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GIS-BASED VISUALIZATION FOR ESTIMATING LEVEL OF SERVICE

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INTRODUCTION

❖ The estimation of the level of service within an urban road network should be one of the regular tasks of traffic management in order to either maintain a stable traffic flow or to identify and cure traffic congestion.

❖ A large number of studies on measuring Level of Service which having definition of:

"a qualitative measure describing operational conditions within a traffic stream, generally in terms of such service measures as speed and travel time, freedom to maneuver, traffic interruptions, comfort and convenience."

INTRODUCTION

❖ The objective of this study is to estimate different types of Level of Service by using Highway Capacity Manuel Table (HCM, 2010) and visualize those with the help of applying cartographic representation methods.

❖ One of the main contribution of this research is that it provides an understanding the estimation and visualization of LOS on case study of Istanbul.

BACKGROUND

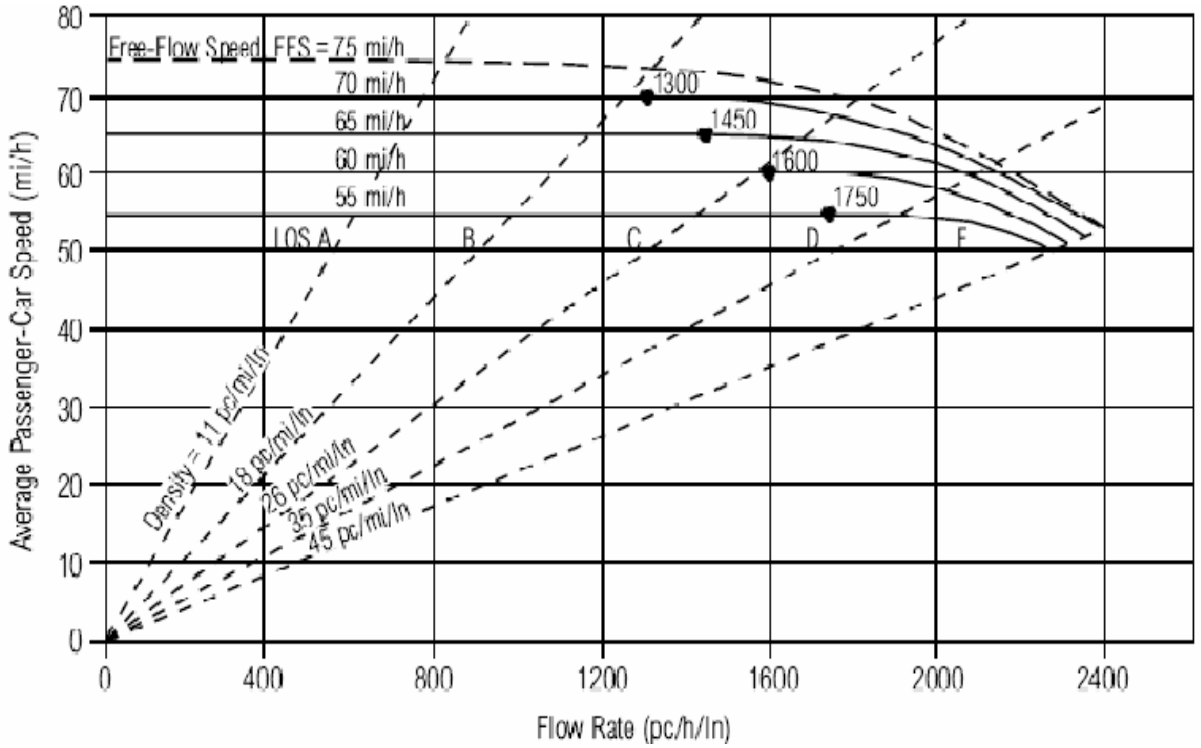
According to the latest version of the *Highway Capacity Manual* (2010 HCM), the LOS of freeway segments is based on the density of vehicles, expressed in passenger cars per mile per Lane which can be evaluated with volume-to-capacity (V/C) ratios that the ratio larger than 1.0 is assigned to LOS F for the road segments.

Density(pc/mi/In)	LOS by Volume-to-Capacity Ratio	
	≤ 1	> 1
≤ 11	A	F
> 11-18	B	F
> 18-26	C	F
> 26-35	D	F
> 35-45	E	F
> 45	F	F

LEVEL OF SERVICE (LOS)

❖ Density gives the proximity of other vehicles in the stream. Since it affects the ability of drivers to maneuver in the traffic stream, it is also used to describe LOS.

❖ In HCM 2010, speed-flow relationship is depicted in the figure below.



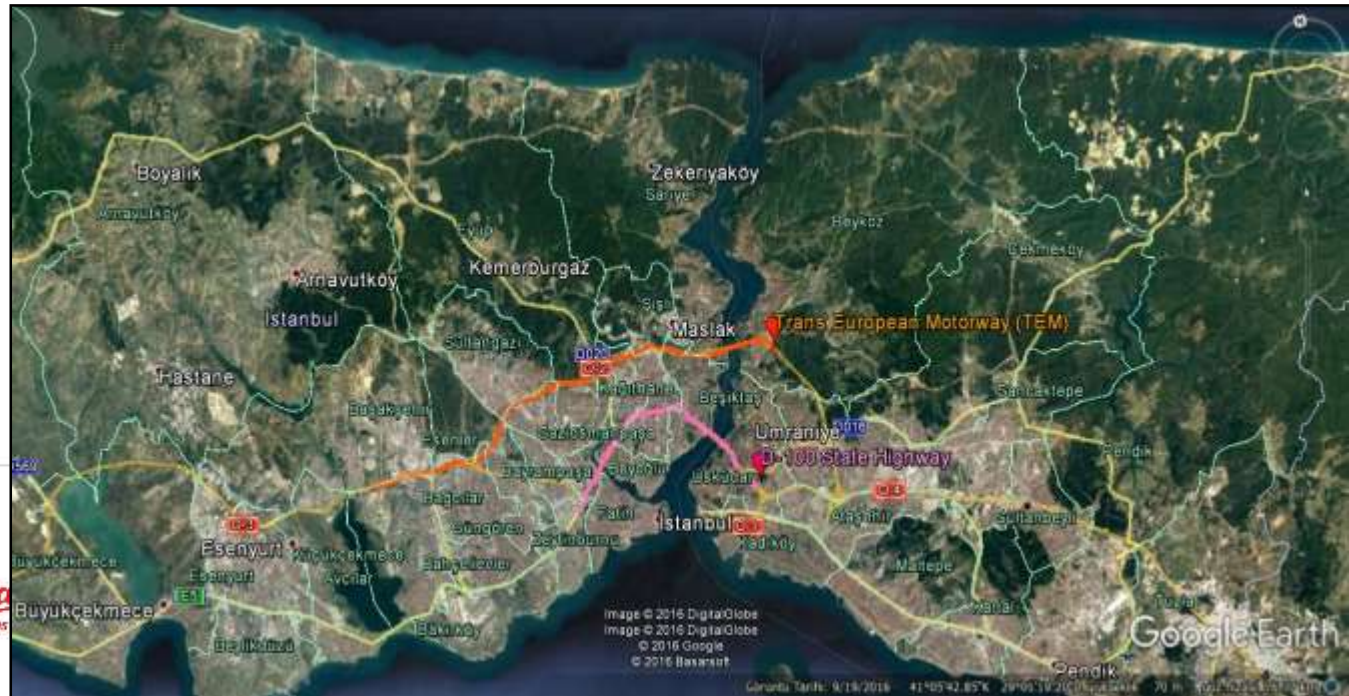
STUDY AREA

Istanbul is the most intensely populated city in Turkey, located in coastal area and seperated into two parts by three bridges. The study area, Istanbul, having the worst traffic jam especially at peak hours.

STUDY AREA

❖ The case study was developed in a section existing on the Trans European Motorway (TEM) and D-100 State Highway having huge traffic congestion in every hours. D-100 State Highway having a paralel route to the TEM.

❖ As occuring numbers of traffic accident, it is important to assess its accessibility at those sections by determiming the level of service (LOS).



DATA COLLECTION

Data were collected at morning and evening peak hours which is a part of the day during which traffic congestion on roads and crowding on public transport is at its highest, namely, the times during when the most people commute.

	Time
Morning Peak Hours	7:00 - 9:00 a.m.
Evening Peak Hours	5:00 - 7:00 p.m.

DATA COLLECTION

❖ Density, capacity and volume were recorded per 30 minutes for each link at assigned section of TEM and D-100 State Highway.

❖ In order to specify Level of Service for each link, average density were calculated at morning and evening peak hours and to be found the corresponding level grades using HCM 2010 Table.

CARTOGRAPHIC REPRESENTATION OF LOS

❖ Data visualization is a method to convert data into a visual representation. Cartographic visualization is mainly concerned with visual representation of spatial data.

❖ Cartography discipline also developed guidelines to help to improve the design of maps to produce maps which offers insight in spatial patterns and realtion in particular contexts.

❖ Within GIS, a map can be considered as a visualisation and interactive tool generally oriented to the representation of a spatial configuration at a specific instant in time, or a spatial configuration valid for an interval of time (Kraak et.al. 1997).

VISUALIZATION OF LOS

❖ The Level of Service can differ in terms of road conditions, thus a visualization of LOS on road network is the most suitable representation.

❖ By using this visualization the spatial distribution and level of service patterns for each road segment could be observed directly on the map. Visualization of LOS in road network will give an actual representation of road and traffic condition in real world as different level of service happened in the road network.

❖ The spatial distribution of LOS could also be easily depicted by using different color in terms of density thresholds for level of service on the road network. With this visualization, identify which road segments having whether high or low level of service would be easier.

VISUALIZATION OF LOS

VISUALIZATION OF LOS

CONCLUSION -1

❖ Level of Service for each segments of road were assigned and visualized through using cartographic techniques.

❖ Data were collected at morning and evening peak hours and recorded per 30 minutes for each linked at assigned section of TEM and D-100 State Highway and to be found the corresponding level of service grades using HCM 2010 Table.

CONCLUSION - 2

❖ Each LOS for two links were visualized by using cartographic representation and to be undertood that both bridges have the worst Level of Service grades.

❖ Special attention should be given to problematic sections of network. Different alternatives should be developed in order not to excessive usage of bridges.

❖ People should be promoted the public transportations and the comfort and reliability of those modes should be improved.

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