

## Park and Ride Location Near Metro Stations (Case Study: Tehran)

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### ABSTRACT

The objectives of this research are to identify park and ride location and assessment commuter's behavior related to building these facilities.

Large cities such as Tehran, have many traffic problems. These problems derived many different factors that related to unbalanced economic growth and development. In recent decade traffic congestion in Tehran generate many negative externalities such as waste of time, air pollution and traffic accident. Worldwide experience shows that managing congestion requires to combine restriction on private mode along with development public transportation systems. Park and ride is one of transport demand management (TDM) scheme, which is very popular in some congested city with wide parking area at the border line or peripheral area.

In this paper we want to propose some area for building park and ride facilities near metro stations in city of Tehran. For this reason we accomplish field study and surveying for identification suitable park and ride lot. The result of sample survey shows the potential of accepting park and ride system is high and about 83% of people who have private cars.

**Keywords:** Park and Ride, Facilities, Location, Metro Station.

### INTRODUCTION

Park and ride facilities that are parking lots with public transport connection that allows commuters to leave their vehicle and transfer to bus and rail systems [1]. Nevertheless Tehran public transportation systems have been growth in recent years, the car share in daily trips is high. Therefore we need park and ride facilities to manage trips. Tehran is capital of Iran and is a major and fast growing urban areas. Around 10 million people live in Tehran. The trip rate has exceeded about 18 million trips every day. The fuel consumption is about 12 million liters per day and it leads to a serious health problems because of air pollution emission. There is lack of park and ride facilities in Tehran therefore building these facilities is essential. The neighborhoods of metro stations have a good potential for park and ride lots that connecting private modes to public modes. In present situation there are five active metro lines. The following figure shows the map of Tehran metro lines.

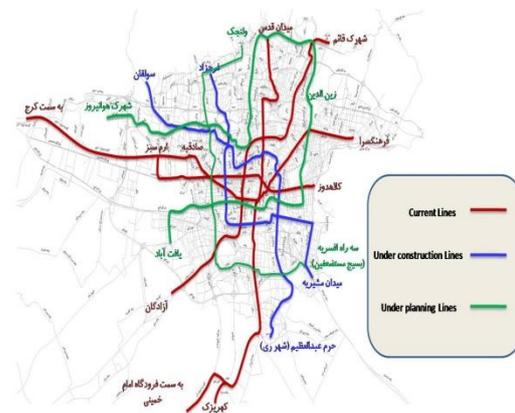


Figure 1: The Map Of Tehran Metro Lines.

### METHODOLOGY

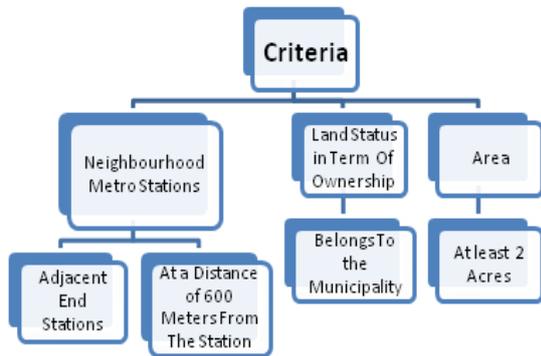
The methodology for finding park and ride location is to identify park and ride area based on some criteria and after that estimating probability of accepting park and ride facilities by commuters.

For response to these question we do two actions:

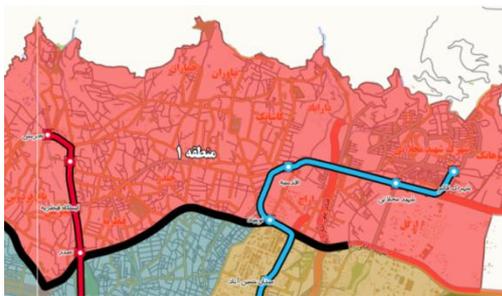
For first step, in this study we concentrate on current and under construction metro lines. In this step we

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wanted from tehran's regions municipalities to present suitable location with our criteria. These criteria are shown in figure 2.



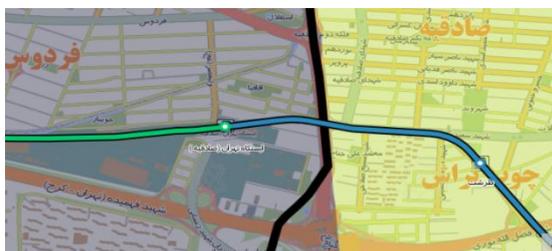
**Figure2.** Criteria For Park And Ride Location Selection



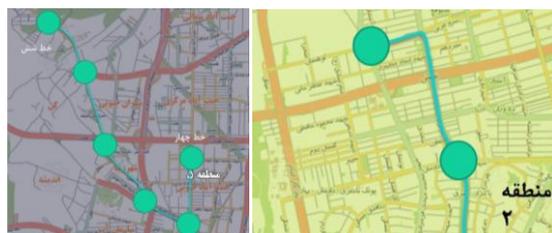
**Figure3.** North Part Of Line 1 And Line 3



**Figure4.** East Part Of Line 2



**Figure5.** West Part Of Line 2



**Figure6.** North Part Of Line 4 And Line 6(Left) And North Part Of Line 7(Right)



**Figure7.** South Part Of Line 7(Left) And South Part Of Line 6(Right)



**Figure8.** South Part Of Line 3

The regions municipalities present their suitable sites. in following figures we show these area.



**Figure9:** Condidate Park And Ride Location Near Line 4 (Charbagh Station)



**Figure10.** Condidate Park And Ride Location Near Line 7 (VarzeshgahTakhti Station)

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**Figure11.** Candidate Park And Ride Location Near Line 3(Nematabad Station)



**Figure12.** Candidate Park And Ride Location Near Line 3(Haramabdolazim Station)

From the lots located adjacent to subway lines in different areas of the municipality, there aren't suitable land in region one, region two and region four. In the other words based on the criteria, there is no land available for line 1, line 2, north part of line 3, 6, 7.

The south part of line 3, 6, 7 and the east part of line 4 have suitable lots near metro stations with specified criteria.

In the second step, survey was conducted at the area near the candidate park and ride location. This survey was aimed to identify "how is the potential of accepting park and ride?". The survey tool used questionnaires to capture the trip characteristics and the behavior of people, which were needed for analysis of park and ride system. 500 samples are taken in samples which were distributed proportionally to all candidate area near the metro stations.

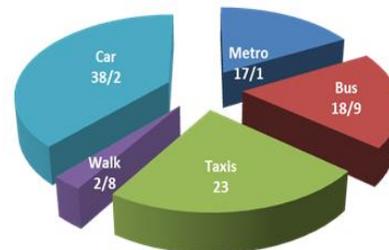
In the questionnaire we asked nine main questions:

- where did your trip begin?
- where will your trip end?
- what is the purpose of your trip?
- how will you get to your destination?
- how many times per week do you make this trip?

- if your destination is in city center, which form of transport do you most frequently use?
- how many cars are there in your family?  
If there is one or more cars in your family answer following question:
- if we build park and ride facilities near here, do you use car & metro for making your trip?

### ANALYSIS AND RESULT

The characteristics of trips of people around the candidate park and ride area are with no car 66%; one car 21%; two cars 9%; three cars and more than 4 cars are 4%. The mode share of daily trips is shown in figure 13.



**Figure13.** The Mode Share Of Daily Trips Near The Candidate Park And Ride Lots

Based on survey result, 28 percent of trips that are done by different mode toward city center. Also based on the stated preferences the share of car & metro will be according the following table:

**Table1.** Mode Change Before and After Park and Ride Policy

Car Ownership	Car & metro (Before)	Car & metro (After)
1 Car	8.9%	16.9%
2 Cars	2.4%	4.4%
3 Cars And More	1.2%	2.2%

In basis of above table all candidate park and ride lots will be accept by commuters with high percentage.



**Figure14:** Park And Ride Location Near Metro Lines

### CONCLUSION

From the previous analysis and discussion, it can be concluded as the following:

Due to traffic limitation in central district in the form of definition forbidden area in CBD and odd or even zone ,development park and ride lots near metro stations of Tehran's marginal municipalities districts is effective tools in mode change from private to public modes. The result of this research are indicated.

The potential of accepting park and ride system are obtained from questionnaire is high and about 83% of people who have one or more than one cars. This is shown the program and policy regarding park and ride is reduce long distance car trip and increase transit efficiency.

In order to maintain the continuity of the program, monitoring program should be set up.

Finally it is suggested to encourage the citizens to change the trip mode from private car to combination of public and private mode, incentive policies such as discount at fees of using park and ride lots to be applied for everyday commuters.

### REFERENCES

- [1] TCRP, park and ride, 2002.
- [2] Florida department of transportation, State park and ride guide, 2012.
- [3] Spillar, Park and ride planning and design guideline, 1997.

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