



Determination of Fire Station Coverage Area Using Response Time Approach: A Case Study of Samsun

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SAMSUN

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Fires

Flame, among the most important things discovered by humankind, is still one of the most important factors in our lives. Fire, appearing in our lives with flames and being described as big fire which causes harm, is an important potential danger



Fire is defined as an uncontrolled burning. It is not possible to avoid fires completely; however, the harm and damage caused by fires can be reduced if it can be taken under control at the initial stage and effective fire management.



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Response Time




The response time is a critical component in the control and mitigation of an emergency incident. The response time is the manageable segment of time within the entire sequence, it includes alarm answering time, alarm processing time, turnout time, travel time and initiating action/intervention time.

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#RESPONSETIME



In an emergency call the major factor is travel time, and travel time is affected by various factors; such as traffic volume, average travel speed, driver habits, road networks (main roads, residential roads), time of day (rush hour vs. non-rush hour), the season, and the location of the incident. Most of the factors affecting travel time cannot be controlled, but determining the best locations of medical emergency stations and fire stations for a particular area could reduce the response time.

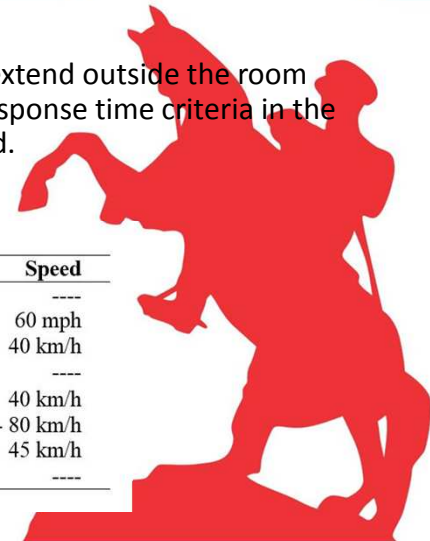
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According to the NFPA after 8 minutes the fire starts to extend outside the room without sprinklers where it began. Table shows some response time criteria in the literature. In this study 8-minute response time was used.

Table; Studies on response time and average speed;

Reference	Response Time (min.)	Speed
Stiegel 2004	10	----
Yang et al. 2007	5 to 8	60 mph
Habibi et al. 2008	3 to 5	40 km/h
NFPA, 2010	2 to 4	----
Catay, 2011	5 to 8	40 km/h
Chevalier et al. 2012	8	15 - 80 km/h
Nisanci et al. 2012	3, 5, 7	45 km/h
Murray, 2013	9	----



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Average Speed

Travel time is the major factor which affect the response time. But, travel time is affected by various factors; such as traffic volume, driver habits, quality of road networks, etc. Average travel speed is one of the most important factors which affect the travel time.



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In this study average speed of the different type of roads were determined using vehicle trace system data. Samsun Fire Department vehicle tracking data were collected and recorded periodically. Average speeds were determined using three months vehicle tracking data for four types of road; main road, street, branch road and alley.

For heavy vehicle of fire stations;

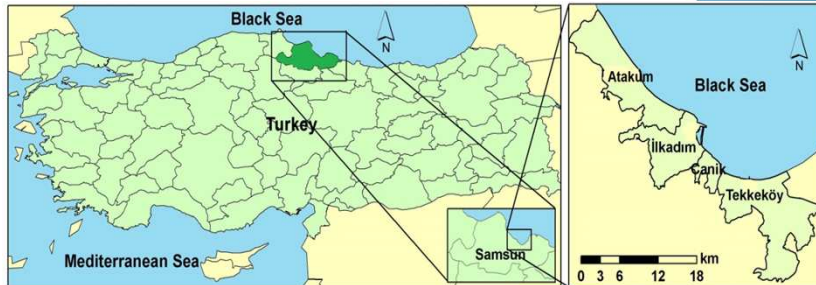
- Main Road: 40 km/h**
- Street: 30 km/h**
- Branch: 25 km/h**
- Alley: 15 km/h**



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Study Area



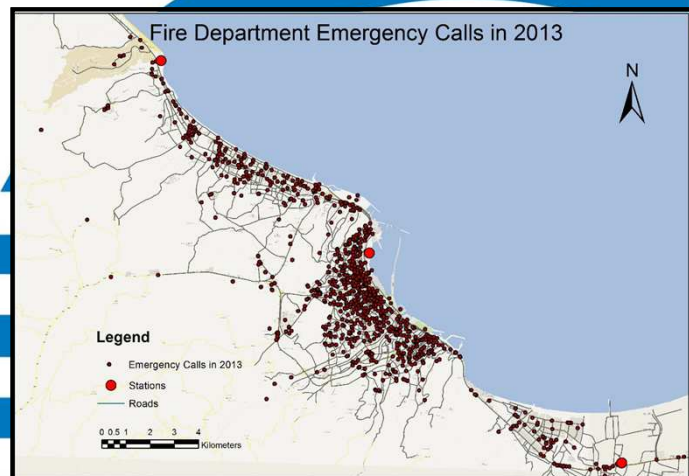
In this study, cases which occurred in 2013 in Atakum, İlkadım, Çanık and Tekkeköy districts which are located in Samsun city Centrum and responded by Samsun Metropolitan Municipality Department of Fire Brigade are mentioned.

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In the first stage of study, road network belonging to working area was organized by digitizing the map which constitutes the transportation infrastructure of Samsun.

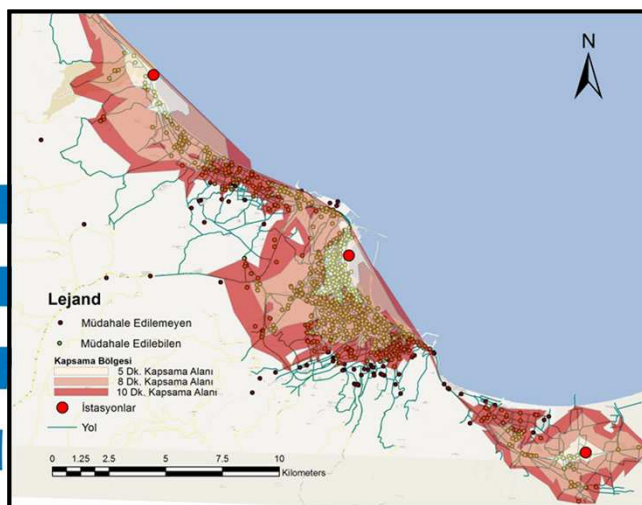
Locations of cases which are mentioned in the study as a separate layer are indicated by digitizing on the map and feature information of all cases was provided.



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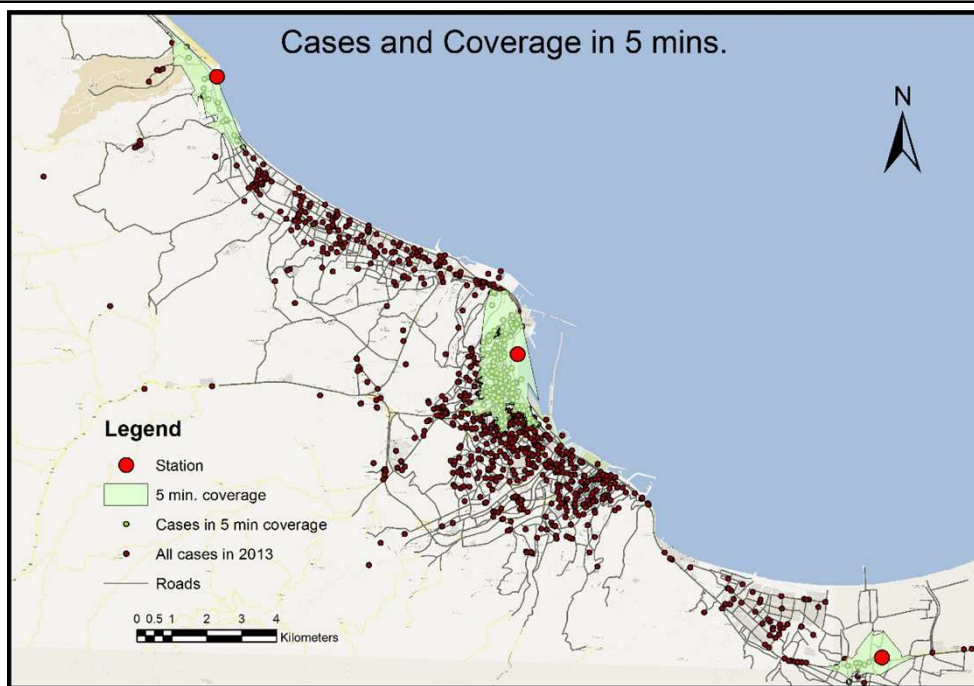
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Main purpose of this study was analyzing the present fire stations' response sufficiency and capability at a particular time frame according to responded cases by Samsun Metropolitan Municipality Department of Fire in 2013.



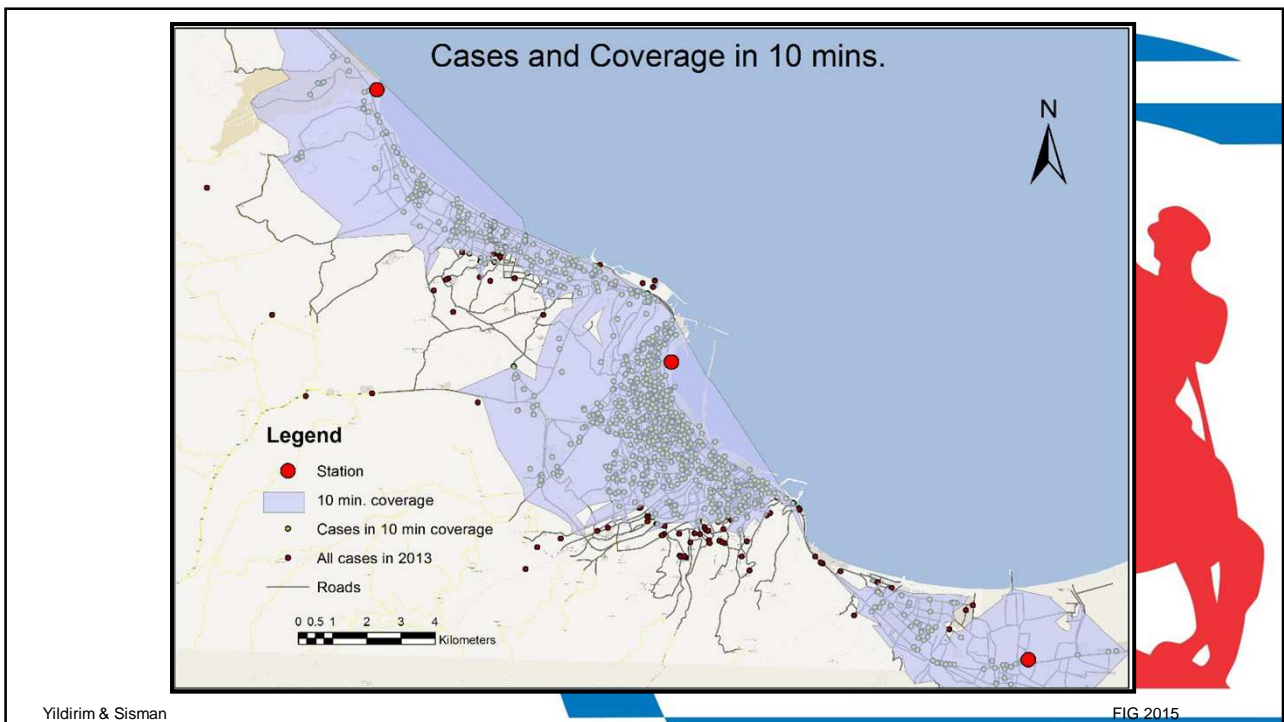
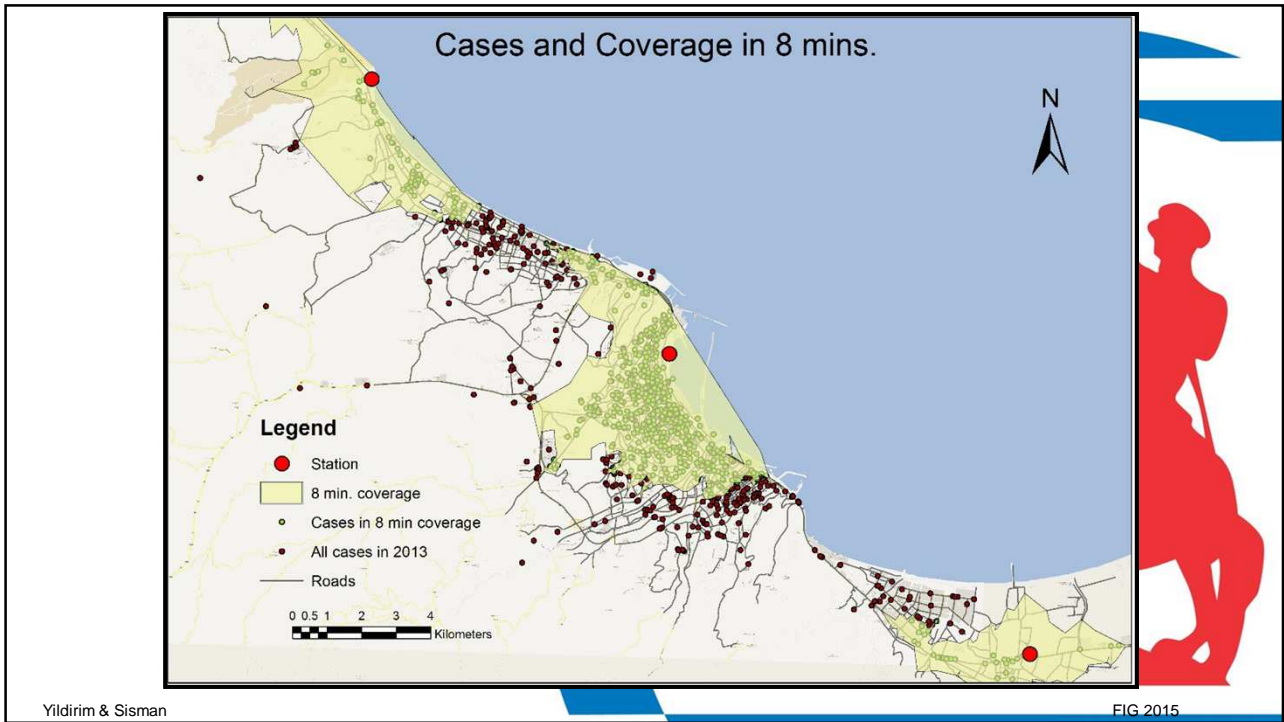
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Results

As a result of examining the locations of fire station units and fire cases in 2013, it is seen that fires are become dense in İlkadım and Atakum districts and response of Department of Fire Brigade to the fires occurring in İlkadım district is sufficient due to the location of department.

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An increase in number of fires should be expected in Atakum district because of growing population and settlement. For this reason, with the 5 minutes' analysis of Kurupelit platoon, Atakum district's being distant from fires in center is observed. As a consequence of this, need of movement of Kurupelit Platoon's location to the Atakum site or need of additional platoon to the Atakum district is observed.

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With urban transformation projects, it is determined that in the regions that are fast growing and having increased density as Kazım Karabekir Quarter, Derebahçe Quarter, 200 Evler Quarter and Belediye Evleri, more fires are occurring and a new platoon which is close to these areas is a need.

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Thank you for listening to us.