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Studying the Structural Effects of High-rise Construction on Urban Environment Sustainability

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Abstract
Nowadays, High-rise Construction phenomenon is extremely developing in all around the world; this is because of house shortage and population growth. From urbanism's point of view, this phenomenon has hidden dimensions and also plenty of complexities. Aggregation increasing and creating tall buildings, are the main policy that have been emphasized in developed urban designs; till it can be an answer to growing population's settlement. Besides, Sustainability is propagated in all dimensions that the stable city is one of these dimensions and lets its settlers to estimate their needs and increase their welfare without threat current and future people's life. The purpose of this research is studying the effects of "High-rise Construction" on urban environment Sustainability that is used analytic-descriptive method. First, we review visionary principles and the stable city and tall building concepts; and then the parameters of each one are compared via check-list (dual matrix) separately and finally, the final parameters of this research are reached. At the end, the final parameters are segmented by: structural, aesthetics and availability scales. Scales of these parameters are evaluated on Janbaz Boulevard that in recent years, High-rise Construction has been advanced in this place. The results show that compulsory imposition to build tall building on city structure, in addition to disarrange the physical balance of cities, result in other problems. However, the "compact growth" is one of stable city's principles. So, tall buildings have negative effects on city space that result in un-stability of city. Yet, according to population growth, High-rise Construction phenomenon is an obvious problem and this problem is only evaluated positive when tall buildings are stable.

Key Words: Construction phenomenon, house shortage, population growth, urban environment

1.Introduction

Todays, in lots of cities in around the world, the basic and necessary problems such as: Traffic, land aggregation, desolated buildings, land application changing and lots of environmental problems are proposed on cities Sustainability (Maleki, 2003). Cities have an important role on Sustainability increasing and it is recommended that cities should be noted as the main point for solving the global problems and reaching to Sustainability and constancy (Heydari, 2013). In Dehkhoda's dictionary, "Sustainability" means resistance, tolerance, assiduity & persistence. This word, as a development descriptive, is equivalent to a situation that the idealistic and equipment don't reduce during the time and is implicate on long term strength (Zahedi, 2007). In a dynamic system like human society,basis, Sustainability means "balance stability during time" (Muldan&Bilharz, 2000). Hence, Sustainability is

the process that outbreak people, organizations, natural sources and ecosystem and consist of changes in behavior, attitudes, consumption models , purchase customs and understanding and ranking ecosystem. Emersion of Sustainability concept in 1970 decade, is a result of logical growth and new intelligence respect to improvement and environmental global problems that really focused on Sustainability subject since Branteld commission (starter of Sustainability improvement subject) and after that, in Rio conference (1992), human settlement congress (1996) and global congress on stable improvement (2002) in relation with principles of Sustainability, expressed manifestos that had 21 important documents on earth congress. Urban builders can play an important role on subjects related to Sustainability and editing some general solutions for achieving a stable city (Bahreiny, 2008). Urbanism position in city Sustainability is presented from construction dimension; because proficiency of urban builders in the field of urban planning and designing can realized via intervention to city construction. Hence, in this research, construction dimension as one of urban Sustainability dimensions is expressed.

Sustainable city has some complete definitions from different viewpoints. In this research it is attempted to achieve a unique definition via studying the different definitions of Sustainable city, targets and solutions that are proposed for Sustainability. According to following table, a Sustainable city can defined as: the concept of Sustainable city is a very valuable and hopeful concept that provides people to remove their needs and increase their welfare without any threat for people's today and future. Also Sustainable city is a city that improves the public life level of the people via social and economic opportunities increasing and doesn't have any undesirable effects on environment. Normally, tall buildings use lots of energy during structure process and also during exploiting and even when reach to their end of life and destroyed, have a lot of energy to waste. So, basically, they are opposite to Sustainability targets. but, according to necessities that now lead to propagating High-rise Construction, it is necessary that city builders research on reducing the negative effects on environment (Yeang, 2007).

A main part of future population growth and settlement need in an area or city can be estimated by: loading the empty textures of city, aggregation increasing, reconstruction and repairing the old and timeworn areas, revival and changing the application. One of the most important targets of Sustainable city is that it should use the lands of inside the city before using or destructing the main natural lands or the lands around the cities. In such a way, the sprawl growth can't compatible with Sustainable city's target; because this kind of irregular development, makes a long distance between settlement place, work place, shopping centers and play centers and as a result, this far distance makes more dependence on personal cars. High-rise Construction is a global phenomenon that started since end of 19th century and beginning of 20th century. At first, High-rise Construction was as a human action to space shortage and also the sovereignty's power to boast their economic powers. But towers, in addition to business role, found settlement role in such a way that in the next decades, settlement towers were more that official and business towers (Farhudi, 2001).

According to Management and Planning Organization of Iran's reports on tall buildings: "each building that its height (orthogonal distance between the floor level of uppermost occupancy stage to the level of undermost available stage for fire station) is more than 23 meters, is known as a tall building". Based on Ministry of Housing and Urban Development of Iran, the concept of tall buildings is buildings with 6 floors or more than 6 floors. Tall buildings emerged after decade 40 in Tehran and after decade 60, had been got many times than 2 past decades (Karimi, 2004).

Analyzing the effects of High-rise Construction needs to pre-defined parameters and scales. Hence, a set of parameters of tall buildings that affect surrounding physical environment can be divided as follows:

Table 1
Dimension of Sustainability

	Sustainability targets	Sustainable solutions	Sustainable city's definition
World Commission of Environment & Development (WCED) - 1983	♦ social and Economic opportunities increasing ♦ decreasing the energy share in urban growth ♦ optimum utilization in water, land and the other sources ♦ minimizing the production of rubbish & sewage and maximizing recovery from waste ♦creating management systems with enough power & efficiency in order to achieving to environmental, social & economic targets. ♦ leading the city-related technology to stable improvement targets ♦reinforcing the power of different areas of city in order to preventing or answering to threats and environmental, social & economic targets.	♦increasing social and Economic opportunities in such a way that cover all of urban settlers. ♦ decreasing the energy share in urban growth ♦ quantity decrease in water, land and the other sources that are need for this development ♦ minimizing the production of rubbish & sewage and maximizing recovery from waste ♦ creating management systems with enough power & efficiency in order to achieving to environmental, social & economic targets ♦ leading the city-related technology to stable improvement targets ♦ reinforcing the power of different areas of city in order to preventing or answering to threats and environmental, social & economic targets that are results of natural and human parameters	Sustainability is not a stable and achievable position; but also is a process of changing natural sources usage, capital management, technology development tendency and organizational revolution in such a way that is compatible with current and future needs
Bahreiny (2001)	♦ improving the public life level and more welfare future and also ecosystems preservation ♦ dense and proficiency application, less cars, more availability and efficiency in using sources ♦ less pollution and waste material, natural systems revival, suitable house and life area, healthy social ecology, stable economy, people partnership, culture preservation and local tact	♦ Large amount of people outbreak in order to urban (or an special area) long term healthy improving ♦ studying the ideas and successful samples in different parts of the world, is an effective work for achieving to kinds of possible solutions ♦ providing and editing the functional standards and Sustainability parameters are effective in measurement and judgeship respect to development to long term targets and reviewing the programs and politics	Sustainable city is a city that has such an economical base that not only has the least undesirable effects on environment; but also is very effective on revival and improving the quality level. In other words, Sustainable city, is a city that more than normal and limited solutions, has focused on environmental and social problems and sees them by a complete and wide view
Sarrafy&Azizy (2003)	♦ Minimizing the un-revival natural sources utilization ♦ stability of un- revival natural sources utilization ♦ sustaining the pollutions and wastages production in the level of national and global absorb density ♦ Providing Social and human needs	♦ decreasing the reliance to cars (specially personal cars) in transmission process ♦ increasing the construction revival of urban improvement ♦ conservation of natural systems compression in city and area around that	In a Sustainable city, social equanimity is started and the possibility of qualified life is provided. Also this kind of city has the form that less sources such as energy is used. The urban networks areeffective and rivalry and have high sufficiency for human life

Source: Authors, 2014.

❖Influence on urban environment turnover: influence on foundations, streets network and other services, city equipment and revolution in some urban turnovers.

❖ Influence on city space: shadowing, wind direction change, hurricane creation, creating trouble for adjacent buildings settlers.

❖ Influence on environmental pollutions: air and noise pollution (especially solid particles propagation) during manufacturing and environment pollution due to wrong excretion of home Waste and urban Wastewater.

❖ Influence on urban feature: influence on surface and urban feature because of height, scale, form and the amount of towers conformity with around environment (Aminzadeh, 2000). Besides positive effects on population and house shortage, High-rise Construction phenomenon has some negative effects. These effects are presented briefly via antivood point of view.

Structure Sustainability presented for the first time in Branchland commission called "our common future" that can be followed in one environment and hard economical and possibility background. But this situation cannot be observed without any availability to expense sources, costs designation and revenue. In following the structure Sustainability in 1992 at Rio conference named "providing Sustainable human settlements, this subject was stated that [urban environment sustainability] consists of problems like informal settlements reinforcement, earth application planning in order to preventing "urban lateral expansion" to agricultural lands and vulnerable areas. According to population growth and house shortage, tall buildings introduction in city is one of compact's city resolutions that obeys the principles of Sustainable cities, from energy economy and effective availability point of view. Sustainable city has special structural principles and targets; presenting this approach in tall buildings can result in tall buildings Sustainability and at the end, it will lead to city Sustainability.Sustainable cities have least adverse effects on production and natural environment during the building's life and areal and global pitch. Sustainable city emphasizes on 4 subjects: suitable efficiency, energy qualities & efficiencies (consist of green house), preventing the pollution (promoting the inner air quality and pollution decrease) and adjustment with environment (environmental estimation and recognition) (Malik M. A.Khalfan).

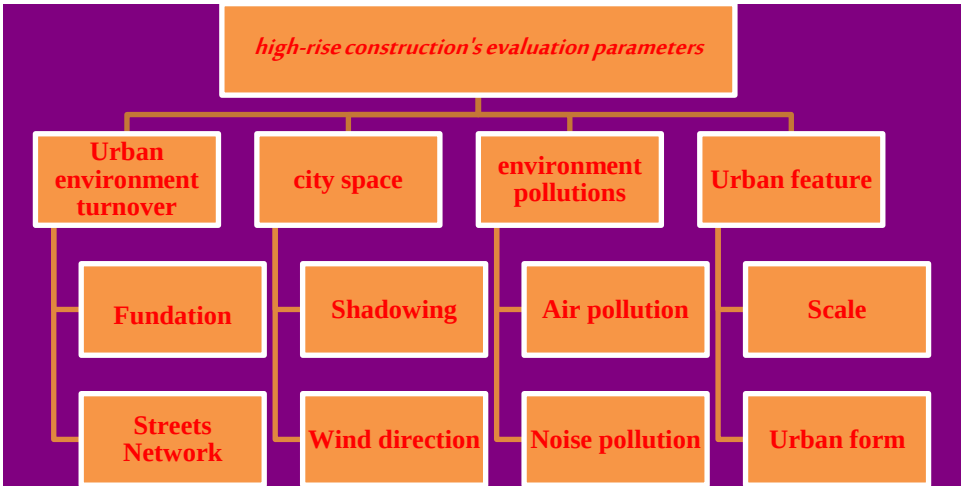


Fig.1. The parameters of High-rise Construction's evaluation

Table 2
Negative & positive properties of High-rise Construction from Antivood's idea

High-rise Construction (positive properties)	High-rise Construction (negative properties)
More Compact cities- transmission reduction	Using more energy and material for building in height
Land optimum usage: According to population focus, reduction of improving around the cities & environment harm reduction	Using more energy for elevators (up to 15% of total building's energy)
Intensive cities- urban foundation networks reduction	Using more energy for maintenance and cleaning the building
Less inside trips- less time waste	Negative effects in city scale (storms, wide shadowing, light locking
Power and possibility to make buildings with many applications	High population aggregation in special places (open space shortage,pastime spaces &…)
Wind more velocity in height (more ability for wind energy efficiency)	More pressure due to the wind in height (effect on size & dimension of surface and structural elements
Narrow and long stages-more possibility for taking natural light from the outer space	Closed & isolated spaces in height (more need to air ventilation)
Space in the sky- possibility of snug, calm &solitude; city view	Safety problems & safety in height (during building process for operators)

Source:Daneshpur, 2009.

2. Case Study Region

Mashhad covering an area of 204 sq. km, for centuries, has been an important trade center and junction point on Silk Road caravan routes and highways from India to Iran and from north to south between Turkmenistan towns and Sea of Oman. At the beginning of the 9th century (3rd century AH) Mashhad was a small village called Sanabad situated 24 km away from Toos. Today, Mashhad is the capital of KhorasanRazavi Province of Iran (Fig. 2). It is one of the most important cities because of its religious, historical and economic values that attract a large number of people each year. In 1986, its population was 668,000 whereas its current population is about 2.8 millions. Since 1987, built-up areas in the city have expanded significantly (Rafiee, 2007); the city has witnessed a rapid growth in construction which has caused destruction of green spaces areas. This trend in the urban park is in sharp contrast with the rules governing improvement and establishment of new urban parks within the current boundary and the projected future of the city. In fact, municipality closely attends to the urban parks and scrutinizes even single tree uprooting. On the other hand, there are nongovernmental organizations and the general public who watch the trend carefully and exert controlling effects on public urban parks removal. In addition, the provinces of Iran are all under extensive land use evaluation and planning, the results of which will be available in near future. The application is mostly environmentally oriented giving high value to public urban parks and aims to upgrade the per capita green areas in the newly built regions. However, there are other players in the filed including major private stakeholders who have influence in deciding the physical and biological properties of built-up area development plans.

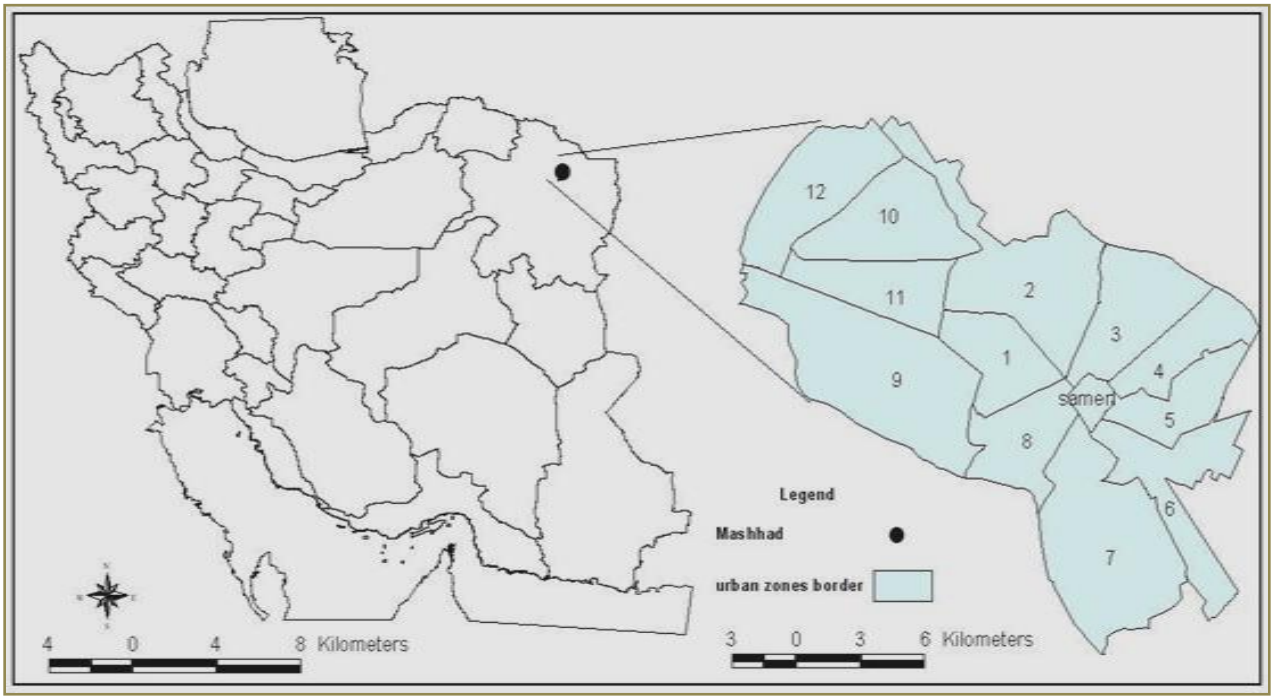


Fig. 2. Case study Region.
Source: authors adopted Rafiee& et al, 2009.

Table 3
Structural Sustainability's parameters

	Parameters	Sub-parameters	Background
Structural sustainability parameters	**Structural – turnover form**	Texture particle size Scale Different types House Family aggregation in unit Residential Buildings quality Compatibility Designing turnover form	❖ Particle size above 200 m^2 ❖ Proportion of human scale with building aggregation, restriction ❖ Variation of occupancy models ❖ equal to one ❖full frame (steel frame & Reinforced concrete) ❖Applications compatibility, aggregationintensitycorrespondence with streets capacity ❖layout, participant with around environment (topographic, continental& plant cover ❖ Shadowing ❖continentalcompatibility
	Availability	Pedestrian availability سوارهavailability Physical & visual relation Public transmission	♦ safety, availability simplicity, Pedestrians direction (legibility) ♦ traffic, parking ♦ penetrability ♦emphasis onPublic transmission
	Aesthetics	Trees & green spaces Material & surface	■ kind of plant cover, specified space for green space ■Sustainablebuilding material from renewable sources &compatible with the environment instead of un-renewable material, conformitywith around buildings, skyline

3. Research method

The research method is descriptive – analyzing that is used in two phases. At the first phase, the parameters of urbanSustainabilityassessment and High-rise Construction are determined based on studying that has been done in research. Based on these works, High-rise Construction's parameters that are related to urban Sustainability are compared via check-list (binary matrix) and final parameters are reached in research approach. at the next phase, the effects of each variable related to tall buildings in Janbazboulevard in Mashhad is researched via field studies

and also expertstudies to determine how much effects have these tall buildings on urban Sustainability; and which parameters can lead to urban un-Sustainability.

Table 4
Sustainability and High-rise Construction's parameters check-list

Sustainability parameters / High-rise Construction parameters	Scale	Texture particle size	Pedestrian availability	Building aggregation	Buildings quality	Application adjustment	hemisphere compatible designing	Surface & material	Trees & green space
Dominance	Partly dependent	Completely dependent	Partly dependent	Completely dependent	neutral	Partly dependent	neutral	neutral	neutral
Urban aspect	neutral	neutral	neutral	neutral	Completely dependent	neutral	Completely dependent	Completely dependent	neutral
Building aggregation	Completely dependent	Partly dependent	Completely dependent	Completely dependent	neutral	Partly dependent	Completely dependent	neutral	Partly dependent
Adjustment	Partly dependent	Partly dependent	Partly dependent	Partly dependent	neutral	Completely dependent	Completely dependent	neutral	neutral
layout	Partly dependent	Partly dependent	Partly dependent	Completely dependent	neutral	Completely dependent	Completely dependent	neutral	Partly dependent
Street width	Completely dependent	neutral	Completely dependent	Partly dependent	neutral	Partly dependent	Partly dependent	neutral	neutral
Pedestrian availability	Completely dependent	neutral	Completely dependent	Completely dependent	neutral	Partly dependent	Partly dependent	neutral	neutral

Completely dependent | Partly dependent | neutral

Table 5
The parameters of High-rise Construction assessment via structural Sustainability approach

	Scale	Sub scale
The parameters of High-rise Construction assessment via structural Sustainability approach	**Availability**	Street width Pedestrian availability Limitation Dominance
	Aesthetics	Surface & material Form &configuration Skyline
	Structural - turnover	Texture particle size Building aggregation Compatibility Human scale

4. Research confine & zone

Mashhad is the second metropolis of IRAN with more than 2,400,000 people up to 2006 and almost 294 square kilometers surface in north east of Iran (Parsomansh, 2009). The Holy Shrine of Emam Reza results in this cityreceive each year more than 20 million people as traveler and pilgrim and also almost 240,000 tourists from other countries. Mashhad is divided in to 7 service areas that JanbazBoulevard is our research zone in the middle-western area. The middle-western area is one of special areas for tall buildings that the settlement model in that area is 2 to 4 floor flats. In recent years,High-rise Construction phenomenon in this area has grown. In this area, special paths like JanbazBoulevard are affected of this phenomenon.JanbazBoulevard, as a main site of High-rise Construction of Mashhad, takes more tall buildings each year and this process leads to selection of this boulevard as the researched area. The applications of Janbazboulevard are mainly business that Proma, Kian center and Qatar airline tower can bementioned, that are showed in following picture.

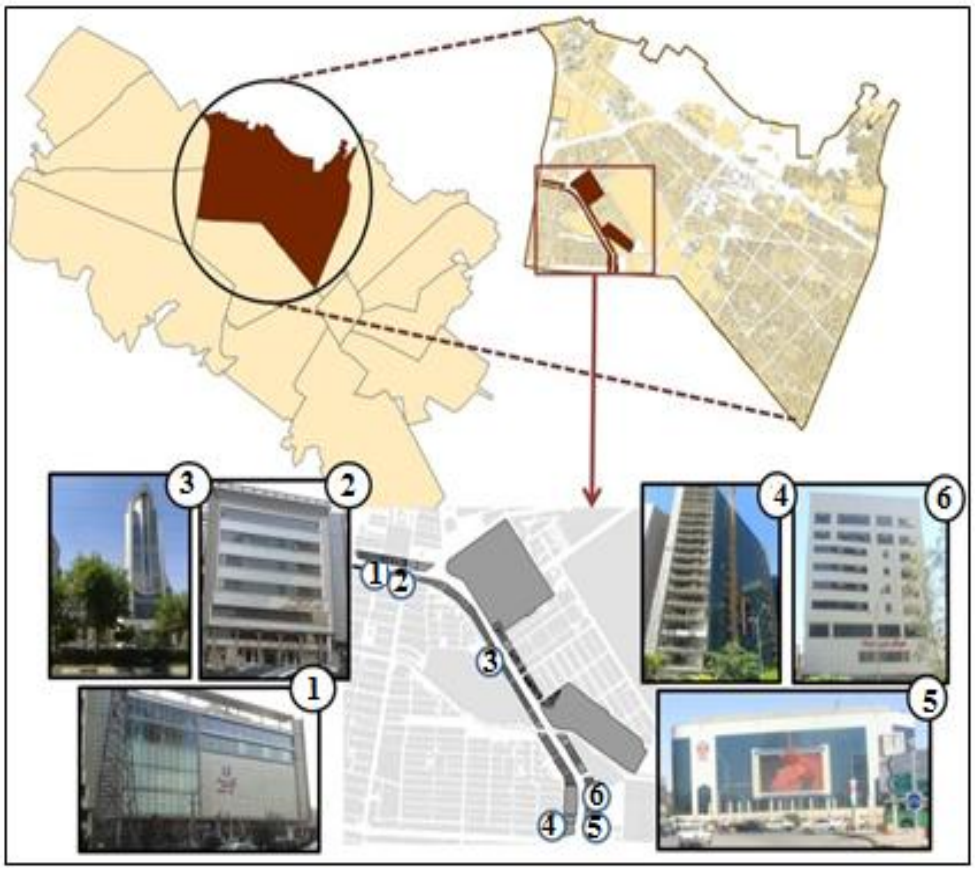


Fig. 3. High-rise Construction on Urban Environment Sustainability

5. Segmentation of researched location

In order toSegmentation of researched location, two layers consist of application and availability network are put on each other till the common parts observed as a unit segment. Based on this principle, JanbazBoulevard divided in to three segments A, B & C that tall buildings are in segments A and B and in segment B, there are sterile and obsolete lands.

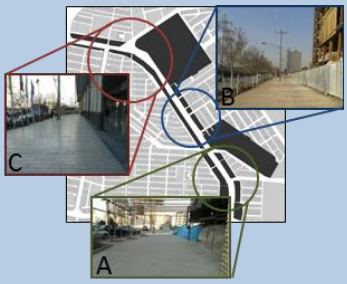
5.Analysis

In this part of research, according to achieved parameters in research approach, case study area (JanbazBoulevard) was analyzed:

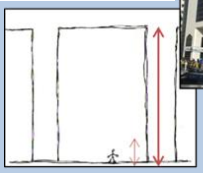
5.1. Availability system

The parameters of network can be analyzed via different subjects such as network place relationship with applications and activities and traffic problems; that in this research, it is analyzed by Pedestrian availability sub scales, Streets width and limitation. According to position of tall buildings, the Streets widthand Pedestrian availability situation is analyzed on each segment.

Table 6
Availability system in the case study region

	Sub Scales	Analyzing Janbazboulevard segments			Visual statement
		Segment A	**Segment B**	**Segment C**	
Availability	**Streets width**	Width of the main street of Janbaz is 60m. according to tall buildings in segment A (Proma&Nika shopping centers) it can said that the width of the main street is compatible with tall building's applications	In this segment, some tall buildings are in preparing phase and there is just Qatar airline tower that the main street width is compatible with that's application. Janbaz 7th with 16m width is suitable for tall buildings	Tall buildings in preparing phase with different official and business applications that are compatible with secondary street's width (Janbaz 9th and 11th)	 مقطع عرضی خیابان جانباز AA"
	deduction	Width of the main and secondary streets, are compatible with tall building's application (city scale) and is formed based on Sustainability principles			
	Pedestrian availability	In segment A, a discrete path is determined for pedestrian people transmission that result in availability simplicity	In this segment, somesnags like lamp-posts and car balustrades, are troublemakers of pedestrian people	In this segment,Width of the main street is suitable for pedestrians. in this segment, The wastelands lead to people propensity reduction to walking.	
	deduction	According to the width specialized for Pedestrian availability, it can said that in this boulevard, it has been paid attention toPedestrian's need and just wastelands and rigid walls result in people propensity reduction to walking; that it is a negative factor for this area.			
	Desirable limitation	In segment A, the width of main and secondary streets is compatible with the building's height	In segment B, the limitation is ½ that is desirable andalsotiny spaces like trees lead to limitation in all over the area is indeterminable	In this segment, some parts of sidewalk has roof and this results in limitation	 محصوریت نامناسب
	deduction	According toSustainability properties, urban apace should have suitable limitation that among researched segments, it has just undesirable limitation in segment C			 محصوریت مناسب

	Sub Scales	Analyzing Janbazboulevard segments			Visual statement
		Segment A	**Segment B**	**Segment C**	
Aesthetics	**Surface material**	In segment A, most of the materials are made from glass and stone. Because Glass surface need more energy, this material is opposite to Sustainability principle	Since most of this segment buildings are in preparing phase, yet their material has not been formed and don't have any surface. Only Qatar airline building and the new built building beside that have glass surface		 نمای شیشه ای ساختمان های بلندمرتبه
	deduction	Tall building's glass surface result in emerging some non-Sustainable buildings in material's point of view			
	Building's forms	According to Francovasshay's idea, one of the most important problems on tall buildings' form is the effect of height in formation of this kind of buildings. In this boulevard, most of the tall buildings are in form of square and rectangular	According to the principles of Sustainability, it can said that the buildings that grow horizontal, have more resistance against natural disasters like earthquake and wind respect to vertical buildings		
	deduction	Most of the tall buildings in Janbazboulevard are vertical that according to the principles of Sustainability, this position is non-Sustainable			
	Skyline	**In southern framework**: in Janbaz street (segment A), most of the buildings are tall and the skyline is stairway-like. Thewastelands between these tall buildings results in this skyline. In north framework: buildings such as Proma, Nika shopping center and new buildings make an irregular and stairway-like skyline.			
	deduction	One of Sustainable city's properties is regular skyline that in our case study area, tall buildings and wastelands result in irregularity of skyline in south and north frameworks.			

	Sub Scales	Analyzing Janbazboulevard segments			Visual statement
		Segment A	Segment B	Segment C	
Structural	division	Division in this segment is in form of big grade because most of the buildings in this segment are tall.	Division in these two segments at the end of Janbaz street is middle and big grades that big ones are wastelands. Since there is no buildings, these two segments don't have any effect on this area's sustainability		
	Deduction	According to division in Janbaz street and sustainability position of this area, it can be concluded that since the lands are more than 200 meters, they are sustainable. Wastelands are opportunities for urban compact growth			
	Human scale	Since most of the buildings of this segment are tall, their scale and dimensions are not based on human scale	At the end segments, the tall buildings are dominant on human and people feel this subject when walk in front of buildings		Tall buildings dominance on human  
	Deduction	Tall buildings in Janbaz street are not based on human scale and there is no idea for reducing human scale dominance on people			
	Building density	In this segment, tall buildings are beside each other in the form of clusters	Wastelands in these two segments, provide necessary opportunity to compact growth based on sustainability principles		
	Deduction	Since the compact growth and preventing dispersal, is one of Sustainability city's properties. Based on Sustainability principles, it can be said that high compact buildings are necessary to reducing the need to out lands			Tall buildings cluster dispersal

5.2. Deduction

According to generalconcept of Sustainability, it can be said that Sustainable building is not only environmental Sustainability, but also that's other properties such as application, Aesthetics and availability should be Sustainable.New theories try to make a qualified space by emphasizing on Sustainability concept; making tall buildings with a mixture of natural, structural and population conditions, is a suitable answer to premium and shortages based on Sustainability's concept. Global tendency is around using more compact forms with different models. It means that if a suitable site is found for making tall buildings (according to environment continental, Aesthetics parameters, availability, and application conditions), it can be said that we will see some qualified and Sustainable buildings.

A complete recognition of city in a special place is provided for us. We can achieve some results about the position of city Sustainability in JanbazStreet via collecting the negative and positive properties of tall buildings and comparing with the properties of a Sustainable city. In JanbazStreet, availability system is the most qualified property among all properties; because according to these researches, this case study has Sustainability conditions, in such a way that thisStreet width iscompatibleto application and the height of buildings. So, it can be seen that there is a suitable limitation is the main and secondary streets. In Aesthetics system, space structure of Janbaz street play an important role on this street's Sustainability. In this way, the shapes of buildings are vertical and rectangular and those materials aremade of glass that is opposite to Sustainability principles. According to researches on tall buildings structure, in structural system, it can be said that the shape of this street is due to different factors that should lead to itsSustainability and also result in environment, social and economic balance. In high-rise Construction in this area, human scale had not been regarded and the built space in dominant on human.

Up to now, urban Sustainable development of Mashhad has been based on two complete designs: Khazeni (*1966-1991*) and Mehrazan (*1992-2016*) that resulted in urban diffuse growth and emphasizes on application severance and segregation. According to compact forms scores, that one of that samples has been done in JanbazStreet, compact urban Sustainable developmentcan be done. So, in the next planning and developments, it shall emphasized on strategies that can lead to compact city model and alsohigh-rise Construction's policies in logical limit, urban density increase, preventing the lateral growth of city specially in adjacent urban settlements. One of the most important urban planning principles is environmental quality preservation that its aim is to increase the desirability of structural space for work, life, pastime and also cultural, social and economic applications.

5.3. Strategies presentation by systems segregation

5.31. Availability system

■Urban life simplicity via increasing the availability to tall buildings; because in order to reach city Sustainability, it is necessary to provide some conditions that the people live near to services centers and other life's equipment. This can be provided via mixed applications in buildings

■All the snags in sidewalks should be moved in order to people persuasion to walking

■ The height of buildings should be compatible with street width till it can avoided to unsuitable limitation

■ Providing special way for bicycles in JanbazStreet and reducing the personal car usage, leads to JanbazStreet's Sustainability

5.3.2. Structural system

♦ Urban space should not only surrounded by tall buildings. It is better that urban space surrounded by buildings with human scale and dimensions and tall buildings brought to behind places.

♦ Making compact city in order to reducing the use of personal cars, is possible by increasing building density

♦Providing some equipment such as green space in JanbazStreet, results in decreasing tall building's effrontery on human.

♦Wastelands around JanbazStreet can be used for green spaces.

5.3.3. Aesthetics system

✹To prevent changing the scale and inconsistency creation in urban aspect, in composition of tall buildings and short buildings, it is necessary to use middle scales. The empty space between two tall and short buildings should be open space or green space.

✹In order to creating more desirable and more human view to tall building, it is more suitable to provide some equipment

✹It is possible to assume some criterions for color usage in tall buildings in order to balance between application and culture.

✹It is necessary to usegreen roof on tall building in order to air condition

✹From aesthetics' point of view and also the area application (effect on adjacent texture), it should keep tall building's proficiency on adjacent buildings.

✹ Using some materials like stone can result in energy waste reduction in tall buildings.

✹ Using lateral shapes in tall buildings leads to natural disastervictim's reduction.

According to represented strategies, it can be said that if urban planning and designing can use these cases, or a part of that, in creating urban structures, it will be a social architect and will help to urban life quality promotion in a Sustainable city.

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