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A Safe Pedestrian Walkway; Creation a Safe Public Space Based on Pedestrian Safety

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Abstract

Urban space belongs to the public acting as a generator of social and cultural interactions. Behavioral patterns define how to use space. Therefore, a successful urban design is based on how it fulfills human values. Urban environment can be the origin of cognition, differentiation and spatial behavior. With a rise of motor vehicles, separation of pedestrian path from vehicle seemed to be inevitable in order to provide pedestrians safety. In this paper, through library based researches, we have tried to reach a model of well-organized pedestrian movement, and to clarify safety factors in addition to designing a people-friendly, urban public space.

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Keywords: Public urban space; environmental behaviour; pedestrian; pedestrian safety

1. Introduction

City campus is known as an important feature in urban development descriptions. A campus belonging to public for restoration all cultural, social relations, so, conceptually viewpoint, it can be considered as a public space (Madanipoor, 2000). Of course, sometimes it is considered as bed which is forming city.

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These spaces create a bed of all external activities for a human being. If it provides above mentioned, historical perceive and beauties will be mingled together (Bahreini, 2007).

Realization of space identification, belongs to an environment and realization of city campus qualities, is the accessible by walking in the environment. Social contacts in the city campus create a social life and it will be reinforced, and caused a cultural cycle and process (Rasooli, 2009). A city is good which raises cultural process, and helps a survival and stability for the persons, and provides the field of growth that is the development during the continuation via restoration of activities and by a human being which to be relied culture (Bahreini, 2007).

Therefore, utilization the campus, especially by pedestrians has a cultural, and the environment has only a deterrent role and not to determine the behaviors. Whereas possibility of any change in culture or behavior patterns is not seen, so, we can protect from suitable activities through utilization of design, and henceforth, in street. Design with the use of factors, suitable perception, and ideal spaces, can be used and prevents in favorite affairs (Bahreini, 2007).

Jan Gehl, a Danish architect, have written interestingly about the patterns of pedestrian life in a book, *Life between buildings*. He simplifies, and divides outdoor activities in public spaces in a city into three categories, each of which places very different demands on the physical environment: necessary activities, optional activities, and social activities.

Necessary activities include those that are more, or less compulsory such as going to work, shopping, waiting for a bus, or a person running errands. Among other activities, this group includes the great majority of those related to walking. Because the activities in this group are necessary, their incidence is influenced only slightly by the physical framework.

Optional activities – that is, those pursuits that are participated in if there is a wish to do so and if time and place make it possible – are quite another matter. This category includes such activities as taking a walk to get a breath of fresh air, standing around enjoying life, or sitting and sunbathing.

Social activities are all activities that depend on the presence of others in public spaces. Social activities include children.

At play, greetings and conversations, communal activities of various kinds, and finally – as the most widespread social activity – passive contacts, that is, simply seeing and hearing other people. These activities could also be about and be in the same spaces. This implies that social activities are indirectly supported whenever necessary and optional activities are given better conditions in public spaces.

According to Gehl, a social activity takes place every time two people are together in the same space. To see and hear one other, to meet, is in itself a form of contact, a social interaction. The actual meeting, merely being present, is furthermore the seed for more comprehensive forms of social activity. This connection is important in relation to physical planning. Although the physical framework does not have a direct influence on quality, content, and intensity of social contacts, architects and planners can affect the possibilities for meeting, seeing, and hearing people. (Johnson, Philip, 1)

Through behavior study, can conclude that in city campuses, a high significance is served, for cars that is more than pedestrians, and priority is for cars, and passengers and finally pedestrian should arrive to destination with anxiety (Bahreini, 2007). what is separated the pedestrians, is their tranquility, and this quality enables the pedestrians due to experience it. In the designation of squares' campuses, and allocation of campuses to various performances, a preference should be served (Barakpoor, 2000).

Meanwhile, through necessary studies, we can encourage people to walking, and it requires sufficient spaces, immunity, Attractiveness, and providing necessary tools (Bahreini, 2007). In any case, serious and practical attention in this regard returns to half a century ago. Whereas the first sidewalks in 1950 at countries like Germany, Netherlands and Denmark, were established during the second world war, and until 1966, it limited to some European countries, and a few was in the U.S.A.(Gozarrah, 1996). Following to falling the quality of life in Europe in the late 1950's, attention too presence of a human

being increased. For this matter, several general methods chosen and, all these actions consist proper limitations, and it is called ‘Woonerf,’ that is, quite designs (Jadali, 2003).

In American cities, some trading designs is considered as a mark of linear points which led to pavement paths which is different with some European countries. Also in another American cities some commercial designs under title of the mall are noted, and all of them have been executed (Parvand, 1993).

Pedestrian accidents which leading too injury, and even their death, are some serious difficulties in the cities. Some efforts should be paid attention. Because of submit processors in order to increase safety, for passersby whereas in societies which determine freedom, and selection right, for people, for this reason they should have to pass freely, and safely regarding some purposes like recreation, spending leisure time even going to work (Zegir, 2006). One of the purposes which are considered in this essay is to provide the field of going, and coming for people comfortably, safety, efficiency, and as far as car, and automobiles are an important part of daily life but is served as a danger too. Therefore, regarding to mentioned hints related to walkway significance as a field of social interaction, accumulation of collective memories and...necessity of defining a systematic framework for implementation of a safe walkway in order to provoke people to have participation in urban spaces is inevitable. (Bahreini,2007).

On the other hand, regulation a good framework for building a safe pavement due to more presence in a city campus. Each should be paid attention that the concept of walking, and pavement is different. Sidewalks path is a place for authorized passages. In any case a sidewalk is a route equal to the cavalry, but it is separate from accessible network which is used for dismounted people in the city usually through green spaces, gutter, tables, bridges and so on separated from sidewalks. In fact pavement is not described the place in the city and each open campus which is used for walking activities can take a title of sidewalk. In Many cases, walkers are much more than pavements in crowded streets and even, sometimes streets are used instead of pavements. (Pour Sartip, 2010).

1.1. The benefits of making pavements:

The respective benefits are as follows:

- The priority of dismounted in order to mounted (review of driving patterns, encouragement for miss use of personal vehicles, and public transportation systems, and more contact with the city and environment)
- Optical perception (improvement optical perspective, visualization and perception of city campus)
- Perception of time (communication with city campus, proportionate to walking speed and access to city centers)
- Mind relaxation, security of environment, safety of pedestrian and human measurement for a hysterical tranquility is arising from relationship between human, and environment that is to say residents’ starts to purchase and, other offers comfortably and all the man is free of danger by vehicle systems.)
- Life environment remarks, geographical and stability(decrease of pollutions, exploitation from natural elements ,improvement physical conditions and illumination of centers and creation of welfare also physical and though full healthy)
- Improvement and increase social relations (possibility of discussions with others and contact with city campus)
- Creation of miscellaneous activities and trading deals. (Various activities, and applications, living straightly and, security in the city campus, attraction of new investments.)
- Culture (identification, historical and custom values in a city campus, recognition of places and other factors which connected people together also with a city campus.)

- Creation a partnership sense, (presence of active persons and groups for making decision and execution, feeling responsibility, possession and more relation to environment.))Pour Sartip, 2010)

1.2. Planning for pedestrians:

A good planning for pedestrian is obtained with correct realization from behavioral features, or also along with requirements, and aspects of passersby, can be more involved with safety planning, and understand various solutions because of encouraged using from pavements also better safety of existing possibilities. The important points are about how ness and what ness of pavement, and which furniture is safer for it. (That is why their movement is not forecast able) Saboteur humans (these persons need to be cared) also middle-aged residents (the persons who needs more time for passing across the street.) (Zegir, 2006).

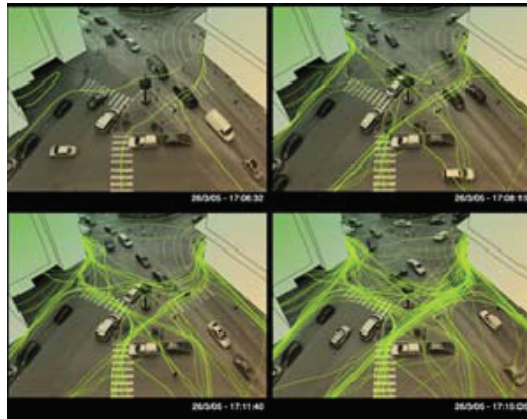
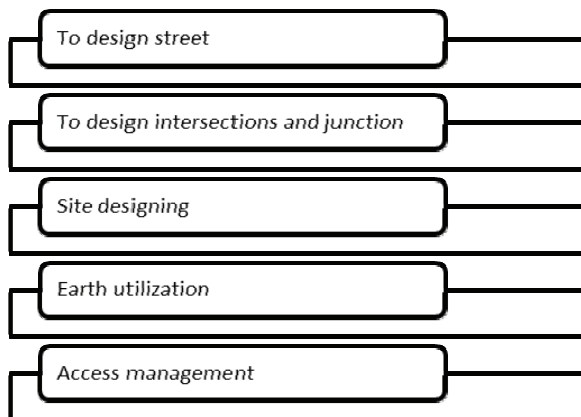


Fig. 1. Planning for pedestrian , Source: www.imaginativeamerica.comtagpedestrian

1.3. Transportation design and necessary policies for safety of pavement:

Method of design and copious policies are at present served as a deterrent factor regarding a safe environment is considered. Several factors for safety and transportation network have been affected. The most important planning, designing and effective policies in this regard are as follows: (table 1)

Table 1: Effective policies for security of pedestrians. Source :(Authors, 2011)



As far as this topic consists of an important part of security of pavement by re-design of streets and checking related accidents in this respect. This requires concentration on details about designing a street. This system is formed the base on more utilization of the transportation system in journeys. Therefore, the most of possibilities for mounted journeys have been done studies show that these streets are not well at the service of people. Whereas some of this factors have pointed in table 2(Zegir, 2006).

Table 2. Factor of safety disturbance for pedestrians complicated intersections. Source :(Authors, 2011)

| | |
|--|---|
| <p>complicated intersection</p> | <ul style="list-style-type: none"> •Usually vital pathes heve some street divergences and also wider tracks for pathing heavy vehicles such as track and bus, and this matter causes a more track for pedestrians and during it to be encountered with more cars but is usually difficult and dangerous. |
| <p>wide intersections and the most of uturn</p> | <ul style="list-style-type: none"> •causes time of writing to be elevated for pedestrians tracks. |
| <p>lack of possibilities for pedestrians</p> | <ul style="list-style-type: none"> •some of vital streets have been built in suitable and without pavement or safe tracks. •suitable illuminations all across a day should not be exited in order to provide suitable conditions for crossing streets during night fall. |
| <p>being of streets with lots of divergensis or wide</p> | <ul style="list-style-type: none"> •crossing such streets is so much difficult for pedestrian in case of lack of middle islands.. |
| <p>high speeds</p> | <ul style="list-style-type: none"> •wide streets encourage motor weichle systems to higher speed which has direct connection with enjuries of accidents. |

Existing conflict between vehicle system and, security of pedestrians which is determined as a policy in this relations and, intersection. with less radius which has been designed usually for special passes, can

decrease the distance of passage in streets also increase security of pedestrians. Society with designed streets, sometimes provide a week service for pedestrian and having weaker immunity records, in contrast in society with more attention to security, more efforts have been done for equilibrium between pedestrians security and heavy transportation system. It does not mean that tracks, school buses, firefighting cars and so on should not use from these paths, but they should drive with less speed and do more observation. (zegir, 2006)

1.4. Expression of usual accidents for pedestrians and preventive ways of it:

Accidents when walking beside roads:

- Pavements can put side road accidents of pedestrian through separation the track of walker in contrast with vehicle system.
- Legation of pavements between two sides of streets due to avoid from unnecessary passages in streets.
- Sidewalks should not be adjacent with vehicle system paths and, as far as possible it should be separated with liner plants, parking, virgins and track of bicycles.
- Favorite width of pavement in noncommercial districts should be is meters.
- In vital tracks without partition between mounted and dismounted track, the width should be 3 meters.
- dismounted tracks should be connected and have suitable width in order to prevent from probable closely streets furniture.
- Entrance roads which paths from pavement should be designed somehow to be equal with pavements and, not to be the result of city intersections. (Zegir, 2006)

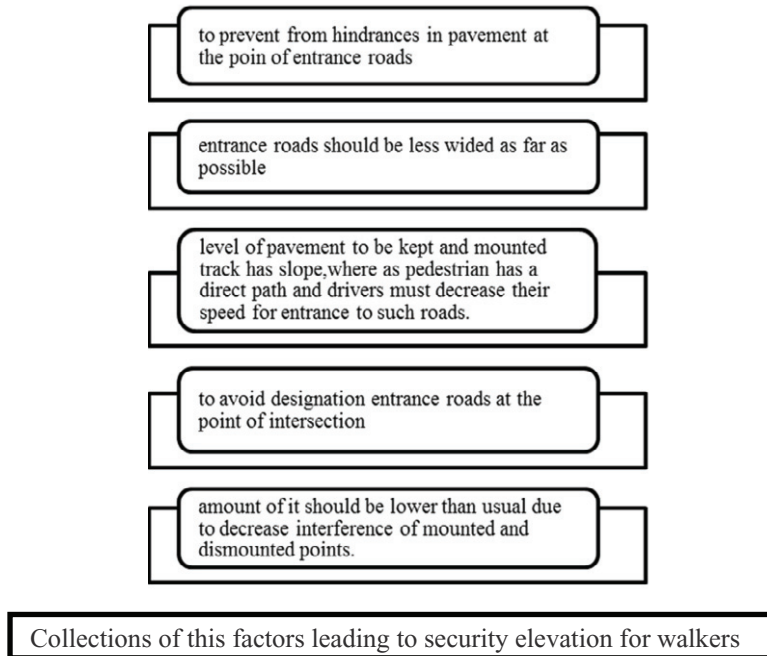


Fig. 2. Source: www.techtransfer.berkeley.edu/newsletter and Fig.3. Source: www.techtransfer.berkeley.edu/newsletter.



Fig. 4. Pavement has been provided a safe track for pedestrians. Source: How to Develop a Pedestrian Safety Action Plan, 56., and Fig. 5. Entrance roads should be designed somehow in which pavement to be located along side of length of tracks, Source: How to Develop a Pedestrian Safety Action Plan, 56

Table 3: respective points in order to design entrance roads. Source: (Authors, 2011)



1.5. Illumination of Passengers:

Pavement should be designed and executed like streets and roads for traffic safety all the day. Because of vision limitation at night, various dangers threatened the users. Unusual accidents of pedestrians to be occurred when a low illumination is existed. (Mostly nightfall) So in districts with full studies regarding light illustration, accidents have been lowered and the following benefits can be considered as a good reason for illumination of pavement:

- Tranquility relaxation of pedestrians.
- To prevent from various crimes.
- To raise public level of transportation and comes some increase of two-sided shops.
- To increase the ability to see objects, lighting, details of appearance, and size of objects.

In places which both pedestrian and vehicle systems are going and coming enough lights should be prepared. two sides should use it well, and to be visible illumination of streets should relax people somehow, and to be seen easily into parking. Of course, illumination is not enough alone, but provide security feeling for people.

1.6. Accidents when crossing the streets:

The described procedures in next pages help to decrease accident for pedestrians and raise their safety. (Zegir, 2006)

Table 4: Solutions for safety elevation. Source: Authors, 2011.

To tighten radius of intersections

- finding places and weak design of ramps make some difficulties when crossing the street and it may lead to accidents.

Middle island in intersections

- in intersection with mountend passages we should consider and optimum solution for security of pedestrian and design somehow which has no need to change of track and not to create unacceptable distance for them.
- The island which are designed well, help to pedestrian to cross the intersection more safely.

Street development

- expansion of streets decreases distance and it helps pedestrians by two methods
- to decrease time of crossing the streets
- to increase their visibility, expected pedestrian can see vehicle systems better and drivers also can see the pedestrian across streets.

Passages in uncontrolled places along with deterrent stop signs

- in the multilines street, one of the lethal accidents is fear of crossing the street, where as drivers stop in a line and let the pedestrian to cross. but in the adjacent line near to passage, driver does not decrease his speed and naturally other driver have no necessary time for reaction and pedestrian will be injured with high speed. stop signs and deterrent line make driver to stop in a back distance

Place and design of ramps in street

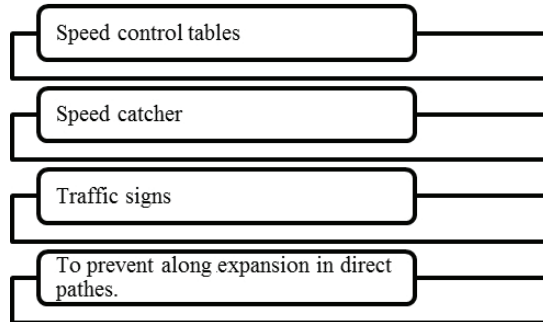
- to tighten radius of intersections has lots of benefits for pedestrians and shorten the passage, nearing to intersection to increase visibility of pedestrian and vehicle systems, and to decrease the speed when turning right.
- for example insuitable place and direction of ramp cause that disabled can not cross the intersection in a certain time or makes them to cross from a none lining limitations.
- The ramps which have suitable designs in streets, providing better conditions for pedestrians having physical disabilities.

middle island of streets

- In two line streets, being of middle islands in uncontrolled places decrease level of accidents by 10 percents
- middle islands for crossing pedestrians cause that passages from streets is simply occurred in two phases, so that the passer cross a line and stop in the middle island and pass another line.

Appeasement of traffic: In a neighboring block, the tools for appeasement of traffic will be used and consist of the tools of appeasement like raising passages of passersby, Cause to see pedestrians better also lighten traffic.

Table 5: The tools for traffic appeasement. Source :(Authors, 2011)



1.7. Accidents related to going and coming by pedestrian:

The most of accidents is related to walking in the sidewalks and most of them consist of crossing streets for getting on a bus or after getting off. All stations should be accessible for all pedestrians and to be contained the following regulations.

All the stations should consider the security of pedestrians, and it does not mean that necessary in each station should be a lining path for pedestrian, all the stations should locate in places in which the pedestrian can cross it safety.

Transportation station and school services should provide a safe situation for standing and expectation, even if there is no pavement, deficiency of expected time is not good, especially for children.

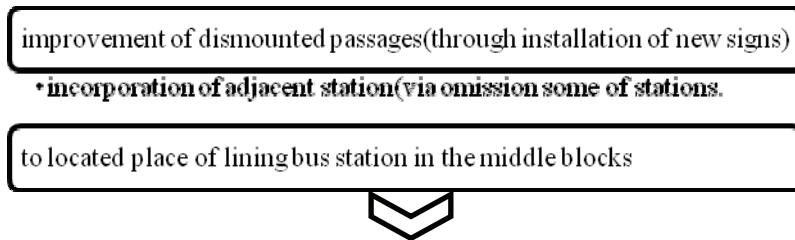
Side walk should be built somehow which to be possible for pedestrians due to access to all transportation facilities. For security, and safety of pedestrians and to decrease sabotages, each is better provide enough light in the site or near station.

Transportation organizations should review all stations and simplify its availability. (Zegir,2006)



Fig 6: Making decision for relocation of bus stops, can effect on the security of pedestrians and also traffic. Stations should be located in a safe place for crossing by pedestrian, Source: How to Develop a Pedestrian Safety Action Plan, 66. And Fig. 7: transportation facilities stations require some pavement with suitable width in order to create a good expectation place., Source: How to Develop a Pedestrian Safety Action Plan, 66.

Table 6: Method of station design due to improve the security of walker. Source: (Authors, 2011)



It enables the pedestrians to cross the street when looking at the traffic of transportation systems also enable bus drivers to stop, or go aside without damaging the pedestrians, and enable them to leave the station without need to wait for passing traffic.

2. Methodology

In this paper, along with analytic-descriptive, comparative methods and with the use of internal/external documents We have followed up phases of security, comparison of several sample cases and then making conclusions in this regard.

Significance and necessity of matter:

With the advent of vehicle systems, segregation of pavement path from mounted path was necessary, because it was easier and safer regarding utilization of pavements.

Nowadays, these phases have been much decreased in cities on account of car gathering and transportation priority, and the cars have the main role for handling residents, the result of minding to vehicle system is lowering the quality of city life.

Pavement paths is served as an important point because of access to various places by people. This matter changes the passers-by and pavements to important elements of the city. So, it is necessary to regulate a framework for more presence of people on a city campus.

Purpose:

- Identify factors detrimental to the safety of pedestrians.
- Compilation of effective factors due to build a safe pavement.
- The main question of research:
- What are effective factors and safety procedures?

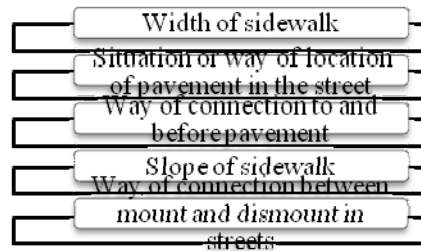
It seems that such factors like policies and legislation for pedestrians, improvement of transportation systems, and communication management are effectively concerned.

3. Results and Discussions

Generally designers, planners, engineers, and officials should pay attention to the following points in order to improve security of pedestrians on a large scale range. Access to one or two cases of this factors, not only decreases the possibility of accidents by pedestrian but also elevates the security coefficient for drivers and passengers.

Primary points and important dimensions related to a safe design of pavement have mentioned in table 7.

Table 7: Important points due to design pavement. Source: (Authors, 2011)



4. Conclusion

In this essay, through studying traffic, transportation and communication networks and evaluation of each one regarding sidewalk which related to its accuracy due to access a safe pavement. Decrease of speed in vehicle system,

- Decrease of path for pedestrians across the street.
- Improvement of vision for pedestrians and car drivers.
- Improvement of welfare for pedestrian.

5. Examination of pavement

5.1. Case sample of Olive purchasing center-hyper market-Kish-south of Iran

Kish Island in Persian Gulf has an area about 90 km (square) in the 18 km of the main land and is a part of coastal province of Hormozgan. Investigated path in Ferdosi Blvd is near to Olive purchasing center, and hypermarket, and the most trading center is in Ferdosi Street and consists of residential application, spending leisure time, recreational, banking, hotels, retailers, and has the capability of accountability to all kinds of users including tourists. In order to the entity of tourism attraction (sea, sand and coral coasts) in Kish Island, connection of main paths is necessary. So, it requires a safe pavement which has passed from a varied way and eventually arrives to sea, and it is analyzed, for security of pedestrians.



Fig.8.(Panoramic): Olive Purchasing Center-Kish Trade Center Center. Source: (Authors, 2011)



Fig. 9 (Panoramic): Kish Trade Center-Hyper Market . Source: (Authors, 2011)

6. Investigation



Fig. 10. Middle Island in Ferdosi Blvd., Source: (Authors, 2011) and Fig.11. Middle Island in Ferdosi Blvd.,Source: (Authors, 2011)

Creation a middle island to help a safe passing of pedestrians in intersections. Utilization from suitable furniture in the body of pavement in order to intensify the segregation of paths. Continues utilization from the said furniture due to continue walking. Lack of ramps for utilization of disables from the path.



Fig. 12. Using Ramp in Ferdosi Blvd., Source: (Authors, 2011) and Fig. 13. Using Ramp in Ferdosi Blvd., Source: (Authors, 2011).

Using lining path for security of pedestrians in order to go across the street.



Fig.14.Ferdosi Blvd., Source: (Authors, 2011) and Fig.15: Ferdosi Blvd. , Source: (Authors, 2011)

To decrease height of corner at the point of intersection with pedestrian line for passer-by especially disables and blind people.



Fig. 16. Ferdosi Blvd., Source: (Authors, 2011) and Fig. 17. Ferdosi Blvd., Source: (Authors, 2011)

Utilization herb cover for separation of two lines. Herb coverage is chosen somehow to create a light traffic, pause, activity and a place for pedestrians interaction. Using herb coverage in two manners of decorated tree and plants due to prevent optical hindrances alongside the pavement. nonuse of shady elements.



Fig. 18. Taxi Stop in Ferdosi Blvd., Source: (Authors, 2011) and Fig. 19. Bus Stop in Ferdosi Blvd., Source: (Authors, 2011)

Stations for public transportation assistances and pavement networks are connected with together. Bus station in the path of pavement in order to meet pedestrian's requirement. Suitable illustration alongside the path due to separate two lines (moving and stopping).

Observation a correct installation of traffic signs which not to be vertical to the body of pavement, and to be slanted with its axis.



Fig. 20. Sidewalk in Ferdosi Blvd., Source: (Authors, 2011) and Fig. 21. Sidewalk in Ferdosi Blvd., Source: (Authors, 2011)

We can access to suitable design of pavement for a safe move through the followings:

- Level difference with a mild slant for walking alongside the pavement. Changes in the level and roofing due to lead passerby to some places for crossing the street.

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