DESIGNING AN UNDERGROUND REST AREA WITH A SUSTAINABLE ARCHITECTURE APPROACH IN SAMAN CITY

Amirhossein Rahmati dehkordi
Department of Architecture Group, Faculty of Art and Architecture, Shahrekord Branch, Islamic Azad University, Shahrekord, Iran

Afshin Reisi dehkordi*
Department of Architecture Group, Faculty of Art and Architecture, Shahrekord Branch, Islamic Azad University, Shahrekord, Iran
*Corresponding Author

Mahdi Mahmudi Kamel abadi
Department of Architecture Group, Faculty of Art and Architecture, Shahrekord Branch, Islamic Azad University, Shahrekord, Iran

ABSTRACT

Rest area is a place for providing a set of services to drivers, passengers and vehicles. If you know that about 85% of transportation is done by road transport, the importance of organizing roads and their service would be understood. Providing welfare services in the intercity roads in the form of service - welfare complexes includes the needs that can be examined in various physical, economic, social and environmental aspects. In between enjoying the architecture in harmony with nature and climate of regions, according to the understanding of environment, connection with nature, understanding the environmental effects, respect for users and creating a participatory process in designing introduce the characteristics of sustainable architecture and link man, nature and architecture. The characteristic represent the Iranian - Islamic architectural design principles and is part of sustainable architecture identity. In this study with respect to the Saman axis which is the most important way of communication in Chaharmahal and Bakhtiari Province, the proposed region for the design of services - welfare complex is selected according to the sustainable architecture model. First the desired site was selected, then required information were collected and reviewed and as a result we achieved the design of services - welfare complex.

Keywords: Services - welfare complex, sustainable architecture, planning, positioning, service elements
1. INTRODUCTION
The ultimate goal of urban and regional planning is the achievement of "sustainable development" and a logical relationship between human and the environment (Ahmadi, 2008), it should be pointed that in studying the place of rest areas, in addition to serving passengers, other important objectives such as growth and development, environmental protection and social justice for the region and its inhabitants are concerned.

Currently, integrating welfare services on the road in the form of rest areas is considered as a way accepted in the world. In this context, governments don’t just consider the economic justification for these complexes, but also environmental, social and cultural and political benefits of the complexes is so much that governments present special facilities for the construction of the rest areas (Seraj and Ilka, 2016), for example, the Turkish government provided an instruction, which coincided with the construction of a highway, rest areas related to it should be constructed simultaneously (Afandizadeh et.al, 2015). In this case, there is not a unit model for the construction of rest areas in countries, because the characteristics of each country require to apply the policy of creating their complex distinct from other countries, for example, in Saudi Arabia, complexes are designed mainly for pilgrims and foreign travelers which have limited needs and high volume of services (Amini, 2003).

World records indicate that complex constructed in each country varied a lot, for example, the breadth of rest areas is different on a highway in Germany or Turkey and it depends on the location, natural features and intervals, and offer different levels of services (Zargar, 2007).

For several years, the construction of rest area on the roads of the country is considered in order to organize on-road services and increase the welfare of passers, but there is many potential in these complexes that can be used to achieve greater goals such as "regional development" and "regional balance". On the other hand, considering new roles for these complexes, while they can be an important step towards the sustainable development of the region, leads to the continued operations of rest areas and justified expansion of the scope of their activities economically (Papeli, 2006). In this context, the positive consequences of construction of the complexes, especially the aspects of tourism and their role in regional sustainable development along with their interaction on local residents and passers in road is to the extent that in some cases it is required that executive bodies to be pioneer for the construction of the complexes and contributing to the establishment of their activity. The general aim of this study was to understand the architectural design process out of the cities and running projects that realize the vision goals.

2. HISTORICAL STUDIES
Major routes in Achaemenid era were built in the same old ways, and the roads often passed through the straits and the numbers of these straits were more than what we usually imagine it today. Three major roads were in Zagros for passengers.

In the Parthian period as the Achaemenid era, the development of roads and stations on the ways and supporting the caravans found tremendous importance and on the way of most roads, especially on the famous Silk Road, caravanserai were built. But by comparing the Parthian fortresses and cities that have recently been identified in Dasht-e-Gorgan, it is likely that the caravanserais in that time were built as squares, rectangles and with materials such as
clay and brick. There were arches and stalls around it and in that time the main trade route in the East and the West and vice versa was done. Caravans carrying goods started from Babylon and through Ecbatana (Hamedan today) and through adjacent pathways to the Caspian Sea, reached themselves to the West or Balkh (Breheny and Rookwood, 1993). Figure 1 shows Shah Abbasi caravansary, Karaj.

![Shah Abbasi caravansary, Karaj](https://example.com/image1)

**Figure 1** Shah Abbasi caravansary, Karaj (Source: Iranian caravanserais)

Master’s skills was so much that they could solve all the drawbacks in terms of construction, such as various types of coverage and decorative bricks. Style of architecture in the era in the construction of buildings such as mosques, schools and caravanserais were almost identical and maps became popular as 2-porch and 4-porch. The most beautiful examples of caravanserais in this period, is "Sharaf Ribat or Caravanserai" in Khorasan, however, it is now destructed, but there are less spectator can be found that pass it indifferently. The inn is also reminiscent of a time when the Khorasan Road was very important and there was perfect boom of trade across the country. (Altinay, 2005) Figure 2 shows Plan of Anoushiravan Ribat.

![Plan of Anoushiravan Ribat](https://example.com/image2)

**Figure 2** Plan of Anoushiravan Ribat (Source: caravanserais of Iran)

Many caravanserais can be seen on the road that were built in the Safavid era by governments and donors and was dedicated to travelers and pilgrims. On the other hand, the size of large roads and development of shipping led to the issuance of Iranian goods to European countries in West and China and India in the East. As a result, a number of inns were built in the trade road. Foreign tourists who traveled to Iran in Safavid era with political ideals and views, recorded interesting description and images of caravansaries, particularly caravansaries of that period and used the caravansaries as hotels today. (Emarati and Valian, 2016). Figure 3 shows Shrine Hashem caravansary.

![Shrine Hashem caravansary](https://example.com/image3)
3. REVIEWING THE DOMESTIC AND FOREIGN SAMPLES

3.1. Shahr-e-Aftab Rest Area in Qom - Esfahan Road

Complex facilities are on both sides of the highway and are often repeated on both sides. Some tips about the complex include:

The complex includes a variety of services including hotel, café, buffet, restaurants, mosque, petrol station, repair shop and other services that except for the mosque almost all other sectors are on both sides of the freeway separately. It seems the construction of some parts like hotel and repair shop separately is not necessary. Most functions of this complex are integrated as centralized in buildings close to all that it caused the complex not to have readability, and for example to access to a restaurant, you should enter like an office building and search for the area. The focus of buildings made the general view of buildings to be seen as an integrated volume along the freeway, naturally, the office building is not compatible with the nature of the complex. Mosque which is located on the north side of highway is designed to be separate from other buildings. Surfaces of complex body is mostly made of short walls and thus the general view of the complex at a massive level formed the ceilings that are in different directions, so considering the integration of buildings, the overall outlook of the office suite has not the required quality. Figure 4.shows Shahr-e-Aftab rest area. Parking and terraces surrounding them on the back of the complex and away from the freeway provided a suitable space for short breaks of passengers.
3.2 Rasthause Gruibingen rest area

The complex is on the route of Köln - Bonn - Frankfurt and has an area of about 5 hectares. In the complex that its construction and operation is done by the private sector and it is managed by a Muslim and originally Tunisian person called Mohamed Raufhamassi, offers the following services:


It is constantly trying to expand the services to provide more attractions for users. For example, recently a device is purchased to polish the shoe that does it automatically, (Mohammadi, 2014). Figure 5 shows Rasthause Gruibingen foreign case study.
4. DESIRED SITE FOR DESIGN

The site desired for design is located on Saman axis (five kilometers of Saman to Zaman Khan Bridge) and it is marked on the map. Now the reasons for choosing the site are discussed: the project site is located at longitude 34° 46' and latitude of 41° and at an altitude of 2085 meters above sea level. This field has a gradient of 20% to the north. Total land area is 30,000 square meters (three hectares) that is suitable to meet the desired objectives to design a rest area. Referring to relevant organizations such as the Organization of the Municipality, the urgent need to design the project in the region and the importance of its implementation has been realized. Figure 6 shows. The area of the proposed site for designing services - welfare complex in the region to Zaman Khan Bridge.
5. CRITERIA AND STANDARDS FOR PROJECTS SPACES

5.1. Restaurant
Dining venues: between 0.75 to 2 square meters per person in each restaurant is required. The average size of about 1.5 square meters per person can be accepted in Iran.

<table>
<thead>
<tr>
<th>Shape and size of table (cm)</th>
<th>Total surface for each seat (m²)</th>
<th>Type of waiter service</th>
<th>Restaurant rating type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Square 85*85</td>
<td>1.5</td>
<td>Full service</td>
<td>Good restaurant</td>
</tr>
<tr>
<td>Square 85*85</td>
<td>0.1</td>
<td>Typical service</td>
<td>Ordinary restaurant</td>
</tr>
<tr>
<td>Circle with a diameter of 60</td>
<td>0.6-0.7</td>
<td>Light service</td>
<td>Cheap restaurant</td>
</tr>
<tr>
<td>Square 70<em>70 or 100</em>100</td>
<td>0.1</td>
<td>No waiter</td>
<td>Self-service</td>
</tr>
</tbody>
</table>

In planning, we should consider the flexibility of the plan to cover conditions related to the rapid changes of social habits. Unshaded parts are dining areas and shaded parts show the kitchen space. Dining areas may be divided into smaller sites and for different groups. The expansions of main details are marked with dotted lines. When expanding different units, we should be careful not to create unnecessary details. It should be noted that the kitchen can serve the dining area before and after the development (Mansourian, 2016). Table 1 shows overall surface required for each seat and the size of table.

5.2. Facilities and Maintenance
Necessary environment for facilities and maintenance can vary (for example, from 8 to 24 percent of total public facilities space in terms of the degree of controlling the internal environment and the type of equipment used, i.e. kitchen, washing and refrigeration).

5.3. Game and Picnic Area
The main open spaces in the public facilities with the resort include a children's play space, a space for eating meals in the open air. These spaces should be close to parking and should be simply related by sidewalks. The major part of public facilities includes the sale of hot and cold beverages and they should be linked to these spaces. Place of these spaces should be favorably influenced in the position and should be away from the main road. In cases possible, they should be completely separate by the trees and in some cases, it is required to be roofed to prevent rain and sun. However, interior design and its landscaping must be studied with great care to give needed calm to the passengers and supply security for the children as well. Outdoor facilities may include picnic table with materials resistant to atmospheric effects and children's room and play equipment. Special care must be taken to gathering and removing waste. These principles also apply to parks (Kashanian et.al 2016).

5.4. Motels and Camping
The insertion of motels along the way and camping facilities means to provide the temporary break space for passengers who do not want to waste their time to go to town and find a hotel and or due to the unavailability of suitable hotels, (Negarstani et.al 2016). So the two types of facilities should be separated in a way that any collision occur between their joint activities (e.g. noise generated by the movement of cars in the resort area). Figure 7 Shows an example of the placement of motel in complex (Architects' Data)

5.5. Parking Area

In the development and creation of parking lots, providing an open and undivided space is not appropriate. Therefore, the necessary space for circulation in the parking lot should be predicted, so that the vehicles don’t act irregularly and erratically in terms of congestion. Such circulations should not be at the expense of failure of view. Prevent creating deadlock parking placed at the end of a long entry way for private cars, because drivers should not be in search of the parking place. The possibility of creating a separate car parking for employees must be noted. The bus stop should be located adjacent to the dining area and toilet to avoid passage of a large number of people from the road or parking lot (Lawson et.al 2016).

<table>
<thead>
<tr>
<th>Specifications</th>
<th>Car</th>
<th>Bus</th>
<th>Large trailer</th>
<th>Trailer truck</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance between beginning and end of wheelbase</td>
<td>4.3</td>
<td>6.7</td>
<td>15.2</td>
<td>3.18</td>
</tr>
<tr>
<td>Front projection</td>
<td>9.0</td>
<td>1.2</td>
<td>9.0</td>
<td>6.0</td>
</tr>
<tr>
<td>Rear projection</td>
<td>5.1</td>
<td>4.2</td>
<td>6.0</td>
<td>9.0</td>
</tr>
<tr>
<td>Vehicle length</td>
<td>8.5</td>
<td>1.12</td>
<td>7.16</td>
<td>9.19</td>
</tr>
<tr>
<td>Vehicle width</td>
<td>1.2</td>
<td>6.2</td>
<td>6.2</td>
<td>6.2</td>
</tr>
<tr>
<td>Vehicle height</td>
<td>variable</td>
<td>1.4</td>
<td>1.4</td>
<td>1.4</td>
</tr>
<tr>
<td>Height for plan</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
<td>5.4</td>
</tr>
<tr>
<td>Minimum radius of the inner circle of circulation</td>
<td>20.4</td>
<td>4.7</td>
<td>9.5</td>
<td>8.6</td>
</tr>
<tr>
<td>Minimum radius of the outer circle of circulation</td>
<td>3.7</td>
<td>8.12</td>
<td>7.13</td>
<td>7.13</td>
</tr>
</tbody>
</table>

The bus should be able to park and get out of the park without using reverse gear. This type of parking if possible can also be used in commercial vehicles. In the plan of parking lot for trucks, the allowed maximum length and width of the vehicle described in the relevant
regulations (Table 2) for parking of long vehicles and with heavy loads should be considered. For vehicles and raw materials and employees, a separate parking adjacent to dining building and away from the road and public parking must be considered.

5.6. Facilities Related to Residents
The complex must be designed so that the residents can use it as a recreational space, occasionally by referring to it to fill their leisure time. Thus, establishing a series of activities in the form of cultural - educational activities seems inevitable in the project (Shieh and Badri, 2005), Visitors according to their ages, have different needs for leisure (Mansourian, 2016).

Needs of different age groups for their leisure time:
- Children (9-5 years): play with peers, watching television, playing in the park, reading books especial to children.
- Adolescence (10-14 years): their needs are the same as the previous group, but with the vaster and more complex needs.
- Youth: excursion with friends, sports and going to sports clubs, listening to music, watching movies, cinema and parks and natural excursions, reading.
- Middle-aged: reading newspaper, watching television, seating with colleagues, family visits, minor repairs of home appliances, walking in the park.

5.7. Refueling Facilities
Fueling facilities before joining the main road is offered to the users of resorts. This means that the facilities are placed between the parking lot and exit positions. Capacity of fuel tanks for different types of vehicles depends on demand and the usual delivery period in the region, (Salehi et al, 2005). In designing a filling station, key issues must be considered including:

A. Separate filling stations for trucks and buses from passenger vehicles
B. Creating the necessary space for a regular position of vehicles in the ranks of refueling
C. Far status of filling station from a service complex due to safety and environmental reasons
D. Building parking for short stop of cars and buses and trucks separately and with minimal interference
E. The focus of ancillary services of petrol stations in a complex due to economic savings and reducing infrastructure
F. Observation of all standards on the movement and circulation of freight and passenger vehicles
G. Prediction of access roads for vehicles that don’t tend to fuel and want to only use ancillary services

5.8. Water Facilities
Per capita water consumption is approximately 60 liters per person a day. In these areas, the amount of water needed to irrigate each square meter of tree-planted lands varies between 3.5 to 5 liters per day, but non-toxic wastewater can be used for irrigation (Mehrpour and Masoudian, 2015).

5.9. Power
The required power can be supplied from main electrical power plant, or production by the generator at the site. Fuel of generators may be of various types: gas, oil, diesel or using wind energy, geothermal or sun. The required amount is probably as following:
Designing an Underground Rest Area with a Sustainable Architecture Approach in Saman City

- 0.5 kW per food prepared in the restaurant.
- 1.25 kW for air conditioning per person entering the resort.
- 0.15 kW for lighting per person entering the resort.
- 0.05 kW for filling station per person entering the resort.

Energy required for water treatment and reuse must be examined individually. The supply of electricity depends on electrical energy, but where we can use other types of energy, power consumption can be altered (Maleki, 2015).

6. CONCLUSIONS

According to the fact that the site is high and has a cold and mountainous climate, design is on the agenda as inward and compact. According to the historical region of Zaman Khan Bridge that can be seen easily from the site and due respect to the historical atmosphere, the plurality of stories is prevented and design was done with less stories and embedding all the needed functions in this space.

Due to the location and slope of the adjacent land and the lands that reach the site to the river bank and maximum use of the site and observing the third principle proposed the design was on agenda and done in two ways:

A. The use of land slope in different platforms to use the surrounding space, recreation and temporary housing (according to the theme and attitude of the design in taking maximum advantage of these spaces) the design of the platform was done with respect to the ground shape and radially.

B. Use of space created below the designed part in the ground level for accommodation, cultural complex, traditional restaurant (according to the theme and attitude in taking maximum advantage of the space)

Due to the slope of the platforms, the form in the ground and first floors kept their state as the height of walls and ceiling. The final design is presented as Figures (9) and (10).

Figure 9 Final design

Figure 10 Bird's-eye view of site
7. ANALYSIS AND CONCLUSIONS
Design of rest areas has no long history in Iran. A place which is studied and designed can have complete amenities and memories of a relaxing atmosphere for all who are in road trip. This place is designed as a trip point, a place to stop, a place for relaxation in an area with a lot of ups and downs overlooking the high mountains that invites drivers as a specific location for a short break.

7.1 Generalities and the Basic Requirements of the Site
The use of previous studies in other parts of the world as well as taking into account some successful works in the country, could be helpful for primary diagram design which forms the core of the design. The main idea of focusing on nature and viewing landscape on the site, orders all the parts together.

Curved modes as semi-circle are dominant in whole building and fits surroundings enough. Inner spaces that are located in the basement of the building, have a conflict between the outer shell of building which is decorated with soft and relaxing colors and can provide the optimal time to relax. Selected materials on site have high resistance and require little maintenance and can guarantee continuity of service.

The building is considered as a buffer (the interstitial section) between the traffic and nature. Design is done in such a way that it created the least changes in the landscape and a kind of modesty and humility can be seen in whole of the complex. The reason for this is lack of degradation of the natural environment of that is the most important asset of the area (Mohammadi, 2014).

7.2 Considering the Safety of Users in the Center
Rests areas are crucial in travels. These complexes are necessary to serve at all hours a day. Safe rest area is a functional concept in inter-urban road system which includes a lounge area and paying attention to the safety of people wherein they stop. Designing the center is inspired by the surrounding nature and this can promise the drivers a beautiful environment with natural landscape (Kasmaee and Zandieh, 2016).

The need to provide adequate lighting on places at all hours because of a sense of security and comfort of users is essential. Several factors must be considered for lighting. Most notably include the geographical location of the site, topography, providing comfortable and safe conditions for drivers and passengers, appropriate services in terms of environmental design and buildings in the complex, clear sidewalks in the design and supervision on the security forces on the site.

Points that should be considered in the rest areas is in the input and output, paths within the premises, parking spaces and its service spaces. Definition of these segments can be used for practical public or private purposes (Mansourian, 2016).

An input and output area is defined so that the vehicle can gradually slow down and enter the site. There re necessary measures in output for safe evacuation of users by determining the location and the provision of adequate lighting and warning signs. Driver visibility is an important debate during entry and exit that is included in the project.

After the entering the site, lighting requirements and supplying warning lines and signs have been clearly done, so that drivers can access the desired service with no confusion. No blind spot is designed for drivers at the site and it can be said that people and drivers will reach the site with full safety (Maleki and Arabi, 2015).

Proper lighting in the parking lot is so that drivers can detect inputs and outputs and in this sense, no danger threatens the parking lot users. Stands clearly determine the location of
vehicles and priority is considered proportional to the area of entry and exit to the parking lot. The design should be so to supply welfare and adequate security even for drivers who tend to rest next to their car. The use of lights of different colors in every part is an acceptable solution in this regard.

7.2.1. A Sense of Security
Psychological studies show that people feel more secure in the ground rather than on it, due to this we can say that ditch or pit is the architectural visualization of the word "fear". In the Middle Ages, people hid themselves behind the walls with a cover similar to ground cover to deal with risk. At that time, the risk was foreseeable, at least there was a confidence the risk area is on the earth's surface, and only its direction was uncertain, but now with the advancement of technology, risk area has exceeded: on the earth, beneath the earth and even the sky! This leads to the creation of new policies in urban development. People feel more secure under the ground because they are hidden from enemy sight. Given these issues and considering the needs, underground cities were created not only complying with today's risks but also by taking into account future needs. Also, going the basement was a way out. This is also true in the modern world although its luxury aspect is dominant to its need aspect. There the need arises and there is lack of space as the most primitive impulses, but in underground architecture, luxury is evident in different form and models: from shopping malls and movie theaters, from industrial bases to museums and subway stations (Salehi and Armaqani, 2016).

7.3. Systematic Approach to Selecting the Similar Site for Rest Area
Locating and determining the place for building similar complexes were often done by transportation engineering and proportional to the distance of two hours (average speed) between the adjacent towns and settlements. Given that the complex functions are beyond providing services to drivers and passengers, it seems that having a comprehensive and systematic approach can bring the desired design quality for these structures (8). Taking into account the economic, social, cultural and environmental aspects can have the improvement of the complex’s performance. It is recommended to use this view in similar projects, to increase user-friendliness.

7.4 Reducing the Number of Accidents Using Rest Areas
Rest areas between can reduce the number of accidents. This is due to the recovery and concentration of drivers at the identified opportunities that appropriate to this need, the center with a distance of two kilometers from the nearest stops and neighboring towns was designed that have considered standard for the rest of users (Negarstani et al, 2015).

7.5 Reducing Energy Consumption in the Designed Complex
Today, according to the energy crisis and environmental problems, special attention is given to environmental sustainability. Diving in the heart of the earth is a solution to reduce energy consumption that brings the user comfort, optimum ambient conditions, and reduced fluctuations in weather. What can perform more effective in the field of energy conservation in the designed spaces is the large-scale development of this architecture that can identify its positive aspects more. Hence, this research presents the importance of energy conservation through underground architecture as a functional plan by using the design in a suburban site. Due to the natural characteristics of underground architecture, its combination with the design of the underground rest areas is recommended.
7.6. Providing Various Options for Comfort of Complex’s Users

A. The main service areas are those which are intended for walking of users. Good lighting in these areas provides the users a good sense and help them to focus and recover energy.

B. The side activities of places where there is a possibility to sit on a bench and order tea and coffee, and is in connection with the basic service spaces. Lighting in this parts can be done with less intensity to induce more relaxation to the user.

7.7. Necessary Maintenance of the Building

Typically the rest areas are located at a considerable distance from cities and service centers and the issue minimizes access to services and equipment of repair and optimization. Monitoring such areas is difficult and needs more maintenance and attention than in urban areas. Presenting a system problem using the equipment and periodic visits by private contractors can be considered a good strategy (Emarati and Valian, 2016).

7.8. Using the Center as a Place for Leisure of People in the Neighboring Cities and Tourists

Human is dependent on nature, but the technology created a gap between him and nature. What is less considered in our society is planning to spend leisure time. Today, the need to plan for leisure for all people, including citizens is strongly felt because the proper use of leisure time can lead to human excellence and growth and affects the performance of other parts of life. Tin public culture of Iran, travel and tourism has a special place and importance in terms of expanding information, knowledge and understanding as well as the leisure and recreation. Experienced man in this culture becomes a worldly-wise man who travels around the world and knows every nation. Such a man requires a minimum of facilities for comfort during this journey to achieve his goals that must be provided for him. Therefore, these issues led to practically analyze the necessity for the establishment of a center that with its specific structure and facilities creates a happy atmosphere, and facilitates and encourages users to benefit from wonders of nature in Saman City, (Shieh and Badri, 2005).

7.9. Respect for Nature and Considering the Limits of its Destruction and Change

Changes in the lives of urbanization and industrialization in recent years globally and in Iran has caused the use of leisure time for psychological recovery and enjoying life more become very important. That is why in recent decades, creating recreational and tourism spaces based on the needs of society and potential of natural areas is faster. However, if these spaces are not built by identifying and evaluating the environmental, social, human potentials, not only it fails to change this process, but also will have negative effects on the process. In this study with respect and humility of building in the face of nature, not only the face of the area will not be affected by the building, but also the main approach of building will be the use of the natural ability. It is recommended that during the implementation of similar projects, to use minimum possible change and sustainable and local materials. In this way, we can achieve the sustainability of the rest area architecture (Cyprus, 2009).
REFERENCES


[17] Mehrpour Brenti, F., Masoudian, M., Using rainwater to provide part of the consumed water of rest areas; case study: Qazvin and Gorgan, the second national conference of development-orientation of civil engineering, architecture, electronics and mechanics of Iran, Gorgan, Department of Research of Parou Gostar Pars Engineering Company, Oxford Cert Academy in England, 2015.


