for both gate. Particularly, water head-discharge curve is obtained and unexpected pressure and force generation at the



transition structure between the water intake structure and penstock is examined in time dependen





**EFFICIENCY of PUMPED STORAGE HYDROPOWER COMPARED TO  
CONVENTIONAL HYDROPOWER and EFFECTS to ENVIRONMENT**

**Tuna IŞIK**

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The renewable energy usage is becoming a more critical issue as the energy consumption and correspondingly pollution rates rise each year. The hydropower plants provide clean energy on any river with sufficient flow and head. At the peak energy demand, hydropower is used as instant energy source. In addition to normal hydropower plants, pumped storage hydropower plants are being used more and more. With the decreasing water resources, the importance of the pumped storage hydroelectric power plants is increasing. Pumped storage hydroelectricity (PHS) is the only economic and flexible means of storing grid scale amounts of excess energy, allowing power plant dispatchers to successfully manage that balancing act. In this study, additional reservoir to Gökçekaya Dam and advantages – disadvantages of the new reservoir pumped storage system is studied. Excess electricity of wind turbines is used to pump water to the upper reservoir. Geographic Information Systems (GIS) are used to determine the most convenient environmental friendly location for upper reservoir. The efficiency of PHS varies quite significantly due to the long history of the technology and the long life of a facility. The round-trip efficiency (electricity generated divided by the electricity used to pump water) of facilities with older designs may be lower than 60%, while a state-of-the-art PHS system may achieve over 80% efficiency.



## USING OF DISTILLED WASTE PETROLEUM IN TRANSPORTATION INDUSTRY

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In nature, millions of litres raw liquid petroleum get mixed to seas, rivers even lakes by many different ways such as ship accidents or by transporting petroleum molecules in air and clouds. When accidents happen, this petroleum directly mix with the water. On the other hand the molecules carried by air get involve to nature a little bit different way, by condensation. In any meaning, the petroleum molecules mixed to water sources on earth have really serious harmful effects for nature. Effects on water habitants, fresh water sources, and even direct effects on humans can be examples for these harmful effects.

In this project, the ways of using this waste petroleum in transportation industry were investigated. This research has possible two useful results. First of all when the waste materials related to raw petroleum are distilled from natural sources it has a positive effect on earth. Secondly it provides a chance to obtain very cheap raw stuff to use in transportation industry. So it creates a win-win situation. In this aspect, this project promises a more environmental and economic solutions for brighter futures. The experimental process is going to be carried out basicy two simple steps. First of all a sufficient number of specimens are going to be prepared with different bitumen percentages and proper grain size distribution of used aggregates in specimens. A part of these specimens will be used to obtain optimum stability and strain values with Marshall Tests. In



second step a part of specimens will be exposed to salty water. (real sea water)  
After that process same experimental process will be carried out and results are going to be compared and we are going to have a conclusion if these kind of raw petroleum materials are appropriate of using in transportation industry or not.



## **SÖĞÜT MARKET PLACE ROOF COLAPSE**

**Yılmaz ACAR**

Danışman: Doç.Dr. Özgür AVŞAR

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2015 kış ayında, ağır kar yükü nedeniyle birçok çatı çöktü. Eskişehir ve Bilecik'te fabrika, depo, spor salonlarının çatısı çökmüştür. Bu çalışmada Söğüt Pazar yerinin 04.01.2015 tarihinde ağır kar yükünden dolayı çöken çatısı incelenmiştir. Çatı uzay kafes sistemdir. 2002 yılında inşaa edilmiştir. Çatı 5495 m<sup>2</sup> alana sahiptir. TS 648 çelik yapı hesabında, TS498-1997 ise yük hesaplarında kullanılan şartnamelerdir. Maalesef, yaklaşık olarak 100 araç çöken çatı enkazı altında kalmıştır. Bu çalışmada yapı elemanları 3 kar yükü durumu için kontrol edilmiştir. Bunlar 75 kg/m<sup>2</sup>, 150 kg/m<sup>2</sup>, 305 kg/m<sup>2</sup>'dir. Çelik çubuklar çekme gerilmesi, burkulma durumu, bulonların çekme ve basınç gerilmesine göre 3 farklı yük durumu için de kontrol edilmiştir. SAP2000 analizleri ve mühendislik hesaplarına göre, çatının çökmesindeki ana neden aşırı kar yüküdür. Ayrıca yetersiz kesit ve rijitliğe sahip yapı elemanlarının kullanılması göçmenin diğer nedenleri olarak belirlenmiştir..



## **PILE FOUNDATION DESIGN AND PROTOTYPE OF PILE FOUNDATION SYSTEM**

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Nowadays, the modern buildings has increased considerably with changing and developing world. So high-rise and heavy loaded buildings, huge dams, highways etc. are built. In order to carry to the high loads, and safer design earthquakes, modern foundation systems are being developed. The aim of foundation system is to transfer structural loads to the ground safely.

In this study, according to the boring experiments at the field, soil investigation report was prepared. The allowable bearing capacity of soil and the settlement values of foundation is calculated. Bearing capacity of piles for different diameters are calculated with manual calculations, then the most economical and safer diameter had chosen. Moreover, the bearing capacity of piles, distributions of the piles, settlement analysis are satisfied. The behavior of the piles under the static and dynamic loads are determined. Later on, with using STA4CAD software program, eccentricity of structure are determined. This difficulty dissolved by under mat foundation located piles. Furthermore, the chosen system is analyzed with Plaxis 2D. The prototype of this pile system is made at laboratory.