

# A NEIGHBORHOOD DEVELOPMENT APPROACH TOWARDS SUSTAINABLE URBAN DEVELOPMENT, WITH EMPHASIS ON SUPPORT CAPABILITIES USING AHP MODEL: CASE STUDY: GHATARCHIAN NEIGHBORHOOD OF SANANDAJ CITY

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## ABSTRACT:

Present facilities and capacities has established in neighbourhoods of city, since many years ago. Establishment of this facilities and capacities has been done with financial, humanity and environmental costs. In ancient neighbourhoods of cities, there are different reasons that, the maximum capability of the facilities and capacities are not used, they have been useless and collapse with the pass of time. Generally the capacities of development of neighbourhoods are found in ancient neighbourhoods; but for there are unknown and unused, capacities are not able to create the development in these cities. Sanandaj has many ancient neighbourhoods, unfortunately they have been unused in growth and physical development of Sanandaj and usually its expansion has been done horizontal and the expansion of city has been happened with demolition of agriculture lands around the city. The usage of urban planning techniques such as Analytic Hierarchy Process (AHP) caused to evaluate the capability of capacities and their shares (each one of the capacities) in neighbourhood's development in future. In this paper, by usage of the Analytic Hierarchy Process (AHP), all capacities of neighbourhood of Ghatarchian in Sanandaj have been analysed, and evaluated in order to recognize their proportion in neighbourhood development; thus score of each present capacity has been compared with score of Urban Sustainable Development pattern capacity, in order to make the correspondence between present capacities and Urban Sustainable Development pattern clear. Relying on results of Analytic Hierarchy Process (AHP), proposal approaches have been presented for each capacity and finally considering the present capacities in neighbourhood, we can populate the Ghatarchian neighbourhood.

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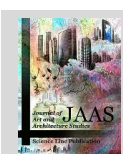
## KEYWORDS:

Neighbourhood, Urban Sustainable Development, Capacity, Capacity Evaluation, Feasibility Study.

## INTRODUCTION

Present facilities and capacities has established in neighborhoods of city, since many years ago. Establishment of this facilities and capacities has been done with financial, humanity and environmental costs. In ancient neighborhoods of cities, there are different reasons that, the maximum capability of the facilities and capacities are not used, they have been useless and collapse with the pass of time. Generally the capacities of development of neighborhoods are found in ancient neighborhoods; but for there are unknown and unused, capacities are not able to create the development in these cities. Iranian cities has many older neighborhoods that unfortunately they have been unused in growth and physical development of

cities and usually its expansion has been done horizontal and the expansion of city has been happened with demolition of agriculture lands around the city. In this paper, by usage of the Analytic Hierarchy Process (AHP), all capacities of neighborhood of Ghatarchian in Sanandaj have been analyzed, and evaluated in order to recognize their proportion in neighborhood development; thus score of each present capacity has been compared with score of Urban Sustainable Development pattern capacity, in order to make the correspondence between present capacities and Urban Sustainable Development pattern clear. For each of the potential solutions were proposed capacities and finally considering the present capacities in neighborhood, we can populate the Ghatarchian neighborhood.



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Population growth and increasing urbanization of the effect of a reduction in mortality due to advances in medical science and improved economic conditions and social, and on the other hand migration effect of rural - urban areas is the result of the Industrial Revolution in Europe. The first of these two phenomena led to the growth of cities accelerated biological Secondly, traditional urban centers, that were known Mahalatshahr, to be affected. Industrialized countries that regenerator industrial society with careful planning and better living conditions and in line with advances in technology could overcome the problems caused by the industry and technology. But countries held back as centers of environmental conditions were consistent with evolving technologies and this led cities of our country to be without any rules and ideas. It was nothing more than quality agricultural land converted to urban settlements on the fringes of cities to create and impose exorbitant costs of new towns and cities around the economic structure of the country.

Despite population growth and urban sprawl no provisions for renovate the buildings and optimizing urban areas was done to welcome the arrival of the machine and technology. Thus the neighborhood was not responsive to their residents and the requirement of modern times. It was on a process of identity and functional decline and recession. If it makes facilities and equipment for the welfare of its residents during its life time, but not only these facilities not used for renovate the buildings and living conditions in areas, but these have been ignored facilities [1].

Among these, research studies to identify and restore capabilities and capacities of local communities as a development platform can be raised, is essential. This research is not only to discuss the feasibility and feasibility of potential deal, which is one of the new topics of twenty-first century overall the world in the field of urban planning and urban planning, but also to identify potential neighborhood development and analysis them (But here's a choice only of physical capacity and brought in much patience do is talk) is to provide solution.

#### **Main research question based on presentations includes:**

- What are the capabilities and potential in the neighborhood?
- How can we live in a good condition to prevent uncontrolled urban development (attached

and detached development) created by the revival of capacities in the traditional urban local created?

- What are the strategies in urban areas (scale neighborhoods) in order to actualize this capacity and proper use of them?

#### **The necessity and importance of research**

The scientific and professional necessity of research: According to science importance of the field of urban planning, it seems essential that parts of issues and problems in any neighborhood should be solved with the resources and capacities in that or in other words, each urban problems in its place be eliminated.

The necessity of attention the international situation of discussion: In recent years regarding the optimal use of their facilities and to create a stable balance of nature and make it an important part of the world, especially the United Nations that several resolutions have stressed the need for attention to urban and sustainable development. Resolutions in which they explicitly to sustainable development and optimal use of capacity and resources to focus on Agenda 21, 1992 UN meeting in Rio de Janeiro, Earth Summit 1992, the Commission's Green paper on the urban environment in Europe in 1990, Resolution 56/201 in 2001, the UN General Assembly, Resolution 2002/29 UN General Assembly, can be cited. So do some research as to the importance of such measures and refer to the inconvenience in Iran.

#### **Research Objectives**

The main goal of this research is the identification and analysis of existing capacities in the neighbourhood, to provide optimal patterns appropriate for use in capacity planning in achieving sustainable urban development. This study is based on identifying current and potential analysis residential neighbourhoods is trying in various dimensions to trying to planning for develop old neighbourhoods and problematic buildings as sustainable development and a better quality of living to be presented, In this point there are considered that the objectives are:

- Population estimates and estimates of housing capacity in older neighborhoods against exogenous developments with regard to the provision of appropriate methodologies for determining neighborhood capacities (Aimed at preventing the development of an exogenous).
- Adding the local population, which could lead to a possible division between old and new



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residents will and also could be used from the pattern by using the potential of urban land. In an old neighborhood in the face of exogenous and discrete (the use of existing facilities in neighborhoods).

- Efforts to respect human scale and neighborhood development in the distribution and diversity of land due to urban sustainable development approach

## METHODOLOGY

### Purposes and principles of community development based on sustainable urban development

The following principles and objectives for community development based on sustainable urban development is proposed using and applying the principles and objectives set forth in each of the following conditions are influenced by the spatial, economic, social, user community is:

#### Intensive development of the optimal density

Traditional neighborhood development to intensive development density should be optimized. Compact development patterns for all applications (both residential and non-residential uses) may result predictor of increasing the efficiency of land use also reduction of the costs of infrastructure and public services [2].

Intensive development means development that is well designed is based on a human scale. Human scale called proportion to the relationship between human and physical dimensions of the spaces that are used by people that includes walking distances, height of buildings, design lighting, and signs in the streets, sidewalks and other cases. Through intensive development, increase social interactions in urban spaces, such as parks and public buildings that are built close to each other, and can encourage people to get different functions [3].

#### Mixed Use

According to the theory of traditional neighborhood development, sustainable urban development based on mixed user must be combined. This means that non-residential land use such as commercial - utilities and blank space are mixed with residential land use. Mixed use helps to increase walking among different land and also forms of transport such as walking, cycling and use of car will be promoted in the community. Mixed use can also cause a neighborhood center or focus. For

example, a neighborhood may have social and public facilities such as parks, recreation facilities, schools, or libraries, or retail center. Mixed use includes Land Office - Commercial Business - Medical, Commercial - Residential, commercial and military - residential - office, residential - training.

#### Different Forms of Transport

Local access networks in order to develop traditional neighborhood units by different forms of transport, network connectivity, circulating systems with walking, cycling and driving to be get easier, will be created.

#### Capacities of Neighborhood Development

It is maximum potential and capacity of the service to a certain number of people in a given society considers acceptable for a specified time and quality standards. The definition of capacity not assumed to be static but can dynamically according to time and place consistently to be charged [4].

#### Dimensions Capacity

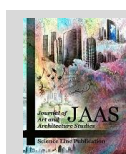
Capacity and performance aspects of the role and capacity of the surface is to be determined. The total capacity of urban is different of capacity at the local level [5]. The important capacity in the city that the optimum and rational utilization of them will lead to sustainable development includes: Potential environmental, physical, economic, social and cultural.

It was noted that each of its capacities and dimensions has smaller divisions. In this research, to provide and implement a suitable method for measuring the capacity, only examined a sample capacity (physical capacity) for tangible and concrete, and also according to the study area, which is at the neighborhood level.

At the following, the aspects of the physical capacity at the neighborhood level that in this research are presented have been presented. Spaces that include undeveloped land, land reuse (exploitation of the Earth) and the space is in use. Infrastructure includes water, sewer, electricity, communication networks, parks and blank spaces.

#### Capacity criteria

In order to district the capacity of neighborhood development must to access some criteria by using them consider the capacity and capability of each associated with neighborhood development. At the following will be analyzed to measure capacity.



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### Location

Local capacities in terms of location can be placed in four positions:

- Main communication networks
- Corridors that are the same side streets in neighborhood
- Nodes
- Inside neighborhood

Capacity depending on the type of use and location, are analyzed and evaluated. For example, the housing capacity estimates (residential users) within the neighborhood is preferred more than other applications. Commercial / official mixed-use in node and major communication network have highest efficiency and have the potential for expansion. The criteria for each of the capacities are valued according to the optimal location. This criterion assesses the potential by quality [6].

### Function and role

Local capacities in terms of function and role of the urban fabric at different levels are evaluated. Since the study area is at the neighborhood level, terms of the capacity and performance of neighborhood and beyond neighborhood levels are measured. It means whether they are local or beyond the capacity of local. Some capacities are purely local in nature, such as housing capacity who are just serving local residents [7].

But some non-residential capacities can learn the nature and role of the neighborhood to take such administrative and transportation. This criteria analysis capacity by quality.

### Level of service

This criteria in terms of both capacity and performance in terms of the percentage of people who use or used to evaluate. For example, the capacity of undeveloped land can accommodate how many people or the local water network in a specified period could be good for how many people [8]. In this criterion can know the maximum potential and elimination of any capacity and solve it. By this criterion the standard capacities and evaluates quantitatively analyzed.

### Stability

The criteria analysis duration of each household to assess their capacity to subscribers. The criteria on which the three criteria, longevity, and type and quality of materials is made of any capacity what is the service life of a sewage system? The quality of

service is dependent upon the previous two criteria on the quality of service in that capacity? The capacity measure both quantitative as well as qualitative analysis are subscribers [9].

## RESULTS AND DISCUSSION

Capacity of existing facilities in urban neighbourhoods should be standards of acceptable. In order to provide services to the population and the surplus of capacity, city or neighbourhood will have the ability to accept larger population. Urban development model to assess the capacity of a city or neighbourhood can be considered as a standard model and index and the capacity of a neighbourhood or city are measured relative to this model. The next step is to plan for a neighbourhood, are initially measured capacities and capabilities of each of its capacities for development of the neighbourhood is specified. Then the existing capacities in the area are compared and evaluated relative to sustainable urban development patterns. Here and after comparison of the capabilities and capacities of the neighbourhood, the neighbourhood is started [10].

### Elements of analysis

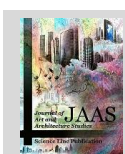
The analysis of AHP includes these elements: goal, criteria, sub-criteria and alternatives. The analysis of this study is as follows:

The aim of the study was to assess the capacity (capacity assessment) returns. Criteria for selecting and evaluating the development potential used of four criteria of location, the performance and the sustainability of the service. Sub criteria: the criteria for their selection criteria are divided into the sub which are: Location criteria divided into four sub networks, corridors, the nodes, inside the neighbourhood-function and role into neighbourhood and beyond neighbourhood-service has no sub criteria- capacity into longevity, quality and type of building.

Cases include: blank land, space utilization, usage space, water and sewage, gas, electricity, communication networks, telecommunications, parks and green places. Figure 1 shows the hierarchical structure of the elements.

### Calculated weight (coefficient) values of criteria

The coefficients of the importance of criteria and sub criteria, we compare two by two. Table 9 is used to comparing and judging, which consider basis on



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purpose of the study. To calculate the approximate hourly method is used to measure the importance of which we used the geometric mean due to higher accuracy. To calculate the geometric mean, first calculate the significance values (Table 1), and then normalized them. Criteria important factor is achieved by normalizing the geometric mean which each number divided by the sum of numbers.

Total coefficients on four criteria must be equal to 1, which indicates the relative importance of the criteria. Criteria important factor is achieved by normalizing the geometric mean which each number divided by the sum of numbers (Table 2).

#### Calculated weight (coefficient) importance of criteria

After calculated coefficient values of criteria, each coefficient values of sub criteria is calculated as follows:

#### Calculated weight (coefficient) importance of criteria, location and placement criteria:

Location and placement criteria have four sub criteria major networks, corridors, groups the

neighbourhood which binary are evaluated relative to each other (Table 3). Coefficient of sub criteria value (Table 4) is calculated by normalizing the geometric mean which each number is divided by sum of numbers.

#### Calculated weight (coefficient) value of sub criteria, function and role criteria:

Function and role criteria have two sub criteria, local neighborhood and beyond local neighborhood. Because performance of local neighborhood more than the performance of beyond local neighborhood led to the prosperity and security of local residents (Table 5), then function and role of the local neighborhood is more important than beyond local neighborhood for the development of (Tables 7, 8) neighborhood (Table 6).

Measure service, has no sub criteria at this stage directly into the analysis process.

#### Calculated weight (coefficient) sub criteria of stability criteria:

This scale has three sub-criteria, longevity, type of materials, and quality of each, depending on capacity, is rated.

**Table 1:** Geometric mean of matrix rows in matrix of criterion

CRITERION	POSITION	FUNCTION AND ROLE	LEVEL OF SERVICE	STABILITY	SUM
GEOMETRIC MEAN	0.2697	0.6688	3.409	1.6266	5.9741

**Table 2:** The resulting table 1

CRITERION	POSITION	FUNCTION AND ROLE	LEVEL OF SERVICE	STABILITY
IMPORTANT FACTOR	0.0451	0.112	0.5706	0.2723

**Table 3:** The geometric mean of matrix rows in sub criteria matrixes of location and placement

SUB CRITERIA	MAJOR NETWORKS	CORRIDORS	GROUPS	INSIDE NEIGHBOURHOOD	SUM
GEOMETRIC MEAN	0.2933	1	3.409	1	5.7023

**Table 4:** Factor of sub criteria values of the location and placement criteria

SUB CRITERIA	MAJOR NETWORKS	CORRIDORS	NODES	INSIDE NEIGHBORHOOD
VALUE COEFFICIENT	0.0514	0.1754	0.5978	0.1754

**Table 5:** Geometry criteria of matrix rows in sub criteria matrixes of function and role criteria

SUB CRITERIA	BEYOND LOCAL NEIGHBORHOOD	LOCAL NEIGHBORHOOD	SUM
GEOMETRY CRITERIA	0.4472	2.236	2.6832

**Table 6:** Coefficient of sub criteria values of function and role criteria

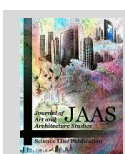
SUB CRITERIA	BEYOND LOCAL NEIGHBORHOOD	LOCAL NEIGHBORHOOD
VALUE COEFFICIENT	0.1667	0.8333

**Table 7:** Geometric mean of matrix rows in sub criteria matrixes of stability criteria

SUB CRITERIA	Longevity	Type of building	Quality	SUM
Geometric Mean	0.8939	0.3057	3.6539	4.8589

**Table 8:** Coefficient sub criteria values of stability criteria

SUB CRITERIA	Longevity	Type of building	Quality
coefficient	0.1840	0.063	0.7531



**Table 9:** Evaluation matrix for measuring capacity

QUALITIES	NETWORK	CORRIDORS	NODS	INSIDE NEIGHBORHOOD	BEYOND NEIGHBORHOOD	NEIGHBORHOOD	SERVICE RATE	LONGEVITY	TYPE OF BUILDING	QUALITY
Water land	Very poor	Poor	Poor	Excellent	Very poor	Very good	150	35	Improper	Very poor
Good land	Very good	Excellent	Excellent	Average	Very poor	Very good	600	35	.	Very good
In use	Poor	Excellent	Excellent	Average	Poor	Average	1750	30	.	Excellent
Water	Excellent	Average	Very good	Average	Very poor	Excellent	13500	30	.	Very good
Gas	Excellent	Very good	Very good	Very good	Very poor	Excellent	10000	25	.	Very good
Electricity	Excellent	Excellent	Excellent	Excellent	Very poor	Excellent	10000	35	Proper	Very good
Street network	Excellent	Average	Average	Poor	Very poor	Average	3000	15	Improper	Very poor
Contacts	Excellent	Excellent	Excellent	Excellent	Very poor	Excellent	10000	30	.	Excellent
Park and Green places	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	.	.	.	Very poor

**Determination of capacity (cases)**

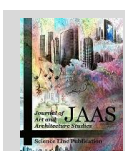
After determining the criteria and sub criteria the importance of capacity (cases) is determined. The priority of each capacity (option) in connection with each of the sub criteria being judged, if there is not any sub criteria (such as service level) to directly measure. This judgment is based on the scale of 9 hourly quantitative of 1. In comparing capacities associated with each of the sub-capacity rather than to what is more

important, it is important that which one is the preferred capacity (Table 9).

The process of calculating weight (value coefficient) of capacity (cases) with respect to each of the sub criteria is as calculating coefficient ratio of the target. At the follow, evaluation matrix of any capacities associated with each of these sub criteria and service means are provided (Table 10).

**Table 10:** Coefficient of existing capacities neighbourhood

CAPACITIES	POSITION			FUNCTION AND ROLE			CAPACITY			
	COMMUNICATION NETWORK	CORRIDORS	GROUPS	INSIDE NEIGHBORHOOD	BEYOND NEIGHBORHOOD	NEIGHBORHOOD	LEVEL OF SERVICES	LONGEVITY	TYPE OF BUILDING	QUALITY
WASTELAND	0.0946	0.1428	0.1368	0.2358	0.0685	0.2657	0.0196	0.1842	0.0469	0.12
EXTRACTATION LAND	0.1121	0.1859	0.1780	0.2107	0.0685	0.1858	0.0276	0.1632	0.0325	0.366
LAND IN USE	0.1515	0.3361	0.2497	0.1143	0.0522	0.1496	0.0476	0.0974	0.0353	0.0555
WATER AND WASTEWATER	0.0713	0.13	0.1176	0.1012	0.2943	0.1172	0.3089	0.1405	0.2361	0.1577
GAS	0.0755	0.0379	0.0356	0.03	0.2305	0.0329	0.1632	0.0830	0.2361	0.1577
ELECTRICITY	0.0467	0.0475	0.0492	0.0549	0.1857	0.0673	0.1632	0.1727	0.1125	0.1577
Street Network	0.1792	0.086	0.0888	0.0472	0.0414	0.0527	0.0846	0.0324	0.0407	0.1852
Contacts	0.012	0.0211	0.0592	0.1936	0.032	0.043	0.1695	0.11	0.2451	0.12350
Park and green PLACES	0.012	0.0127	0.0843	0.0117	0.0203	0.0863	0.16	0.016	0.0143	0.1057



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### Determine the final Capacity score (cases)

At this stage, the combination of coefficients of criteria and sub criteria associated with this study and coefficient value (rated) of capacities, the final score of each capacity will be determined. For this purpose, the hourly hierarchical composition is used that led to a priority vector, taking all his judgments are in all levels of the hierarchy. As seen, water and sewage capacity, rated highest capacity and parks and Green spaces are the lowest rated.

### Considering the capacity of the model of sustainable urban development

The final score of each of the capacities are in the table below according to the results of the evaluation indices of community development principles and objectives of neighbourhood development based on sustainable urban development (Table 11).

According to the table undeveloped land the lowest score (0.037) and space use the highest score (0.35) hold. This indicated that undeveloped land in sustainable urban development pattern

does not exist or is very low and spaces in front of the highest efficiency in the areas of residential and mixed use are undertaken.

### Comparison of existing capacities in the neighbourhood (Ghatarchian) with sustainable urban development pattern

Comparing the final score of each of the capacities of the existing model with sustainable urban development defines that final score of capacity of undeveloped land and the land with ability to extract is high compared to the model of sustainable urban development which indicating that the population estimates and the acceptance of new applications for the neighbourhood. The final scores in neighbourhood in use are far lower than the final score in the capacity of sustainable urban development pattern and it is indicated that the areas are in the neighbourhood are with a much lower performance towards sustainable urban development patterns. Urban infrastructure, except in the grid of streets and parks and green spaces in the neighbourhood (Ghatarchian) all are equal with pattern of urban sustainable development.

**Table 11:** The final score for each neighbourhood development capacity based on sustainable urban development model

PARK AND GREEN PLACES	CONTRACTS	STREET	ELECTRICITY	GAS	WATER AND WASTEWATER	SPACE IN USE	GOOD LAND	WASTE LAND	CAPACITY
0.25	0.15	0.25	0.15	0.15	0.22	0.35	0.047	0.035	FINAL SCORE

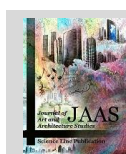
## CONCLUSION

Neighbourhoods formed based on past time needs and answered the needs of people in its time Due to the high population density in urban areas, rare and expensive land, and most importantly, reduced household size and number of households living in a dwelling unit, provided the model for the reuse of land and existing capacities in the areas necessary to give. Neighbourhoods of our cities have capabilities that can be provided with appropriate strategies to deal effectively with the capacity to act. This research was that existing capacities (physical capacities were selected as samples) at the neighbourhood level (Ghatarchian) covered and studied their capabilities can be examined. This capacity is based on the principles of urban planning based on the concept of sustainable development in order to achieve sustainable development practices applied.

### The results of the AHP analysis of the ability to identify potential

The purpose of this research is to develop a set of criteria; one of them measuring capabilities and capacities of sample introduction was attempted. And then applying AHP capacities were evaluated using the following results were obtained:

- The rate of capacity utilization (especially infrastructure) is about half the maximum power capacity.
- Capacities, these selection criteria will be assessed according to the criteria used to determine the capabilities and capacity: The Ghatarchian area between the water and sewer capacity and the greatest potential of park and green space and have the least capacity to achieve development.
- In the form of a practical process can be evaluated and the capacity to be a surplus



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population to accept the status quo could be specified.

- A clear hierarchy of capacity based on the final score of each of the various strategies for each of the potentials can be applied to achieve the goal.

- Revealing Rated capacity result in sustainable urban development model and compare it with existing capacities scores were known in the neighborhood Ghatarchian.

**Table 12:** Solution with respect to any of the capacities

Infrastructure					Spaces				CAPACITY
Park and Green Spaces	Gas	Connects	Street Network	Electricity	WATER AND WASTEWATER	LAND IN USE	EXTRA LAND IN USE	WASTELAND	
Creation	Preserves ion	Preserves ion	Preserves ion	Preserves ion	Preserves ion	Preserves ion	REMOVE AND CREATIO NEW	REMOVE AND CREATION NEW	SUGGESTED STRATEGIES

### Suggested strategies:

- Spaces: the potential capacity of its three undeveloped land, land capable of being used and extraction lands.

- Undeveloped land: the capacity to remove and replace the housing and mixed-use develop.

- Earth extraction capability: the capacity to remove and replace the use of residential, mixed-use parks and green spaces, and opening occurs.

- Space in using: this type of strengthening capacity and improving the quality and quantity that must be considered.

- Infrastructure: The capacity of six potential water and sewage, gas, electricity networks, roads, telecommunications, and parks and green spaces are open.

- Water and wastewater: The capacity should be maintained and that it is best to practice and revise its benchmark interest method.

- Electricity: The capacity should be maintained.

- Street network: the capacity to be strengthened and the quality standards of the city can be promoted.

- Contacts: The capacity should be maintained.

- Gas: The capacity should be maintained.

- Parks and green spaces and open areas is not available in this capacity. This capacity should be deleted according to the rules and principles of urban planning capacities, and inappropriate inertia, develops.

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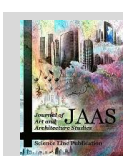
Infrastructural capacities in this area are somewhat consistent with sustainable development model, only two networks infrastructure and parks and green space deficiencies occur.

### Suggested strategies in the treatment of capacity

Here, according to the rated capacity of each of the proposed solution is presented (table 12):

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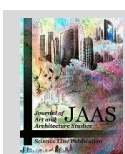
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