up to 200 kPa matric suction, it was verified that as fine grained particles of the soil samples increased, the water holding capacity of the soils also increased. Consequently, the air-entry value, residual water content, and saturated water content increased. This finding shows the important effect of texture and particle size of the soils.

Key Words: Soil type, soil water characteristics curve, unsaturated hydraulic conductivity, pressure plate apparatus.

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Abstract

This study has aimed to provide a model for predicting the severity of accidents in road and rail crossings of Iran with a fresh look at the data of recent years' crashes in these areas. Although Iran has a considerably smaller number of level crossings in its transportation network, however, considering the number and severity of accidents occurring in these crossings, the importance of the safety in these points. In order to have a more comprehensive understanding of the issue of safety at the level crossings, this section looks at the statistics of traffic accidents. Currently, in many countries, including Iran, the safety of level crossing is evaluated based on the frequency of accidents occurring in them. Considering the severity of these accidents is a subject that has recently been considered by researchers. In addition to the frequency of accidents, cross-country crashes in severity can also be investigated. It is noteworthy that trains, pedestrians and pedestrians are usually associated with high severity. This method is one of the methods for identifying hazardous and risky crossings in the rail transport network. In the context of the severity of crashes in the level crossing of Iran, only one study has been done so far. The study is aimed at presenting an intensive prediction model with a fresh look at the crash data of recent years. In this study, the specifications of the 240 authorized passageways in Iran and the crash data used therein are used. In addition, the logit model is used to predict the severity of accidents. It should be noted that the data used in this study are for the years 2009 to 2013. The results of this study indicate the importance of factors such as type of vehicle, type of collision, number of carriages, street lighting and type of train and road drivers' perception of the severity of road accidents.

Key Words: Safety, level crossing, severity prediction model, multinomial logit, official crossings.

THE EFFECT OF SOIL TYPE ON SOIL-WATER AND UNSATURATED HYDRAULIC CHARACTERISTICS

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Abstract

In most parts of the planet including Iran, soil layers are above the groundwater level and in unsaturated state. Various activities associated with soils, such as subsurface explorations, foundation engineering and building constructions in unsaturated soils, etc., necessitate the study of the properties of unsaturated soils. Historically, the studies and activities were associated with the precedence of saturated soils over the saturated soils owing to the strong theoretical basis and low cost of saturated soils. Consequently, the need for understanding the behavior and properties of the unsaturated soils is a great concern for engineers and professionals when dealing with that type of soils. Important issues for predicting geotechnical behavior of unsaturated soils include the determination of the soil water characteristic curves (SWCCs) and unsaturated hydraulic conductivities. The SWCCs has been found to be a conceptual and interpretative tool by which the behavior of unsaturated soils can be understood. The SWCCs define the relationship between soil matric suction (the difference between the air and water pressure in the soil) and the gravimetric water content. In this study, in order to accurately analyze the geotechnical behavior and recognize the effect of soil type on soil-water and hydraulic characteristics of unsaturated soils including sand, silt and clay, three types of soil with different particle sizes were studied from the Nazlo region of Urmia city. To achieve SWCCs, a Pressure Plate apparatus with a pressure control panel was designed and built. Laboratory results were analyzed with Brooks-Corey and Van Genuchten models implemented in RETC computer code. The suction-hydraulic conductivity relationships of the soil samples were analyzed with the Brooks-Corey and Burdine model as well as the Van Genuchten and Mualem model. By analyzing the results of laboratory SWCCs

sues in geotechnical engineering. Typical additives such as cement, lime, fly ash and some nano materials have been previously investigated but pozzolanic materials, especially zeolite, which have unique features, have been less considered in geotechnical engineering. Due to the lack of sufficient studies on the effect of zeolite on soil properties and chemical properties of these materials, this study examines the effects of zeolite on soil strength parameters .In this paper, the effect of a type of zeolite called Clinoptilolite on the strength parameters of clayey sand soil has been studied. For this purpose, after conducting the identification tests on clayey sand (a mixture of clay and 161 Firoozkooh sand), the Atterberg limit test was performed on natural and stabilized samples with 5, 15 and 25% Clinoptilolite. Also, uniaxial compressive strength test was taken into on samples with 0, 5, 10, 15, 20 and 25% additive and curing times of 7, 14 and 28 days. The results showed that the atterberg limit increased with increasing the percentage of Clinoptilolite. Furthermore, the uniaxial compressive strength of the soil increased with increasing the amount of Clinoptilolite and curing times. The highest strength occurred at 25% additive and 28 days. The failure behavior of the samples showed that with increasing time and percentage of the additive brittle failure was occurred and after brittle fracture the uniaxial strength decreases with high speed. Also, with increasing curing time, the failure plan in the samples becomes clearer. The results of this research are based on the laboratory test on a clayey sand soil with the engineering specifications presented in the study and may be different for other soils of this type. These results are also laboratory tests and may have a significant difference in soil conditions.

Key Words: Clayey sand soil, uniaxial compression strength, zeolite, clinoptilolite, improvement.

INVESTIGATION AND ANALYSIS OF THE CONE PULLOUT TEST RESULTS IN FINE-GRAINED SOILS ADHESION

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Abstract

When the metal is in contact with the soil, there is the possibility of sticking soil to the metal surface. For determining the tension stress for soil separating from metal surface the cone pullout device designed. In this apparatus, a cone penetrates into the soil, stopping it for a specific time and, then, separating from the soil. In the present research, according to previous studies and ideas about this subject, cone pullout test device is designed and manufactured. By performing 90 tests on a montmorillonite clay soil with different values for stope time and separation speed, the effect of these variables was studied. The results showed optimum stope time (t =5 min), and separation speed cone (15 mm /min) was determined. To evaluate the reproducibility of the results, by performing other 60 tests on two other kaolinite clay soils, coefficient of variation ($14.49 \geq Cv \geq 1.4$) and accuracy index ($1.22 \geq P \geq 1.01$) were determined. these values showed which results were reputable and acceptable. Because of the effect of moisture content on the engineering properties of fine-grained soil, the effect of moisture changes on tensile stress for separation of metal from soil was studied. The results of the study showed that with an increase in water content, the tension stress decreased. Accordingly, linear relationships were proposed between soil moisture content and tensile stress for montmorillonite and kaolinite clay soils. Slope of the curve moisture content versus tension stress for montmorillonite clay soil and kaolinite clay soil are 1.25 and 0.82 respectively. Therefore, it can be concluded that the slope of the curve corresponds to the soil type; increasing plastic index increases tension stress.

Key Words: Cone pull-out test, fine-grained soil, tension stress, moisture content.

MODELING THE SEVERITY OF CRASHES IN IRAN'S HIGHWAY RAILROAD LEVEL CROSSINGS

bonded length and splitting failure mode by adding a reduction function for take into account post-yield strain effects.

Key Words: Reinforced concrete, bond-slip, pull out test, bond-link element.

SEISMIC PERFORMANCE OF DUAL STEEL STRUCTURES CONSISTING OF NON-GEOMETRICAL IRREGULARITY ALONG THE HEIGHT

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Abstract

The effects of irregularities along the height of structure on the basis of mass, stiffness, strength, and the combination of stiffness-strength are investigated in this study by means of dual steel structures consisting of special steel moment frame and special concentric braced frames. The Performance-based earthquake engineering has been implemented in the form of probabilistic confidence level by means of incremental dynamic analysis in order to obtain seismic demand and capacity. A set of ten-storeyed steel moment frames is taken into consideration with different irregularity cases along the height of structure. All considered structures are first carefully designed based on 4th edition of the Iranian practice for seismic-resistance design of buildings. Several modeling issues are taken into consideration including stiffness and strength drop due to cyclic nonlinear behaviour in beams and columns, post-buckling behaviour, and low-cycle fatigue in braces and gusset-plate behaviour in the brace connections. Generally, the irregularity decreases the seismic capacity when structure behaves in the nonlinear range. Irregularity in the form of weak story decreases ductility capacity when compared to regular structures: however, other irregularity increases the seismic demand in the irregular section of structure, especially in the simultaneous strength and stiffness irregular cases; consequently, increasing the possibility of limit state exceedance and decreasing the confidence level associated to a given limit state. It is worth noting that these results are strongly dependent on the irregular conditions. The combined stiffness and strength irregularity as well as mass irregularity, respectively, are associated with the maximum and minimum effects on the structural behaviour. The results show that the chance of meeting the immediate occupancy confidence level decreases by having irregularity, specially in the case of stiffness irregularity. However, the collapse prevention limit state confidence level is not affected much by the irregularity in all cases.

Key Words: Steel dual systems, steel structure, irregularity along height, seismic performance.

THE STUDY OF CLINOPTILOLITE EFFECT ON THE STRENGTH PARAMETERS OF CLAYEY SAND SOIL CONSIDERING SOIL FAILURE BEHAVIOR

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Abstract

Improvement of soils with the additives is one of the methods for surface or deep soil treatment. Improvement of soil by additives is one of the most important is-

gray wolf optimization (GWO) and particle swarm optimization (PSO) are utilized for optimization. Proposed analyse is illustrated for a three story four bay and a nine story five bay building frame work examples.

Key Words: Performance based design, target displacement, pushover analysis, gray wolf optimization, particle swarm optimization, plastic hinge.

SENSITIVITY OF BACKCALCULTATION ANALYSIS TO TEMPERATURE IN RECYCLED PAVEMENT IN COMPARISON WITH LABORATORY

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Abstract

Falling weight deflectometer (FWD) and ground penetrating radar (GPR) tests were performed in a section of Damghan-Semnan highway after rehabilitating with cold in-place recycling. The results of FWD test are mostly related to asphalt layer temperature. Therefore, the main objective of this study was to investigate the sensitivity of backcalculated moduli to temperature. The sensitivity of recycled layer to temperature variations was also considered. The bitumen emulsion incorporated in recycled layer can increase the sensitivity of this layer to temperature. Backcalculation analysis was accomplished using ELMOD program. Furthermore, a new method was proposed for backcalculation analysis based on previously proved theories. Results of destructive tests were used to validate the backcalculation analusis outcomes.

Key Words: NDT tests, backcalculation analysis, cold recycling, temperature correction factor, backcalculted moduli, FWD.

BOND-SLIP RELATIONSHIP OF REINFORCING STEEL BARS WITH SHORT EMBEDMENT IN CONCRETE

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Abstract

The behavior of the reinforced concrete structures is influenced by the bond-slip mechanism between concrete and rebar. The performance and strength of the structure are strongly affected by this mechanism. Therefore, it is indispensable to take bond-slip effects into account when analyzing reinforced concrete structures. In the current study, bond-slip behavior between concrete and reinforcement is investigated and a new bond-slip model for deformed bar is proposed. The main distinction between the proposed model and the current models is that in this model, slip starts when bond stress reaches a threshold value. Constant parameters of the proposed model are maximum bond stress and maximum slip. Calibration of the constant parameters of the model is done based on trial and error method with the aim of achieving the best coincidence with the experimental results. For each of constant parameters of the model, three different values were selected. So in total, nine models were used in modeling the interaction between rebar and concrete. To calibrate the model, some pull-out tests are simulated by finite element software of ABAQUS. In this simulation in order to take bond-slip effects into consideration, steel nodes are connected to that of adjacent concrete through non-linear springs. The behavior of these springs is defined based on a variety of bond-slip models for deformed bar. Considering the error of models with respect to experimental values, the best model with the minimum error was chosen. Moreover the best proposed model was compared with current models. The results showed that the proposed model has much better predictions than the current methods regarding both the maximum load and post-peak behavior of load deformation curve. Furthermore, the proposed model can be expanded for long

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Abstract

With increase in cities' population and development of urbane life, passing buried pipelines near the ground's surface is inevitable in urban areas, roads, subways and highways. In this paper, the results of laboratory tests on flexible pipe with a 160 mm diameter, placed in reinforced-trench by a geogrid layer and an EPS geofoam block subjected to repeated load are investigated. The pipe diameter change, strain and pressure acting over the pipe were measured throughout the loading, unloading and reloading. The parameters inspected in the tests included the thickness (30, 60 and 100 mm) and width (160 and 240 mm) of EPS block and burial depth of pipe (1.2 and 1.5 times the pipe diameter). Based on the results, the values of the pipe diameter change and pipe strain swiftly increases during the early cycles of loadings and followed the stability trend with the gathering of load cycles. In the geogrid-reinforced system, the change in pipe diameter and in pipe's strain at the end of the loading cycles showed 19% and 20% reduction, respectively, as related to the unreinforced system. According to the results, the minimum pipe diameter change and pipe's strain were acquired by using EPS block with maximum width, thickness, and 30 kg/m3 density over the pipe in addition to a geogrid layer representing values of, respectively, 0.26 and 0.3 times of the others acquired in the reinforced trench with a geogrid layer.

Key Words: Repeated load, buried pipe, EPS block, geogrid, embedment depth.

OPTIMUM DESIGN OF STEEL MOMENT-RESISTING FRAMES BASED ON PERFORMANCE LEVELS, USING TARGET ROOF DISPLACEMENT CRITERION

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Abstract

In this study, a performance-based optimal design of moment frames is presented based on target roof displacement criteria. Four performance Levels defined by four roof target displacements are considered and moment frame has subjected to constant gravity loads and incrementally lateral loads until meet the end roof displacement. In each performance target displacement, hinge rotations, inter-story drifts and internal forces have controlled in accordance with provisions. Because axial force has decreasing influence on plastic moment capacity, magnitude of column axial forces is needed before pushover analysis for modeling column hinges. To solve this problem, an approximate pushover analysis without considering axial forces for column hinges performed to calculate column forces in the final target displacement. Then final pushover analysis executed by considering influence of calculated axial forces in plastic hinges. This pushover analysis and defined constraints only guarantee ductility criteria for the structure until now. To ensure that structure has enough strength, before pushover analysis it has checked for enough strength by gravity load combination and allowable vertical deflection of beams under service loads. To avoid other undesirable mechanisms like soft and hard story or weak column-strong beam, other equations considered as target function and constraint respectively. The proposed pushover analysis has modeled with joining two springs and an elastic element so that moment-rotation parameters introduced as a material to the springs based on FEMA 356 tables. For all models and analysis, OpenSees finite element software utilized in such a way that all text codes write and run in Matlab without opening OpenSees directly. When completed all analysis and calculated all constraints and target functions; cost function assigns a grade to the suggested structure using weight and penalties for violated constraints and this cycle continues for other structures. Two meta-heuristics,

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Abstract

Beach cusps are quasi-regularly spaced features in the swash zone. Cusps can change the form of the shoreline in a short period of time; however, if their embayment's depth and height grow too much, erosion of shoreline follows; if an increase in sedimentation in the seaward point horns causes sedimentary problems for near facilities and ports. Therefore, knowing about the formation and development of cusps can improve and complete the planning of future engineering projects and management of coastal areas. In this study, the formation and development of beach cusps of Roddick beach in the Chabahar city, Iran have been discussed. By using Mike 21 software and 18 scenarios, parameters that affect the change of cusps and the effect of theories have been investigated. The results show that beach Roddick has reflective and intermediate conditions that form the cusp in this city. Increasing wave height and period increases the size of cusp. For stormy oceans, there is erosive swash conditions with embayment deepening; therefore, the growing cusps and the formation of cusps support the edge wave theory. For monsoon storms, there are accretionary swash conditions with horn deposit; therefore, the growing cusps and the formation of cusps support the self-organization theory.

Key Words: Beach cusps, edge wave theory, self-organization theory, mike 21 BW modules, roddick beach.

EVALUATION OF FACTOR AFFECTING ON SEISMIC DISPLACEMENTS AND ROTATIONS OF GRAVITY RETAINING WALL USING PHYSICAL MODEL

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Abstract

Design of retaining wall needs to be considering for static and dynamic stability. For seismic design prediction of displacement and rotation of wall under earthquake loading is necessary that should be less than of allowable values according to performance based seismic design. During an earthquake the lateral earth increases and the walls become susceptible to failure which has resulted in frequent damages of the walls. Gravity retaining walls are designed to restrain against the lateral earth thrust while keeping its original position intact. Analysis of the seismic behavior of gravity retaining walls during earthquake loading is quite complex and seismic movements can occur as sliding or rotational. In this research factors affecting on seismic displacements and rotations of gravity retaining wall using physical model have been investigated. The scale of physical model is thirtieth using laboratory manufacture. Dimension of wall (height and base), acceleration, time and frequency of seismic loading and friction of base wall are factors that have been studied in this research. The results have shown that permanent deformation of wall under seismic loading increase with height of wall and decrease with base increment. Acceleration of loading can increase seismic displacement of wall with an exponential function. Skin fiction of base wall can reduce movement of retaining wall and rotation effect. Acceleration and frequency of cyclic movement in this research have been investigated that the result shown that these parameters have the dominant effects on the permanent displacement of retaining wall and backfill. Seismic movements and rotation of retaining wall have direct correlation with acceleration and frequency of cyclic movement .There are many methods based on pseudo-static and pseudo-dynamic force that can estimate seismic displacements of retaining wall. In this study using the Newmark sliding block procedure, try to propose suitable accelerating to predict permanent movement of retaining wall and backfill during earthquake loading.

Key Words: Gravity retaining wall, physical model, seismic load, seismic movements, rotation.

LABORATORY TESTS OF EPS BLOCK INFLUENCE ON BEHAVIOR OF BURIED PIPE UNDER REPEATED LOAD

nonlinear analyses are satisfied by employing linear dynamic analysis. In addition, this development reduces computational efforts and can be extended for future design codes.

Key Words: Impulsive load, capacity modification factor, nonlinear dynamic analysis, linear dynamic analysis, performance-based design, johnson cook model.

EFFECT OF USING MONOLAYER COVERS ON EVAPORATION RATE IN DAM RESERVOIRS EFFECT OF USING MONOLAYER COVERS ON EVAPORATION RATE IN DAM RESERVOIRS

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Abstract

Each year, millions cubic meters of water are lost from water reservoirs (especially dam reservoirs) due to evaporation. Spreading artificial monolayers on water reservoir is one of the ways to reduce evaporation. Monolayers are one molecule thick films formed at a phase boundary like air/water interface. According to laboratory studies, long chain fatty alcohols such as Cetyl and Stearyl alcohol, are one of the most effective materials for reducing evaporation from water bodies, specially dam reservoirs. Most of the materials used as monolayers are readily broken down by bacteria, moreover these materials could also be evaporated, so redistributing them in specific periods is necessary to keep up their function. Most of Previous studies are experimental (both laboratory and in-field) which resulted a wide range for evaporation reduction (0% - over 50%) based on different cases, locations and monolayer materials. The aim of this study is to evaluate the amount of evaporation reduction causes by using this method to reduce evaporation. Energy balance relations were used to calculate the evaporation rate. Minab dam reservoir, was selected as a case study and Cetyl alcohol was chosen as a monolayer material. The evaporation rate was calculated for the 5-year study period (1390-1394) in base condition and in two scenarios, first for full time usage of monolayers and second for only summer usage scenario. Application of monolayers increases the apparent surface boundary layer thickness, thereby, increasing resistance to evaporation. Excess aerodynamic resistance caused by the usage of monolayers was computed according to previous studies as a linear function of wind speed (means the monolayer resistance decreases linearly when wind speed increases) and entered into evaporation rate calculations directly. Results show that average evaporation reductions are 8.1% and 2.7% respectively when monolayers were used full-time and when they were used only in summer. This amount of reduction leads to save up to 3.54 million cubic meter annually. A primary cost estimation was also done and resulted about 1 USD per cubic meter of not evaporated water for full-time usage scenario and about 0.8 USD per cubic meter of not evaporated water for the summer usage scenario.

Key Words: Monolayer, evaporation, energy balance, evaporation resistance.

EFFECTS OF ENVIRONMENTAL PARAMETERS ON THE MORPHOLOGY OF THE BEACH CUSPS OF RODDICK PORT

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from happening or to mitigate their negative impacts were made. To do so, first, a comprehensive literature review was conducted to identify different possible effective factors on construction project delays. Then, a questionnaire-based survey was conducted on different stakeholders of residential building projects to evaluate impacts of effective factors. The survey results indicated project delay is a major concern in the residential building projects in the city. The client's financial problems, contractor's financial problems, and high inflation were identified as main factors with major impacts on the project delay. Proper financial management by the client and comprehensive understanding from supply and demand in the housing market before commencing the project are among recommendations to reduce negative impacts of project delays in these projects.

Key Words: Project delay, delay factors, residential construction, delay reduction.

A PERFORMANCE-BASED METHOD FOR CALCULATION OF MEMBER CAPACITY MODIFICATION FACTORS OF STEEL MOMENT FRAME UNDER IMPULSIVE LOADING

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Abstract

Design of structures under impulsive loads is usually accomplished through nonlinear inelastic dynamic analysis followed by implementing acceptance criteria of the nonlinear analysis specified in design codes. Nonlinear dynamic analyses inherently consist of convergence and computational effort problems. In this research, the capacity modification factors of steel moment-resisting frames' members are calculated in order to simplify the design of the structures subjected to impulsive loading. Capacity modification factors are proposed for different loading conditions that provide a design procedure to perform the linear dynamic analysis, instead of the time-consuming nonlinear dynamic analysis. Herein, an algorithm is proposed to calculate the capacity modification factors as an inverse problem. Firstly, a designed structure is nonlinearly analyzed under impulsive load; then, the structure is checked whether the acceptance criteria are satisfied. For a steel frame structure, story drifts should be restricted to 1/14 of story height; a chord rotation of the members should be restricted to 2 degree. Secondly, if the acceptance criteria are satisfied with minimal tolerance, the structure with the accepted properties is linearly analyzed; otherwise, the structure should be redesigned to reach the desirable condition. Results of the linear analysis are checked by ASCE41-13 acceptance criteria for the linear analyses. These acceptance criteria control demand and capacity moments for a beam, demand and capacity axial force, and moment interaction of columns such that the capacity modification factors are involved in both of them as unknown variables. Thirdly, the capacity modification factors are calculated for each member using the formulations presented for the acceptance criteria of the linear analyses. Here, a portal frame is used as a representative of entire moment-resisting frame to evaluate different types of loading (magnitude and condition). Three loading conditions are defined to mobilize three deformation modes consisting of lateral, gravity, and lateral-gravity modes. The first mode includes laterally distributed and concentrated loads on the left column and downward loads on the beam; the second mode only includes downward loads on the beam; the third mode only includes laterally distributed and concentrated loads on the left column. Finally, many capacity modification factors are attained for every member of a steel moment-resisting frame. These data should be processed by statistical relations to obtain firm results for the main members of the structure. The capacity modification factors are herein calculated for four member groups including roof beams, internal beams, external columns, and internal columns. Results demonstrate that external columns exposed to direct impulsive loads are not ductile as much as internal columns. In other words, internal columns can go beyond the linear limits more than external ones. The roof beams have lower ductility than the internal beams. The reason is the directly imposed impulsive load on their span. Therefore, the calculated factors can be used for new acceptance criteria that need linear dynamic analysis. The proposed procedure leads to avoidance of performing the complicated nonlinear analysis under impulsive loading, while acceptance criteria of

Abstracts of Papers in English

EVALUATING FACTORS CAUSING DELAY IN RESIDENTIAL BUILDING PROJECTS OF MASHHAD

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Abstract

Delays in construction projects increase project implementation costs. Identifying factors causing delays in these projects and preventing their occurrence are major concerns for many construction project managers. Many studies have been conducted about the main effective factors causing delays in construction projects in different regions. The results achieved in these studies indicate effective factors vary according to the prevailing conditions of the specified type of the construction projects in the region. Identifying and preventing delays in specific types of construction projects from occurring in each region requires dedicated research efforts. Meanwhile, residential building projects constitute a major portion of construction projects in the populated cities. Delays in residential building projects can increase the project's costs and the housing price, which has a major share in the family expenses in Iran. Mashhad is the second largest city in the country with a large housing market. However, research efforts addressing residential building project delays in the city are still missing. In response to this need, current research was conducted to investigate the delay in the residential building projects in the city. Main factors causing delays in these projects were identified, and recommendations to avoid delays