

## Smart growth with an emphasis on the walkability (Case Study: Rahnamayi Street - Mashhad)

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### ABSTRACT

Urban planning approach has performed in recent decades to revive the issue of the possibility of increasing the walkability of cities. This paper aims to investigate the walkability matter according to the principles of smart growth in cities with global experiences and point to the place of street performance as a significant element of the urban space and in this regard pay attention to express criteria and suitable solutions to enhance walkability. This article is in several-steps as follows: 1- The issue of walking and pedestrian paths. 2- Expression of internal and external presented solutions 3- Choosing the Rahnamayi streets as a case study and provide short-term and long-term solutions.

**KEYWORDS:** sustainable development, smart growth, walkability, social interaction

### INTRODUCTION

With the creation of the industrial revolution, the dominance of cars and transportation technology development people's kind of life were changed. So that until that time, urban areas are based on the human scale and pedestrian movement, but after that the human being as the main user of urban spaces had forgotten. In developed countries, measures for peace and safety of pedestrian beside cars were taken into account. But unfortunately in developing countries, such measures have not been taken into account. Create paths for walking with suitable physical space for access to various points in all traffic network is essential. Some urban streets incorporate a large number of applications along themselves. And people by referring to these places are able to travel on foot and carry out their daily activities. Conditions in these passages should be in order to create a conducive and safe environment traffic environment for pedestrian movement and provide an environment that in addition to movement and relationship between the paths dynamism and vitality is gone, so that these spaces meet all the demands of citizens and citizens are liberated from the bustle of urban life and meet their needs along with recreation and entertainment.

#### The general framework

Sustainable development is because of awareness of global links, between the growing environmental problems, social issues, economics, poverty and inequality, and concerns about a healthy future for mankind. Hopwood, et al .[1]: 38-39. Urban Smart Growth as a response to the continuing problems of urban sprawl and uncontrolled growth of cities was proposed .Smart growth in the 1990s in continuing the issue of city growth management in the 1970s and 1980s, had used in programming was arose .This theory, concentrated growth in urban centers to prevent uncontrolled urban expansion and support compression, public transportation, walkable scale, mixed land use, walking and cycling and a variety of housing and schools in the neighborhood scale[2]. Pedestrian ways are streets with the highest social role that pedestrian have complete mastery and motor vehicles used only to serve current passages. Pedestrian ways are tools for the development of collective action.[3]

### MATERIALS AND METHODS

This research is done in several steps as follows : first, we study the issue of walkability and walk able in general and subsequently we talk about a successful foreign model and its solutions and following that, a domestic model together with its solutions and strategies are explained in order to troubleshoot it. Finally, we go over the

subject under study (Rahnamaee street) and provide short- term and long term solutions considering the experiences gained from foreign and domestic models.

## RESULTS

By studying the above comments we concluded that all of authors except Le Corbusier know the street belongs to the people, and consider pedestrian as an integral part of it. And with respect to human scale in the streets and create attractive visuals and also by emphasis on social role of the street and its supervision by the people, considered lively, readable and safe place for him.

1. In this case, there is a holistic approach toward process of designing.
2. Interactive view among interest groups and influential involved in implementing street projects, composed of the employer, institution, executive, consultant or designer and people from the beginning to the end
3. Following models and popular and successful theoretical bases in the hierarchy of planning
4. Giving Integrated design assignment to central consultant institution or designer and avoidance of common parallel activities
5. In all existing schemes of policy-oriented and plan-oriented urban planning simultaneously are seen. Based on a series of norms and environmental central qualities in any project play leading role in organizing the space.

According to studies conducted on six examples of successful urban experiences in the main street of the city, the most important conclusions and judgments made are as follows:

1. In all projects there are a holistic approach of urban design to the process of doing projects
2. The implementation of many projects face with problems because of maximum bid regardless of the organizational system implementation
3. Interaction between interest groups and influential perspectives involved in implementation of street plans consists of the employer and the executive, consultant or designer and people from the beginning to the end
4. Follow the patterns and common theoretical and successful basis of urban design in plan designing hierarchy [4]
5. Assignment of the integrated design to the consultant or designer and the avoidance of common parallel activities
6. In all the existing schemes, policy oriented and design oriented urban patterns are seen simultaneously. Based on a series of norms and environmental qualities plays an important and leading role in organizing of space[5].

## DISCUSSION

### The historical background:

In the history of the expressed subject we discuss viewpoints of Le Corbusier, Jane Jacob, Gordon Cullen, Rob Carrier and Kevin Lynch on city streets and sidewalks, and the distinction between these views. Le Corbusier: the twentieth century architect, believes that the new man needs a new kind of street which will be regarded as a plant to generate traffic. Jane Jacobs: In the 60s of the twentieth century in the book of life and death of large American cities created big changes in urban and social planning orientation.

Unlike Le Corbusier his ideal street is full of strangers and people of different classes and age groups with different beliefs and ways of life. Gordon Cullen: In 1961 the in book titled "urban landscape" pointed out to this point that the art is creating visual and structural integrity of all the factors that create urban environment. Unlike Le Corbusier he also emphasis on pedestrians in cities and he knows scale of cities as human scale and human view point.

Rob Carrier: in 1975 in book titled "urban space" believes that city structure is composed of the street and Square and pay more attention to social role of the street from people perspective, however, pay attention to the need to visualization street walls and attention to human respect scale in street space.

### 1.Experiences of different countries in the field of walkability:

1. Essen, Germany, the leading European cities in the 1930s and created the first footpath in 1930 in Limbeker street.
2. The experience of Britain in the creation of walk path.  
Creating residential town without vehicle traffic have been one of successful methods in the UK, which one of the best examples of them is Edinburgh that has been used since 2000.

3. Edinburgh has the following features: a public space without vehicle traffic, crowded bus lines, available schools and supermarkets, children's play area, car clubs for essential use.
4. Copenhagen, Denmark, is a successful example of pedestrian city: change streets to fully pedestrian main roads, a gradual reduction in traffic and parking lots, parking lots transformed to public squares, compress and hold down the scale, respect for human scale, people living in the core, encouraging student life, landscape compliance with the change of seasons, promoting cycling, access to bicycles.

### **1.1.Foreign example:**

#### **R Street, the city of Sacramento (USA), April 2006**

R Street plays an important role in the development of Sacramento city. Development and promotion of this street is a valuable investment because it is an important street for access to downtown and cross light rail. Now the street has several strengths. As well as has the significant challenges ahead. The new design should maximize opportunities and reduce challenges as far as possible. R Street is placed in the southern part of central commercial part of the Sacramento city and ignoring the public area of street is the main problems of it. The purpose is changing the street from an old industrial area into a place with mixed use, new restaurants, art galleries and art studios. In addition to this, the street has historical identity and crossing the first urban railway track gives additional significance to it. R Street is one of the most important accessible streets in the city and the initial option to expand the TOD and locating public transportation[6]. There are traffic jams and cross streets in the street, facilitate access to the street and is considered an important issue for the street. Weaknesses and problems of street:

- Buildings and open areas that have been abandoned and neglected on the streets.
- Buildings that are abandoned and with unhealthy views
- Poor design of buildings and public arena
- Buildings that have turned to the streets.
- Many buildings have bad views with inappropriate materials and openings.
- There are inappropriate transport station
- Lack of adequate pedestrian access to stations
- Poor accessibility
- Lack of proper pedestrian communication on the street
- Inappropriate sidewalks of street
- Poorly designed infrastructure

The challenges that faced in this street are similar to problems in the similar studies, among them we can point to ignoring public arena streets and inappropriate sidewalks floors coatings and etc. Strengths of Street:

- Considering the path integration at the intersection of mounted and dismounted
- Pedestrian passages flooring at intersections to emphasize the continuity of walking route
- Use the ramp at the junction to ease the passage of people with disabilities
- Use of integration and low-cost materials in flooring and appropriate implementation

### **Iranian sample:**

#### **1.2. Ahmadabad – Mashhad path**

Ahmedabad Street is one of the main routes in Mashhad and is a streets with commercial operation and elements such as Homa Hotel, Malekabad garden and Zist Khavar center are presented there. We can say that it is consider the main path in the city and has required some of the important features of main pathways. In general, this project was conducted in two stages, the first stage that is the main part of an urban design project lead to designed solutions and command and control guide of the executive programs. The second step that is conducted after the adoption of policies, guidelines and thematic and local plans pay attention to detail executive design such as architecture details, civil, plant and equipment, urban furniture, landscape layout and like it[6].

##### **1.2.1. Ahmadabad Studies**

Range of project (including floor plan, walls and roof) Ahmadabad range is between Taghi Abad (Shariati) to Malek Abad (Palestine) for the length of 2.5 km. Ahmadabad path that is located in the middle western part connected to the city center of Mashhad and connecting to the Vakil Abad path, is one of the focal sensitive and

important points in city of Mashhad and the need for its transformation into a desirable urban space with elimination disorders is emphasized in this important path[7].

### **1.2.2. Geographical Studies**

Mashhad city is placed in extensive alluvial of Mashhad plains that has a relatively small constant slope. The immediate area surrounding the central area of Ahmadabad in western Mashhad Municipality 1 is often in the range. Surrounding inseparable area of Ahmadabad path that is located in the middle west of Mashhad often is considered in municipality range of Region 1.

### **1.2.3. Population characteristics**

In the meantime population studied in the direct area in 2006, were 1680 people and total population area is estimated 35,000 people (9210 households)[7].

### **1.2.4. Assessment of Physical Characteristics**

Given the importance of the Ahmedabad as the main communication artery from west to east and central part of Mashhad, we are witnessing the formation of transport infrastructure. The high width of the street allow high intensity of traffic to users.

### **1.2.5. Municipal wastewater**

Municipal wastewater generally collected by canals, and rivers and flows towards the Kashfrod River and only a part of it is transferred to the East for purification. Domestic wastewater is generally injected into the ground by absorption wells. In a few cases that absorption wells do not respond, after biological purification are transferred into the municipal wastewater[8]. Ahmadabad path and its range is currently don't have integrated network of sewage collection and its waste excreted by absorption wells. This issue has adverse environmental impacts. Now water and sanitation organization is responsible for collection of municipal waste water.

### **1.2.6. Disposal of surface water**

Ahmedabad St. and its surrounding area is without integrated network of surface water Disposal and guidance of surface water carried out by respect to the slope of the pathways and open raceways. River of Mashhad due to natural base has an important role in response to this issue. Surface water collection network of Mashhad, including open or closed raceways and the main part is composed of canals and drains (rivers). The flow of great canals and drains eventually be guided into Kashfrod River. After doing guidelines, collect surface water of this path is transferred to ToosAb Company. That this path is divided into northern and southern sides and on the south side as under surface and at the north side use of canivo proposed and implemented in the subsidiary.

### **1.2.7. Flooring**

Flooring of street especially on the southern side of the street has very poor quality and in most cases the floor covering of asphalt. Asphalt coating also has many holes that it has added the unfavorable aspects.

### **1.2.8. Urban furniture**

Except in the northern part after Taghi Abad Square, there are a few metal benches, in other places along the path of Ahmadabad no place is considered to sit of pedestrians. These places are necessary streets and increase the vitality of the streets. In addition can provide the opportunity to sit and enjoy the views of the street[7].

### **1.2.9. Green Space**

In view point of the social environment what is important about urban green space, is the amount of public green space it means the green space that public commuting are unobstructed in it.

### **1.2.10. Design solutions**

Urban design solutions of Ahmadabad path are the most important measures and solutions which transfer the total proposed policies on the tables in the previous section into lines and designs. Part of this strategies have been guidelines and recommendations and other part formed by prescribed and tagbible solutions. Based on it the urban design guidelines document of Ahmedabad as a powerful instrument for proposed plans, draw the lines and mention as place. Below are the most important measures and the design solutions that have been used in this document provided by separating each 5 areas:

#### **1.2.10.1 Strategies and measures of number one area:**

1. Assign the areas surrounding the Imam Reza Hospital to urban space in Taghi Abad Square
2. Green artifact wall making of Imam Reza Hospital adjacent Taghi Abad Square
3. Equip the front of the Imam Reza Hospital for the implementation and sustainability of the subway station
4. Maintain and strengthen the sign building exist in the corner of Taghi Abad Square because of its style and age
5. Define the gateway to enter into the path from Taghi Abad Square by increasing height and placement of vegetation elements

6. Creating cultural center in the old building place in the north of the path in order to strengthen the historical identity
7. Emphasizes of Behesht and Pastor streets corner by increasing the height and change in mass of building (according to the proposed views)
8. Creating multilevel Parking nearby Ghaem hospital to integrate parking space in the health context.
9. Opening of the Parastar path from the koohsangi Street to facilitate the movement and entry and exit of patients to health centers.
10. Change access of mounted and dismounted to Ghaem hospital from the south beside koohsangi street
11. Demolition and renovation of clinic at Behesht St.

**1.2.10.2. Strategies and action of area number two:**

2. Design mass of commercial - residential offer in adjacent pieces of Pastor Street
3. Create a visual - Detailed focal point in functional area of two and three areas against Neshat Street
4. Creating highlights on the corner of Ghaem Street
5. Changing Pastor-Parastar crossroad to three ways to strengthen social and emotional life of mounted person
6. Built pedestrian bridge against Subway Station 7 in Ghaem street
7. Embedding multilevel parking in the back layers of path, inside Mohtashami Street
8. Define the Aref path as a green path with high walkability
9. Increasing the height in buildings with a restructuring view on the south side
10. Change the flooring materials around subway stations

**1.2.10.3. Strategies and measures of area Number Three:**

2. Changing the crossroad to two or three ways in order to smooth ride of mounted and secure of dismounted
3. The creation of the equipped pedestrian path in Babak Street from the intersection of Ahmadabad to the back street of Homa Hotel
4. Create high mass around square in order to create a sense of closeness and determine the square space
5. Built the Great Mosque of Ahmadabad to enhance readability and supply the need for the Mosque in path
6. Safe pedestrian connections between both sides of the square
7. Create the perfect atmosphere frontage subway stations
8. Change the glass and uncoordinated facades of Sepah Bank accordance to Homa Hotel View
9. Build underground multilevel parking on top of the square collection
10. Change the operation of Razi serum production to the art center of Mashhad
11. Use of space in front of telephone center and telecommunication in favor of pedestrians and the public space
12. The creation of urban spaces with diverse scale and performance in the square
13. Create an underground commercial market in connection with subway stations code 7
14. Preserve and enhance green space and vegetation cover of Homa Hotel in terms of objective and accessible to people

**1.2.10.4. Strategies and measures area number four:**

2. Create an index and social group intersection of Rahnamai Street with Ahmadabad path.
3. Change the functionality from residential to commercial in the southern side units to strengthen the physical and functional permeability
4. Create visual hallmarks among island path in front of Rahnamai three ways
5. Use of street cafes on the sidewalk against restaurant activities
6. Create Rahnamai equipped pedestrian path with a guide to the performance of commercial format
7. The physical definition of Ranmamai, Reza and Abouzar paths corners
8. Embedding special functional conditions in floor for the disabled and the blind
9. Create the space for overflow control people against the proposed business units
10. Proposed construction of Multilevel Parking on Shirin Street

**1.2.10.5. Strategies and measures of area number five:**

2. Liveliness of Astan Quds garden wall by wall making, injection and retail activities
3. Allocate a portion of Astan-e Qods garden in the corner of Malekabad square into create Malekabad tourist and recreational complex.
4. The creation of large urban beaches next to the square to strengthen social life

5. Create a safe space for pedestrian around subway stations (9)
6. The definition of the points of entry from Vakil Abad Blvd by frame elements and vegetation cover
7. Strengthen the spirit of greenness in the plant by dense vegetation and the use of green roofs
8. Transfer of approved terminal edge of the Ahmadabad Street to back level of Palestine Street
9. Creating functional and social continuity and connection between Palestine boulevard sidewalk in the south of Malekabad square to Ahmadabad Street pavements[9].
10. Produces meaningful symptoms in the middle of Malekabad square by conceptual and symbolic geometry and vertical elements in the center of the island square
11. Create a hierarchy of motion - performance between Malekabad square to linear market inside the South context of Square[10]
12. Change in placement of southern part of path buildings and city walls
13. Proposed construction of Mustafa Khani park-museum in Astan Qods Razavi garden

#### **Case Study:**

#### **1.3. Rahnamai Street – Mashhad**

##### **1.3.1. Study of population:**

Rahnamai Street is placed in the municipality of Region 1 and the population (according to 2006 census) over 5 thousand and the number of households living is within the 1,500 households in the area[11].

##### **1.3.2. The structure and hierarchy of urban access:**

Rahnamai Street as a path is located along one of the main north-south artery in western central area (Sazman Ab Street) and its limitation by other major east-west artery, have fairly substantial role in the spatial structure of the city.

##### **1.3.3. Identify and field survey of Rahnamai Streets:**

Studied crossover according to detailed plan has width of 20 m and a length of 645 m (intersection of Ahmadabad to the intersection with Salman Farsi Street)[4].

##### **1.3.4. Residential plaque access to Rahnamai Street and vice versa:**

In the current situation 3 of 19 crossings that has overflow of vehicles to Rahnamai Street (the studied part to be sidewalk) use as deadlock only for pedestrian.

#### **To provide short-term solutions**

##### **Front and body analysis, the problems of the current situation:**

Improper fit of height and lane width, ratio of width to height should be 1 at least, if it is less than 1 gives the viewer a sense of closeness. Exposure to large new buildings that do not have the characteristics of scale and relatively smaller among older commercial buildings can be seen that hide smaller buildings and cause lack of coordination in façade. This lack of coordination can be resolved by breaking the height of building as stepped which causes suitable underlying for smaller buildings.

##### **Green space:**

Green space along the road with two straight tall trees, parallel with the sidewalk and roadway that are grown in many places in the middle of the sidewalk and due to the lack of considering 1 meter around each tree pits have been created. Despite pits the effective width of the sidewalk around the trees has decreased to 1 to 1.5 meters. With creating metal grids with fine grooves (avoid shoes with heels sticking out) prevent from the sidewalk loss and also the transfer of surface waters is done to trees.

##### **Inappropriate Design of facilities:**

By creating box from facilities' own material and type a good point can be created.

#### **Protrusion of edge:**

In accordance with Article 100 of the Municipal Act, Note 3, as well as the construction of commercial facilities, municipalities are required to obtain fines.

##### **Flooring passage:**

It is better to use the stone surface non-slippery, resistant to weather conditions and frost for places with high footwork.

##### **Lighting:**

High altitude of lights give small light to street and turned off the lights of the upper floors give the viewer a sense of the desolate space. Use short base lights that installed on high base lights for lightening the path, creates a sense of security and peace in the pedestrians.

#### **Use a ramp in the road:**

One of the positive things in Rahnamai Street is building ramp at some intersections. Such an interface must be along a pedestrian zebra crossing, the interface material should be different from surface material of sidewalk and roadway and also be non-slippery to be used for people with different physical and sight conditions.

- For the success of the sidewalk plan following tips should be determined:

#### **Satisfaction of merchants and tradesmen**

The main concern of shopkeepers in side walk plan is that people of our country mostly do their trips by vehicle and if there are restrictions in this regard it is possible to reduce travel and people are less willing to go out and buy, so it will cause a drop in sales. But on the other hand existing of beautiful environment with relative facilities for walking can change view and interests of the community to such environments.

#### **Effectiveness and economic feasibility**

Economic impact of creating side walk at first place will be given to commercial property owners. Where the buying and selling is done, land and property price rises and therefore the government will have to raise taxes. This effect is not limited to business users in that area but will affect the value of surrounding tissue applications which distract privacy of residents and thereby people relocate their place of life.

#### **There is an alternative passage:**

One of the issues that have been raised in pedestrian crossings design studies is the issue of the possibility of substituting this crossing with another roadway at the same level in the same area. If the flow wants to be closer to eastern branch of Rahnamai Street, alternative approach of Kolahduz Blvd can be used. If traffic wants to approach to western part of the Rahnamai, Sanabad or Dastgheyb Street, Palestinian Boulevard is considered appropriate.

#### **Parking:**

Rahnamai Street, is a passage with high levels of closeness, 18 buildings which includes 22% of all buildings around Rahnamai Street has been declared as no building, by selecting these buildings for the construction of the parking lot, park issue of vehicle scrapped. Salman tower parking can also be used to park vehicles.

#### **Public transportation**

Rahnamai Street, is one of the passages that all types of public transport vehicles including bus, taxi, train, and bike path nearby[12].

#### **Available applications**

One of the criteria for changing a path to sidewalk is absence of incompatible applications such as car washes, car repair, home appliances or activities that work just part of the day. Fortunately, in Rahnamai Street composition of applications are suitable and is free of adware applications.

#### **Flooring**

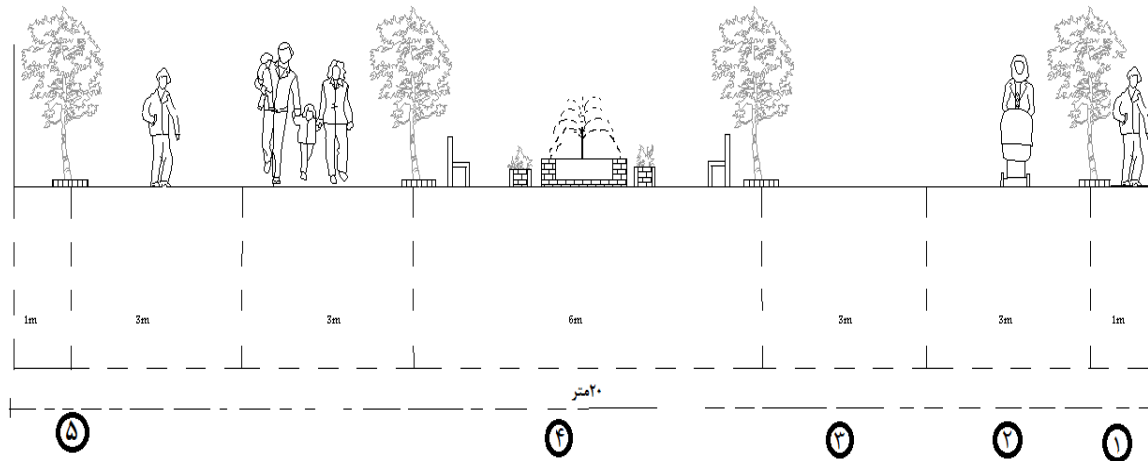
Flooring should be able to give different use and also allow access for vehicles in emergency situations. Ease movement of pedestrians crossing is important, therefore, decking should be consistent, non-slip and flat.

#### **Long-term strategy**

##### **First solution: Converting street to sidewalk**

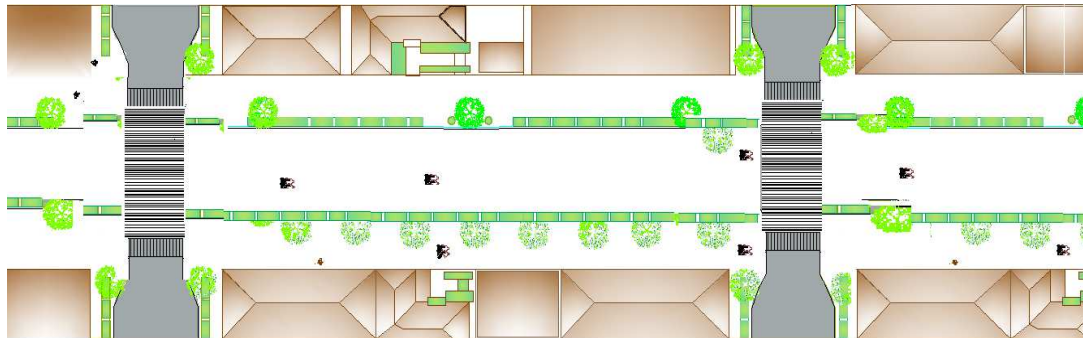
- Converting traffic to alternative passages due to the grid structure of adjacent area
- Access to sidewalk through line 1 of the city train and important public transport stations
- The closure of streets intersecting with it and purchased housing units in path by municipality and create a barrier at the beginning and end of the sidewalk.
- Creating parking lot according to current and future demands of passage
- Passing emergency vehicles (police, ambulance, garbage vehicles, docking and loading, etc.) by providing appropriate infrastructure and use warning signs for drivers

- Geometric elements used in side walk be in such a way that the color difference in flooring of sidewalk be different from emergency mounted (use of paving and brick paving) no difference in height between the two levels.
- Organizing furniture and equipped it, building facades and fountain to engage and provide entertainment
- Lighting sidewalk through light sources with different height
- Improve green space sidewalk



#### The second approach:

- There are numerous intersections in crossing of pedestrian path
- Controlled intersections during the sidewalk, which acts outstandingly (speed reducer).
- Create a barrier around intersections are recommended as locks and hinges for the passage of emergency vehicles.
- At shorter lengths, furniture and spaces of dialogue with appropriate flooring and route of emergency vehicles should be provided.
- But in these type of pedestrian path, safety of pedestrians at intersections will be reduced and the efficiency of passage as an environmental away from the noise and pollution from it, will be reduced, making it beautiful, despite these intersections, will not be just ideal.



#### CONCLUSION

Rahnamayi Street with special features such as appropriate width, high volumes of pedestrian traffic, suitable applications in path, existence of alternative passages for traffic, closeness to transit stations etc. possibility to convert to sidewalk or to minimize traffic. But without doubt the implementation of such a project in the city of Mashhad important for many issues, including:

- Innovative and new designs
- Encouragement and persuading people to clean transport



- Considering urban space and its benefits to citizens (healthy environment, safe and away from the noise along with travel and leisure)
- Link roadway and pedestrian spaces, pause and move spaces, and different functions ...
- In order to granting the right and attention to the needs of pedestrians

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