

## ROADS' ASSESSMENT TO FACILITATE THE PEDESTRIANS MOVEMENT THROUGH PEDESTRIANISATION IN DOWNTOWN TEHRAN

**First Author: Hamideh Khodapanah Roudsari**

Affiliation: Research scholar, University of Mysore

Email: Hamidekh298@yahoo.com

### Abstract

There are many cities in undeveloped and developing countries that are facing decline because of congestion, high volume of traffic, worn-out texture. Public transportation especially pedestrian planning among different modes of transportation have got much emphasis especially in developing countries in recent years. Since city center of Tehran was the initial formation core of the city and due to the location of Bazaar and governmental institutions and centers and district's intra-city role also high volume of travel can see the essence of pedestrian passages within city center. The objectives of this study are (a) assessment of central city streets and passages to facilitate pedestrian movement. (b) To critically discuss GIS methodologies used in this context. To assess and select the desired streets and passages within the city center first some criteria and indexes have considered. Because of the number of indexes which causes complexity in assessing passages, so to facilitate in procedures, GIS software was used. Studies were conducted in two qualitative and quantitative levels and were verified through multi-criteria analysis method and for each street one ID was considered, at the end some categorized map with final decision about pedestrian routes was prepared. After suggestion of ID for each passages, three different condition was selected for each one and finally GIS map was prepared based on each decision. For each one of suggested passages was given three scenario and from comparison of 'component to total research' and 'total to component research', a final GIS map was prepared. The result shows that the map of the streets correspond with the basic idea. The decision was made after different studies and consultation with urban planners and faculties that final plan for passage should be pedestrian route, pedestrian overcome or equipping of pedestrian route. The idea was presented as an interconnected network of passages in two forms of short term and long-term.

**Keywords:** Sustainable development, urban planning, Pedestrian movement, GIS, Multi-criteria analysis.

## Introduction

Tehran's city center as its first core and historical center of capital, face different problems like other cities central parts and other countries down towns. Deterioration of the urban historic centers is a modernist implication that have started after Second World War.

In the current studies of urban planning, improve quality and open public domain of pedestrian is an important issue in the world that with the improvement of public transport facilities reduce the use of private vehicles. In addition to the architectural and cultural heritage monuments, city center still has roles of governmental, administrative, service and commercial roles so still it has a capability to regain to its city center position through restructuring, equip infrastructure and revitalization.

## Study Area

Tehran historical city center with area of about 2400 hectares includes most important collections, axes and buildings remained of the ancient Tehran. Study area of the research is city center of Tehran city, which is located in municipal district number 12. District No.12, consider as the Tehran's old regions which is located in the central part of city, with the area of 16.91 sq.km consists of 6 sub districts and 13 Neighborhoods. This municipal district is neighbor with districts No.6, 7 from north, districts No.13, 14, 15 form east and districts No. 15, 16 from south. District's boundaries from north are bounded to 'Enghelab' street, from west to 'Vahdat eslami' and 'Hafez' streets, from south to 'Shush' street, and from east to '17 shahrivar' street. Municipal district 12 is the commercial pole and economy pole of Tehran city therefore, region in terms of population is divided into two parts: (a) Resident population: People who permanently resides in the area, (b) Floating population, that commute due to area position and intra-city travelling. The population of area according to census (2004) is about 248048 person. Municipal district No.12 is the strategic region which existence of Tehran bazaar is one of its most important features. Many cultural buildings, government institutions and centers, ministries, embassies there are in this area. There are 16 higher education centers, 323 schools and institutes, which the most popular is 'Darolfonoon'.

## The Outcome of Each Group

To combine indicators for each group Multi-criteria analysis was used. At this method the criteria are combined in a way that each have a significant effect on the outcome and have some sub-criteria or varied subgroups and final indexes. At first each of indicators after visiting and final evaluation gets score from 1 to 5 which represents the amount of each indicator. It should be noted that scores have dedicated to qualitative indicators. After this step, score of each group was calculated by combining group indexes. For this purpose, a weight was allocated for each indicator to shows it's importance compare to other indexes. After discussion with experts and planners, weight of each indicators was considered and each indicator was assigned a number from 1 to 10. By using statistical methods, the indicators were normalized and the numerical value of each index was multiplied by its weight. The resulting number represents the amount of weight for each index. If define the value of each indicator as "X" and name its weight as "W" through below formulate can calculate the collector all that group score.

**Table 1.** A sample of a functional index weighting.

Indicators	Sub-Indicators	Weight
Participation tradespeople and residents of	To identify the axes and indicator elements	8
	The identification of indicator persons	5
Social safety	Population density	4
	space visibility	3
	abnormal behavior	3
	The presence of different social groups (No monopoly by a particular group)	5
Stimulate and revitalize of the peripheral textures	Existence of prominent individuals in the fields of social, cultural or their memories	6
	Social and cultural plans	8
	Existence of common memories	6
Mixed use land use	Variety of activities	8
	The variety of groups that use the space	8
The attractiveness of the walking at passages	The variety of urban spaces, events and its activities	4
	Sense of place	3
	The variety of land uses and activities	2
	Existence of different social groups	3
Livability and Palatability	The variety of users	4
	The variety of land uses and activities	7
Attention to the historical and cultural fields		
	Pedestrians density	7
	Residents tradition	8
	Existence of cultural and religious persons	8
attention to the field of tourism and tourists	Existence of memories and historical- cultural events	10
	Commercial tourism	9
	Occasional tourism	5
	Cultural tourism	9
	Religious tourism	10
	Nostalgic tourism	10

**Table 2.** An example of weighting to physical-functional indicators.

Indicators	sub- indicators	Weight
glazed Permeability	mold	7
glazed Visual continuity	mold	5
Stimulate and revitalize of the peripheral textures	Activity	8
	mold	8
Mixed land use	Activity	8
	mold	8
Attractiveness of move in passages	Activity	10
	mold	10
Equipment and facilities for pedestrian movement	Activity	4
	mold	4
Security	Activity	5
	mold	4
Lively and pleasant	Activity	4
Legibility of walking path	Activity	3
	mold	3
Attention to the historical-cultural background	Activity	10
	mold	10
Attention to the tourism and tourist background	Activity	10
	mold	10
coverage of existing parking	Activity	6

**Table 3. An example of weighting to environmental indicators.**

indicators	Sub-indicators	weight
Attractiveness in walking	The combination of vegetation	4
	Integration of vegetation	5
	Ghosting	5
Health and hygiene of the environment	light reflection	2
	Dangerous garbage	3
	Polluting industries	9
Attention to tourism	Park and green space	10
	Aqueduct path	5
Legibility of the walking path	Natural corridor	4
	Intersections	3
		3
	Mountain view	3
	Special natural landmarks	6

### Combination of Consequent for Each Indicator Group

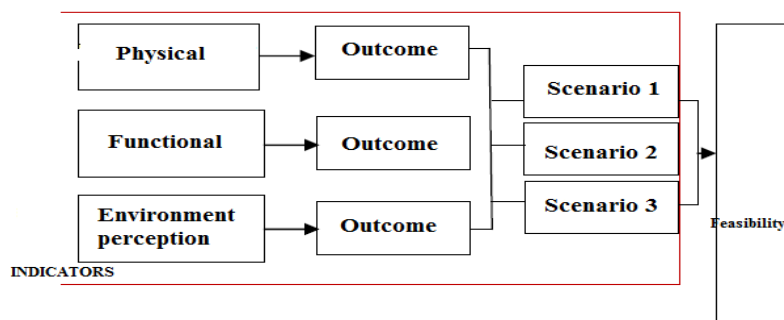
After calculating the group's scores, final combination of group's scores have done so qualitative measurement points have calculated for each one of streets. The below formulate was used to calculate the overall result. In the other words, if consider 'G' as a score each group and 'W' as its weight, the final resultant is for each street is:

$$\frac{(G1 * w1) + (G2 * w2) + \dots}{w1 + w2 + \dots}$$

At next level with the change of group's weight, different scenarios was considered till with comparison of different scenarios can find out the impact of different views on the final resultant. At this stage, three scenarios have designed that in each scenario one of the indicators groups have got the upper weight. That's mean in each scenario there is indicators with different weighting. Below diagram shows different existing scenarios:

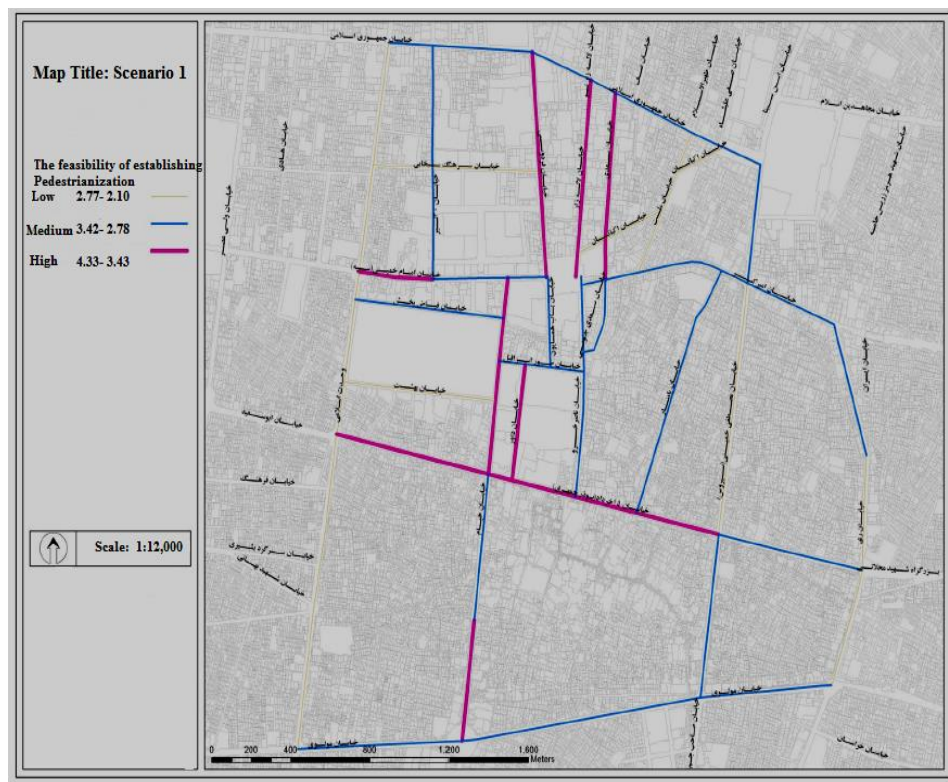


**Diagram 1.** Qualitative indicators measurement and different scenarios



INDICATORS	Scenario1	Scenario2	Scenario3
Physical	5	3	2
Functional	3	5	2
Environment perception	1	1	4

Below maps shows each one of scenarios and passages have got higher points:

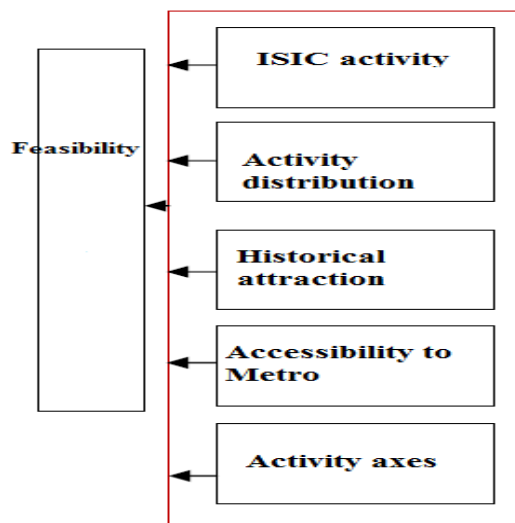




### Assess the Quantitative Indicators

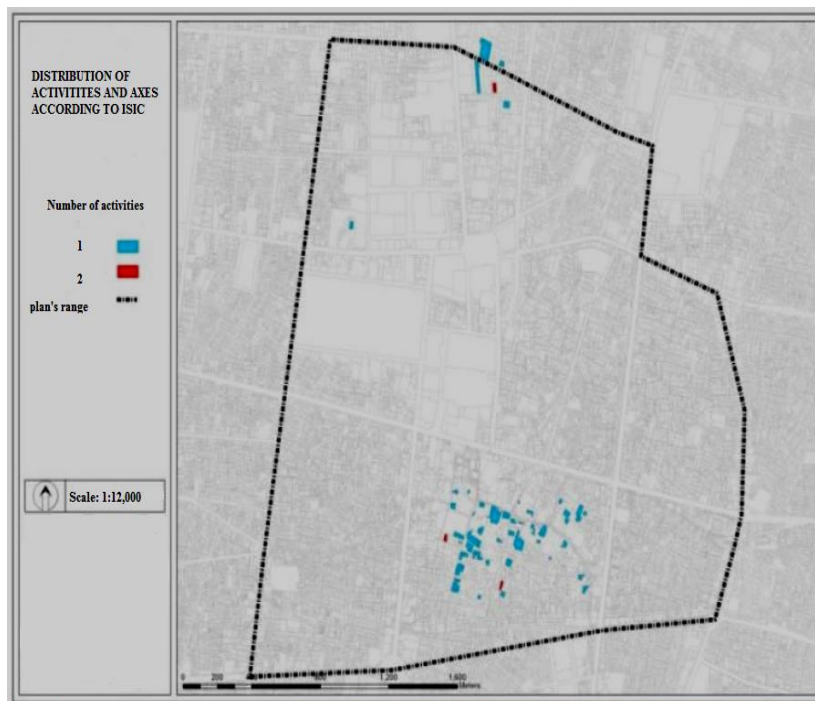
Assessment of qualitative indicators was according to site observation but only verification of qualitative factors is not enough, for this purpose quantitative indicator also was analyzed but without finding final resultant and weighting indicators. It's a mutual evaluation which ensure the viability of the plan. So some of indicators also was assess through quantitative method, some factors like; distance and accessibility to metro stations, distribution of activities and activity axes.

**Diagram 1.** Quantitative indicators measurement



## Evaluation of Activity Distribution According To ISIC Codes

For This Purpose The Data Generated By TGIS Was Used Which Had Been Categorized According To ISIC Activity Classification. The Following Maps Show Activity Transmittal Within The District.

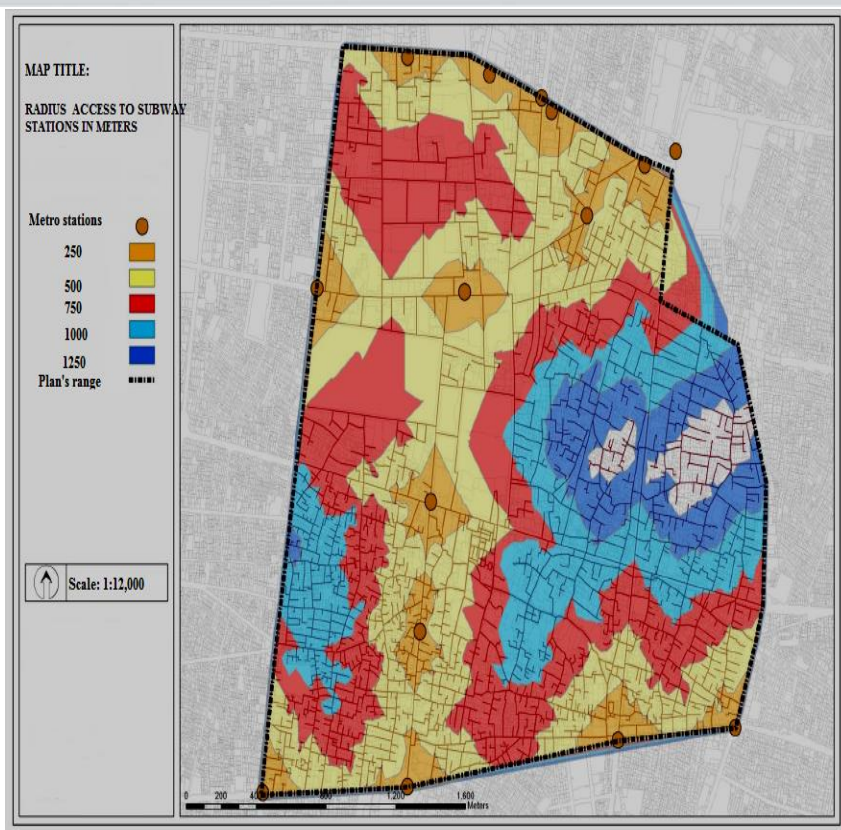


## Measuring Accessibility to the Metro Stations

For measurement of distance to metro stations there is two way, first method is through making buffer at GIS software, the distance by this way are not real and its metering accuracy is low. Second method is metering according to road network which this method is more accurate.

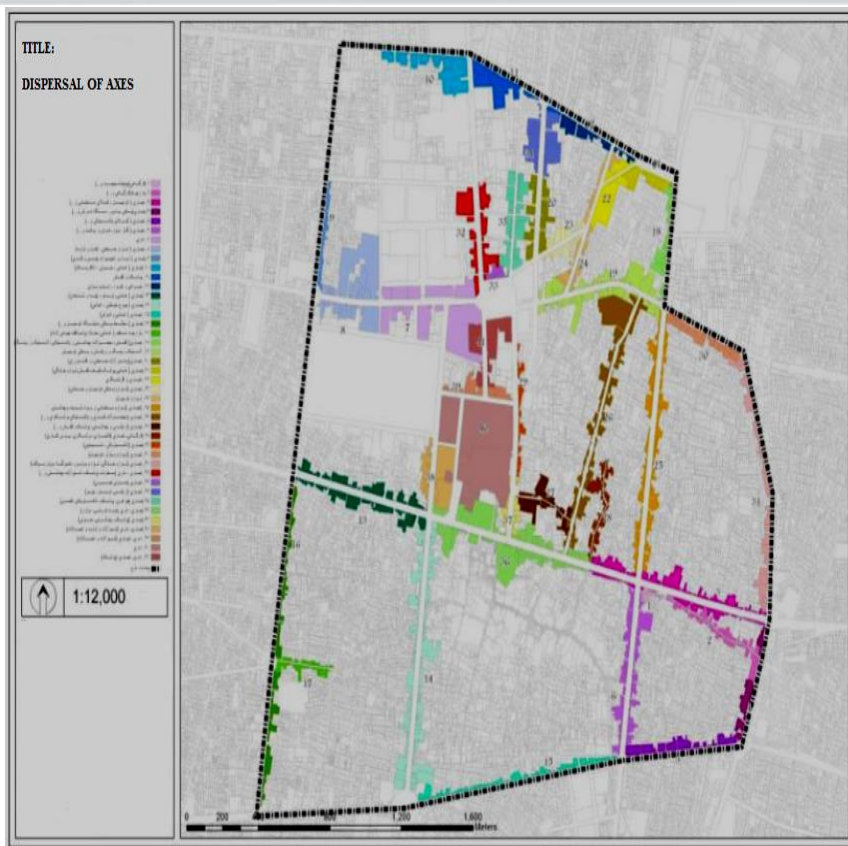
To calculate distance network for each of metro stations, passages network modeling is require that has done at Arc GIS software in Network Analysis sector. After the construction of the passages network, several distance that is convenient pedestrian access has been assessed. Map distance from subway stations came below.





### Identify Activities Axes

One Of the Other Quantitative Factors for Identify Appropriate Passages for Pedestrian's Way Is Commercial Axes. These Axes Are Attractive For Pedestrian And Absorb Different Social Categories To The Area. These Axes Are The Center For Different Activities And Retails Such As; Carpets And Rugs Axis Or Jeweler Axis In Bazaar Of Tehran. Maps For Commercial Land Uses And Identified Axes Is Coming As Follow.



### Preparation of ID for Each Passage

At this stage, after qualitative and quantitative analysis, a final outcome has done and for each street and passage one ID has provided, that all the results in the previous steps has written in the separate list. Whole of key Features of each one of passage are collected at mentioned lists.

### Compare the Results with the Initial Idea

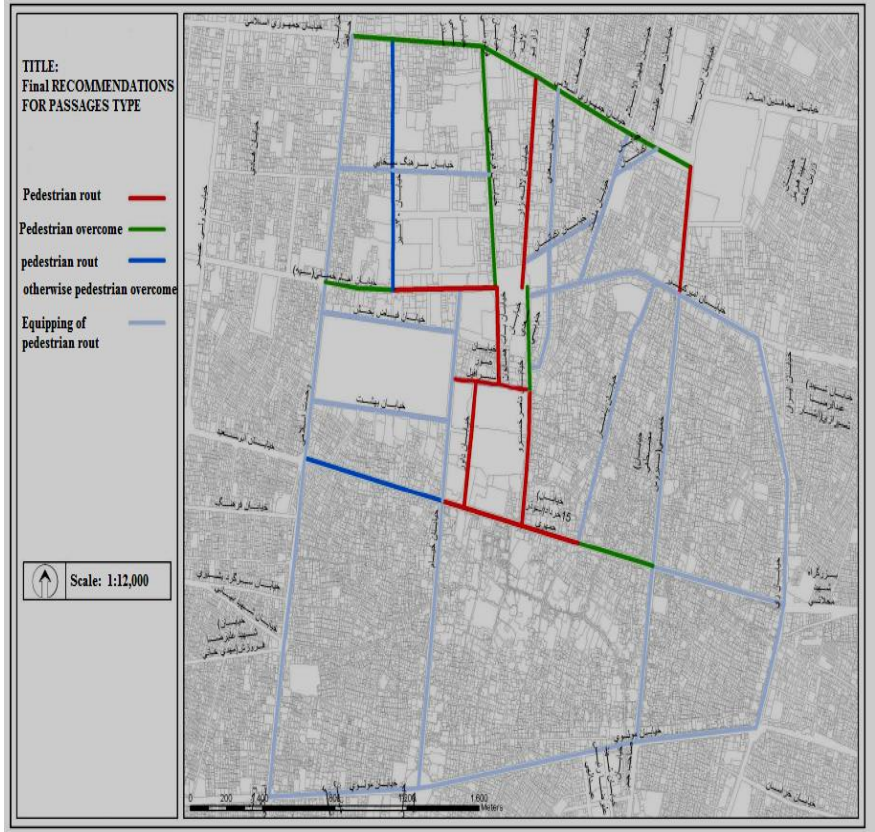
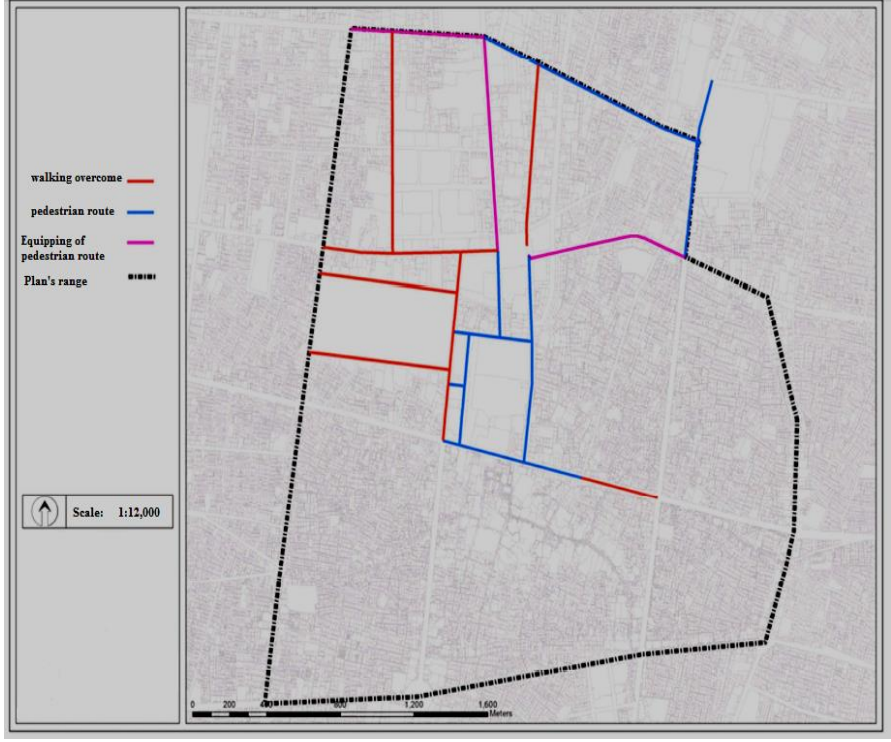
After preparation of ID separately for each passages, planning and design groups had discussion on each one, finally according to the gained scores at previous sectors, three different decision have decided with different functionality for each one of passages.

- First decision: Streets Conversion to walk way; allocate to pedestrians.
- Second decision: with the dominant of walking; at this kind of passage will increase the width of the walking passage and will limit the machine movement.
- Third decision: Equip walking paths; Equipping and organizing walking paths like; Flooring, urban furniture and lighting

Below map shows the final idea which gained from comparison of ‘component to total research’ and ‘total to component research’. ‘Component to total research’ (according to the results of studies and measurement of qualitative and quantitative indicators, negotiation and consultation with urban managers) and ‘total to component research’ that's mean, the basic idea of the project (field experiences and observation of the field). Result of comparison shows that final maps in most of the streets



correspond with the basic idea also with the combination of these two maps and considering their similarities can take final decision.



### Ultimate Type of Each Passage and Create A Network

At this stage after discussion with different experts, faculties, experts and urban planners and urban designers, the decision was made for each passage which be pedestrian route, pedestrian overcome or equipping the pedestrian infrastructure. At last selected passage verified to have most connection with ancillary streets and other streets. Finally the final concept suggested as a continuous network of pathways and interconnected system, in two forms of long-term and short-term. In Section of short-term idea, streets have priority which are now closer to the implementation. In the short-term idea the decision is that after implementation of short term idea again new verification was made and for ideas was concentrated in a long term.

### Conclusion

After suggestion of ID for each passages, three different condition was selected for each one and finally GIS map was prepared based on each decision. For each one of suggested passages was given three scenario and from comparison of 'component to total research' and 'total to component research', a final GIS map was prepared.- The result shows that the map of the streets correspond with the basic idea. The decision was made after different studies and consultation with urban planners and faculties that final plan for passage should be pedestrian route, pedestrian overcome or equipping of pedestrian route. The idea was presented as an interconnected network of passages in two forms of short term and long-term.

### Acknowledgments

The authors are thankful to the respective department for providing data related to the paper and also thankful to IJATER Journal for the support to develop this document.

### References

- [1] Bavand consulting engineering company, Detailed Blueprints report of district 12 (Tehran city) 2007(1389), produced by , Employer [Tehran, Department of City Planning and Architecture]
- [2] Schäfer berde, K. (2011). Speed: 30 Calm local Streets at local existing textures. Compilation and Translation: Pakzad Jahanshah. Tehran: Armanshahr Publishers.
- [3] Pour, B. K., & Ghalam, S. J. (2014). Pedestrian Zone Planning in line with Sustainable Development with an Emphasis on Standards. Asian Journal of Research in Social Sciences and Humanities, 4(3), 220-234.
- [4] Almost Fereydoun (1383), Feasibility and bicycle trails in old Tehran, Arts Magazine, No. 19, autumn.
- [5] Population and Housing census (1385) statistical center of Iran.
- [6] Transportation statistics organization of Tehran, Municipality traffic, in 1385.

### Biographies

Hamideh Khodapanah Roudsari, received ,Bs in architecture, Abhar Azad university, Iran master: M.tech in urban and regional planning , department of development studies, Mysore university currently PhD: research scholar in geography department university of Mysore [hamidehkh298@yahoo.com](mailto:hamidehkh298@yahoo.com)