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AN OVERVIEW OF EFFECTS OF HIGH RISE BUILDINGS ON INTERSECTIONS: ICONOVA

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An overview of effects of high rise buildings on intersections: ICONOVA

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by

Ali ASLAN

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HASAN KALYONCU UNIVERSITY	**GRADUATE SCHOOL OF NATURAL & APPLIED SCIENCES INSTITUTE** **M.Sc. ACCEPTANCE AND APPROVAL FORM**

Civil Engineering Department, Civil Engineering M.Sc. (Master of Science) programme student **Ali ASLAN** prepared and submitted the thesis titled **An Overview of Effects of High Rise Buildings on Intersections: ICONOVA** defened successfully on the date of 10/05/2019 and accepted by the jury as a M.Sc. thesis.

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Ali ASLAN

ABSTRACT

AN OVERVIEW OF EFFECTS OF HIGH RISE BUILDINGS ON INTERSECTIONS: ICONOVA

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Gaziantep is over-growing and one of the most important industrial cities in Turkey. As a result of increasing population and developing industry, the number of vehicles in traffic increases day by day. The number of high rise buildings that built to meet population needs is a substantial amount. Due to this increase, capacities of existing roads remains incapable and causes a slowdown in traffic flow in time. Iconova intersection is one of the intersections where these problems occurred. Because of Primemall the shopping mall and unfinished high rise ICONOVA Towers are located at the same intersection, Iconova intersection that is already running beyond its capacity will become more congested after towers have been used. The purpose of this study is to make longer-term planning by considering the impacts of high rise buildings on traffic and offer a solution proposal for Iconova intersection by using HCM (Highway Capacity Manual) calculations and VISSIM software. It is aimed to make traffic flow more efficient with this work. At the same time, it is aimed that to be a scientific reference in terms of the effects of high rise buildings on traffic and calculations of intersection capacity.

Keywords: VISSIM, HCM, intersection, traffic, high rise buildings

ÖZET

YÜKSEK KATLI YAPILARIN KAVŞAKLAR ÜZERİNE ETKİSİNE BİR BAKIŞ: ICONOVA

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Gaziantep, Türkiye'nin sürekli gelişen ve büyüyen önemli sanayi şehirlerinden biridir. Artan nüfusun ve gelişen sanayinin bir sonucu olarak trafikteki araç sayısı her geçen gün artış göstermektedir. Nüfusun ihtiyaçlarını karşılayabilmek için yapılan yüksek katlı binaların sayısı azımsanmayacak kadar fazladır. Mevcut yolların kapasiteleri bu artışa bağlı olarak yetersiz kalmakta ve zaman içerisinde trafik akışında yavaşlamalara sebep olmaktadır. Iconova kavşağı, bu problemlerin yaşandığı kavşaklardan biridir. Primemall AVM'nin ve henüz tamamlanmamış olan yüksek katlı ICONOVA konutlarının aynı kavşakta yer almasından dolayı, şu anda kapasitesinin üst sınırlarında çalışan ICONOVA kavşağı, konutlar kullanılmaya başlayınca daha sıkışık hale gelecektir. Bu çalışmanın amacı, yüksek katlı yapıların trafiğe olan etkileri dikkate alınarak, daha uzun vadeli planlamalar yapmak ve HCM (Highway Capacity Manual) hesaplamaları ile VISSIM yazılımından faydalanarak Iconova kavşağı için çözüm önerisi sunmaktır. Bu çalışmayla, trafik akışının daha verimli hale getirilmesi amaçlanmıştır. Aynı zamanda, çalışmanın yüksek katlı yapıların trafiğe olan etkileri ve kavşak kapasite hesapları açısından bilimsel bir referans olması hedeflenmektedir.

Anahtar Kelimeler: VISSIM, HCM, kavşak, trafik, yüksek katlı binalar

To my son Metehan

and my daughter Defne...

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LIST OF SYMBOLS AND ABBREVIATIONS

LOS: Level of Service

HCM: Highway Capacity Manual

PT : Public Transport

SC : Signal Controls

FCD : Floating Car Data

veh : Vehicle

v/c : Ratio of Flow Rate to Capacity

SSG : Signal State Generator

PHF : Peak Hour Factor

SSM : Synchronous Strobe Module

VMS: Variable Message Signs

API : Application Programming Interface

SDK : Software Development Kit

VISSIM: Verkehr in Städten – Simulations-Modell

NTCIP : The National Transportation Communications for Intelligent Transportation System Protocol

OCIT : Open Communication Interface for Traffic Control

IoT : Internet of Things (METIS)

MQTT : Message Queuing Telemetry Transport

CoaP : The Constrained Application Protocol

METIS: Central Traffic Management System

CHAPTER 1

INTRODUCTION

1.1 General

There are two main reasons of traffic intensity at intersections between the entrance of residential areas and urban roads: the first one is that non-forward planning in the building bylaws, the second one is that disregarding highway capacity while constructing high rise buildings. Gaziantep is the eighth most populous city in Turkey. As of 2016, its population was about 2 million. Gaziantep, which has borderline with Syria, lets in immigrants about 400.000 after the civil war in Syria (The Ministry of Interior, Immigration Authority, 2018). As a result of this migration, city population and number of vehicles have increased (Nearly 4000 cars came from Syria). With increasing in population, it has begun to build high rise constructions. *The current problem* in ICONOVA intersection is traffic intensity because of both connection to orbit road and Prime Mall (shopping mall) is located in this junction. It is expected that intersection capacity will become much more insufficient and traffic density will increase after settlement to high rise ICONOVA Towers. In order to improve the waiting times in traffic, traffic management software should be used. For this purpose, METIS which is a cost-effective and up-to-date software is used in Gaziantep.

1.2 Objectives of Study

In this study, intersection capacity and current problems described in Section 1.1 (General) will be discussed. In addition, solution proposals will be offered by considering the high rise buildings. The main objective is that to examine the effect of high rise buildings such as ICONOVA Towers on intersections. This study will shed light on the academic world and be a basis for other researchers’ studies in this area.

1.3 Outline of the Thesis

Chapter 1 - Introduction: In this chapter, the main target of the study was fully described and given information about the problem at Iconova intersection.

Chapter 2- Literature Review: In this chapter, it is summarized what was done before about our study in literature.

Chapter 3- Methodology: This chapter describes the traffic count made at Iconova intersection and observations. In addition, information about software used and methods are given.

Chapter 4 - Results and Discussion: Results that obtained from VISSIM (Verkehr in Städten – Simulations-Modell) were discussed.

Chapter 5 - Conclusions and Recommendations: Interpretations of the thesis were done and the required arrangements were explained.

CHAPTER 2

LITERATURE REVIEW

In an article that is written by Eldemery (2007), needs and effects of high rise buildings were discussed. According to this article, high rise buildings need more special engineering when they compared with low and medium ones. Increase in population and urbanization require the construction of high rise buildings. Tall buildings are a necessity to allow for accommodation of large numbers of people and also, more sustainable form of urban development.

Çakıcı and Murat (2016) investigated signalized roundabouts and also, offered a new calculation procedure for signal timing and phase plan. Signalized roundabouts occur due to increase in traffic and in situations where intersection capacity cannot use. Performance analysis can be done by some software programs; however, signal timing cannot be calculated. In the new calculation method, performance analysis for signalized roundabouts was done by VISSIM software and signal timing was calculated with an equation that is developed by Çakıcı (2014).

In a research by Wu et al. (2016), it was investigated the capacity of signalized intersections depends on geometric, weather, and other conditions. For capacity estimation, the proposed model is applicable for data from the over-saturated situation and coordinated traffic signals. End of calculation of signalized intersection capacity estimated queue lengths under unsaturated situations. The relationships between capacity and stochastic characters of signalized intersections were investigated based upon the Queue theory of signalized intersections.

VISSIM is a traffic simulation method. In literature, there are some example researches about VISSIM. Sekhar et al. (2013) investigated the effects of the fuel consumption of vehicles in Ahmedabad, India by VISSIM. The fuel consumption of the vehicles are growing because of increasing road lengths, personal transportation, and congested intersections. VISSIM described in this article as “consist stochastic, microscopic traffic flow simulation program that is designed for the highway and urban operations” (Sekhar et al., 2013). It is used to analyze roads, vehicle tracking model. VISSIM is a powerful software tool for traffic simulation which could handle large networks.

In Bloomberg and Dale (2000) study, VISSIM and CORSIM (Corridor Simulation) models were compared. CORSIM is a similar simulation model with VISSIM. The comparison was conducted by throughput and LOS (Level of Service). According to results that obtained from throughput and LOS were similar, however, HCM predictions were different in some situations. One of the distinctions is that VISSIM is more flexible to state data type. Another one is that VISSIM states travel time routes between two points while CORSIM composes travel times for each. Results of Bloomberg and Dale (2000) study showed that two models are quite similar.

The traffic effects of building construction projects were discussed by Hyari et al. (2015). The aim of his study is that to decrease the negative effects of these kinds of building construction projects in urban areas. In parallel with this purpose, Hyari et al. (2015) generated a traffic management plan. The proposed plan was developed at 3 steps: Firstly, construction traffic management plans (CTMP) for 20 building projects that already exist were looked over. Then, 7 projects in urban areas were visited and finally, sessions were organized to obtain information from professionals. Main steps of the new plan are available in the project in detail.

In a study that was made by Hokao and Mohamed (1999), it was discussed the traffic congestion in big cities and effects of new constructions. According to this research, one of the main reasons for traffic congestion in Bangkok is the insufficient implementation of land-related measures. The recommendation to Bangkok Administration is that to regulate policies. Also, they offered to apply standards during the building of new constructions and to check the location of these developments by the government. In addition, signalization and geometry at the intersections could be renewed, in this manner, congestion could be prevented. Other mitigation methods were categorized by subject as land-use measures and transportation measures in the study.

Al-Kodmany (2012) investigated the reasons of increment in high rise building construction and discussed advantages-disadvantages of tall buildings. According to this article, causes of the high rise building construction are population, globalization, agglomeration, urban regeneration, energy, and climate change and etc. On the other hand, Al-Kodmany (2012) referred to the disadvantages of the topic. These are economic, environmental, the reasons related to public safety, civil infrastructure and etc. Due to these reasons, he recommended managing of high rise building construction by an efficient plan. While increasing advantages, disadvantage should be minimized.

In a similar study by Gregoletto and Luz Reis (2015), the view of the people living in urban areas on high-rise buildings was examined. A questionnaire of 148 participants including architects, non-architects college graduates and non-graduates was conducted. As a result of the questionnaire, it was concluded that at least 10 floors construction were perceived as high-rise buildings. Also, it was concluded that the high-rise buildings increases the traffic intensity, population and overload in urban infrastructure.

In study of Ehlert et al. (2016), a mesoscopic simulation method in VISSIM was presented for intersection parameter calibration. Differences between mesoscopic and microscopic method were determined by PTV VISSIM software. When the mesoscopic method compared with the microscopic, mesoscopic method has fast run times. Also, it concluded that the microscopic method is more complex than mesoscopic.

In a study that made by Köksal and Emirza (2011), it has tried to examine the preferences and motivation of the owners and managers of stores located both on streets and inside shopping malls regarding the choice of store location. The sample set was selected by snowflake sampling method from street stores and stores inside shopping centers located within the borders of Ankara. According to this article, shopping centers and stores that located on the streets are the most preferable places for owners and this causes traffic intensity. In this study, face to face survey method was used to make a comparison of shopping malls and street stores in regard to the choice of store location in Ankara. The survey was applied to 100 store owners and managers. According to results; parking opportunities, playgrounds for children, a wealth of social activities, security services, hot or cold air inside the shopping malls depends on seasons and the hygiene is advantages of a shopping mall. On the other hand, some people think that the stores on the street are cheaper.

Some intersections data that have been affected the capacity of intersections such as the saturation flow was investigated for determining the capacity at signalized intersections by Chodur et al. (2011). According to the study; there are some differences between rural intersection design and urban intersection design. At the rural intersection, more emphasis puts on dynamics, however at an urban intersection; it is on the efficiency of service of different road users. The rural intersection needs to improve safety. Rural roads have higher operating speeds, the slow-down stretch is longer, and has longer queues in urban areas. In addition, traffic control via signals is used more often at rural intersections. When demand flows and intersection design has compared, traffic performance at urban intersections would be better than rural intersections on the lanes.

Microsimulation software (VISSIM, AIMSUM) consists of a probabilistic request and driver behavior for modeling the variability of traffic process (Akçelik, 2016). Simulation models require validated and detailed input data. It is difficult to estimate saturation flow, capacity, and volume to capacity ratio since the simulated queue discharge is normally based on car tracing models.

In a study made by Bang et al. (2016), some methods for determination of signal timing were investigated and applied in CAPCAL 4 software. This software is related to the detailed saturation flow model opposite lanes, green times and minimum green periods and also their application in the process of signal timing. Saturation flow is the traffic flow at the queue discharge and has some effects such as the ratio of left and right turning, geometric design and degree of conflict. According to Rijn (2004), if traffic signals on artery are 0.4 km away from the intersection, flows may not be random (Rijn, 2004).

In another article (Wu et al., 2016), contraflow left turn lane (CLL) at the signalized intersection was studied. The aim of the CLL is to increase capacities of intersections which have intensive left-turn demand. This lane has been applied in the Handan City of China. This design allows left turning to vehicles for entering contraflow left turn lanes, therefore, there will be 2 more left turn lanes and intersection capacity will increase.

Traffic congestion can be solved by methods which are real-time control, the time of day control and fixed time control. In the real-time control method, traffic information obtained by sensors is analyzed and created proper signal timing. Secondly, the ratio of signal timing hour to day is described as the time of day control. And lastly, the fixed time control makes use of signal timing by the administrator. In this study, the real-time control method was used on the basis of VANETs to determine the length of the queue and cycle lengths (Yang et al., 2012).

Zhao et al. (2013) searched on the capacity of short part of the lane in their studies. In this study, adjusting the base saturation flow rate was made by using HCM diverse factors to analyze the capacities of signalized intersections. Short lane has limited length. The upstream short lane has positive and negative impacts on capacity such as influential green time and limited short lane length. For good operation, length of short lane must not be less than 100 m.

In a study that was made by Mathew et al. (2017), convenience of HCM calculations for entrance capacity of a four-streamed roundabout under complex traffic conditions was investigated. Two roundabouts were selected for study area. As a result of study, they expressed that there is an indirect proportion between entrance capacity (obtained from equation in HCM 2010) and circulatory flow. This result supports the suitability of HCM 2010 equations, however number of vehicles in circulating flow results to decrease number of vehicles may enter. So, they stated that HCM equation needs to be calibrated.

One of the most important points for intersections is the level of service. At the intersections with the high level of service, traffic flows proceed easily and traveling time shortens. In a study that made by Johnnie et al. (2012), they aimed to determine the level of service at the signalized roundabouts. Average delaying time was used as a parameter of intersection performance. As a result of the analysis, when the traffic signals at roundabouts turned off, it was observed to decimate in plunge at intersections, and also, a small increase in the level of service by the implementation of the roundabout. The study revealed that the important effect of signalized roundabouts on the plunge of intersections and confliction of vehicles.

It is known that there is an indirect proportion between the number of heavy vehicles and intersection performance. Tanyel et al. (2013) investigated the impacts of minibusses and different types of buses (articulated, non-articulated) on the performance of roundabouts by examining traffic conditions at 5 different roundabouts in Izmir, Turkey. Researches carried out by considering main road and side road, separately. As a result of the study, it is stated that if the average velocity is low at the main stream, the effect of heavy vehicles is seen more.

By means of GIS (Geographic Information System), it is possible to compare many data such as population density and socio-economic status, demographic characteristics, geographical structure, mode of transportation, life style, states of competitors of construction area (Yılmaz and Altunışık, 2003).

The shopping malls have a significant market share in today's retail sector due to their superior social activities, lack of vehicle parking problems, safety, product variety, hygiene and so on. By the development of the modern lifestyle, retailer stores have turned into large structures which is at monolithic regional shopping centers (Cheng and Ling Yu, 2007). The first shopping mall was built in the 1950s in America. Until today, it has reached important potential in the world. In many places around the world, shopping malls have reached a power attracting tourists. In terms of architectural designs and richness of supply, shopping malls have turned into entertainment centers rather than shopping places. “The Mall of America”, one of the largest shopping centers in America, is visited by an average of 42 million people every year (Cengiz and Özden, 2005). Building a shopping center requires large capital investments (Özdemir, 2007). In order to achieve the purpose of large-scale investments, the selection of the location of the establishment is emphasized. It is seen that the companies that are specialized in the construction sector are concentrated in the investments of shopping centers, which are expected to reflect the important experiences of the retail sector (Cengiz and Özden, 2005). Considering the issues expected from shopping malls in urban life, it is also useful to not miss out on the transportation distance and convenience of shopping malls.

CHAPTER 3

METHODOLOGY

3.1 Intersections

Intersections are common areas where traffic flows from two or more directions intersect, separate and conjoin. Considering vehicle traffic in different directions, traffic accidents at intersections are more likely to occur. Intersections should be designed to adapt to environmental conditions, to be the minimum possibility of accidents, minimum delaying, and expense of plant maintenance and maximum capacity. The points to consider in intersection design;

- ✓ There should be no complicated designs that confuse the driver
- ✓ Crossing streams of traffic flows should be as low as possible
- ✓ The main traffic flow passing through the intersection should be at least flowing in the direction of the stream
- ✓ Non-homogenous flows should be separated
- ✓ The speed at the intersection should be checked by the physical structure
- ✓ The situation of vehicles coming from all directions should be examined
- ✓ Regulations should be made so as not to cause accidents
- ✓ Alternative solutions should be evaluated (Umar and Yayla, 1992; Çakıcı, 2014).

Intersections are divided into 2 groups according to the condition of the platform they intersect; ***grade intersections*** and ***bridge crossings***. Bridge crossing is applied at crossing areas where traffic volume and traffic congestion are very high. Cost of this type of intersections is quite high. On the other hand, grade intersections are intersection types which seen more problems at intersections such as traffic accident and traffic congestion.

3.1.1 Grade Intersections

In the design of grade intersections, factors such as security, control, and capacity should be prioritized. The points to consider in the design of grade intersections;

- ✓ Economy
- ✓ Topography
- ✓ Visibility of all vehicles that entering and exiting the intersection
- ✓ Environmental harmony and aesthetic
- ✓ Exiting the intersection with small maneuver (Tunç, 2003).

It is also possible to divide grade intersections into groups as uncontrolled grade intersections, controlled (signalized) grade intersections, roundabouts, and signalized roundabouts.

- ✓ Signalization systems are the control devices used to provide a regular and safe flow at the intersections. The aim of signalization is that to provide traffic flows and pedestrians use the intersection safely and at the optimum capacity. ***Signalized grade intersections*** have been designed on this purpose.
- ✓ One of the primary control systems used as the solution of traffic engineering problems around the world is the ***roundabouts***. Roundabouts are intersections generally around a circular island where the traffic moves clockwise or counterclockwise (Janssens, 1994; Çakıcı, 2014).

Figure 3.1: An example of modern roundabouts in Carmel, USA (Cakici, 2014)

The geometric elements of the intersection should be designed according to the standards to achieve desired and expected performance at the roundabouts. Design in accordance with standards increases the performance of intersection and decreases the possibility of traffic accidents at the intersection. Therefore, the modern design of roundabouts is quite important. Project type and speed of the vehicle, sight distance, deviation degree, the diameter of the circle, the width of turning lane, entering and exiting lane and lightening should be taken into consideration (Tanyel, 2001). Geometric elements of a modern roundabout have been shown in Figure 3.2.

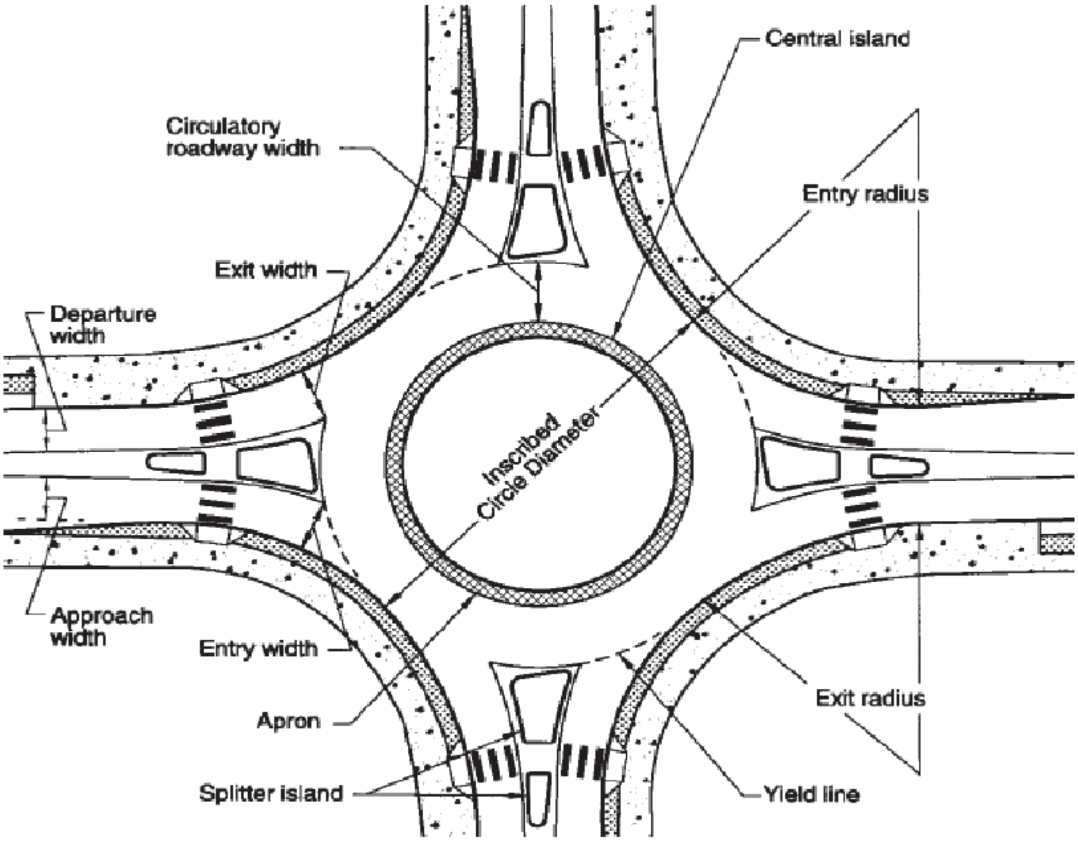

Figure 3.2: Geometric Elements of Modern Roundabouts (Russell et al., 2005)

Signalized roundabouts are one of the grade intersection types that are formed by the combination of signalized intersections and roundabouts. Nowadays, there are two types of signalized roundabouts. First one is the partially controlled signalized roundabouts which are generally common in Australia. The aim of this type is to prevent delaying and long lines. The second one is the fully controlled signalized roundabouts which are common in developing countries like Turkey. This type has signalizing systems at both junction sections and some points around the central island. Plan of partially controlled signalized roundabouts and fully controlled signalized roundabouts have been shown in Figure 3.3 and 3.4 (Çakıcı, 2014).

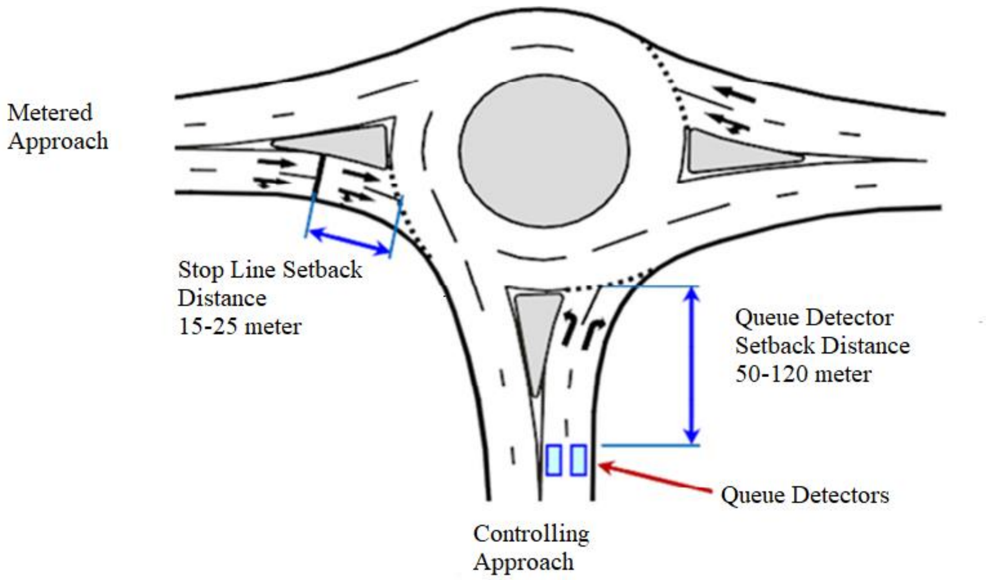

Figure 3.3: Plan of Partially Controlled Signalized Roundabouts (Çakıcı, 2014)

Figure 3.4: Nijmegen Roundabout, Gaziantep, Turkey

3.1.2 Bridge Crossing

Bridge Crossing is the intersection where intersecting traffic flows are transferred to different grades. This type is a drastic solution against to traffic accidents and delays.

However, the disadvantage of this intersection is that the expense of its design is quite high and the area to be used for intersection in the city is limited. Therefore, it is difficult to build this type of intersection. On the other hand, it is obligatory to design bridge crossing where it is more difficult and expensive to apply grade intersection because of topographic conditions, on motorways and where traffic congestion cannot be reduced. Factors affecting the capacity of bridge crossing are as follows: the geometric structure of the junction section, the geometric structure of entering and exiting terminals, and traffic intensity on main roads. In Figure 3.5 and 3.6, examples of bridge crossing have been shown.

Figure 3.5: Beykent Bridge Crossing-1, Gaziantep, Turkey

Figure 3.6: Beykent Bridge Crossing-2, Gaziantep, Turkey

3.2 Intersection Capacity

Transportation is, at the simplest term, transferring the people, animals, and stuff from one place to another place. The increment in the world population and in parallel with this, the increment in the number of motorized and non-motorized vehicles bring with many problems such as material and non-material losses because of traffic accidents, environmental harms because of exhaust emissions and noise pollution caused by vehicles. Traffic jam is the result of increased use of the road network, advancing at slower speeds, traveling longer and waiting in line. If the traffic intensity limits the movement of the vehicles, this situation is called 'traffic congestion'. When the traffic intensity is approaching the capacity of a part or all part of the road, heavy traffic congestion occurs. Traffic signals focus on the estimation of delays and queue lengths that result from the adoption of a signal control strategy at individual intersections, as well as on a sequence of intersections. Traffic delays and queues are principal performance measures that enter into the determination of intersection level of service (LOS), in the evaluation of the adequacy of lane lengths, and in the estimation of fuel consumption and emissions. There are many reasons that cause a traffic jam. In Figure 3.7, traffic congestion has been occurred because of too many numbers of vehicles.

Figure 3.7: Traffic Intensity (source: internet images)

Capacity is defined as the maximum sustainable flow rate at which vehicles or people reasonably can be expected to traverse a point or uniform segment of a lane or roadway during a specified time period under given roadway, geometric, traffic, environmental, and control conditions; usually expressed as vehicles per hour, passenger cars per hour or people per hour (HCM 2010). Capacity at signalized intersection depends on concept saturation flow and saturation flow rate Highway Capacity Manual has indicated the capacity of a potentiality is the maximum hourly rate at which people or vehicles logically can be anticipated to traverse a point or a uniform section of a lane or roadway during a given time period under prevailing roadway, traffic, and control conditions. Vehicle capacity is the maximum number of vehicles that can pass a determined point during a specified period under substitution roadway, traffic, and control conditions. This assumes that there is no effect from downstream traffic operation, such as the backing up of traffic into the analysis point. The capacity analysis observes segments or points of an opportunity under uniform traffic, roadway, and control conditions. These conditions determine capacity; therefore, segments with different prevailing conditions will have distinct capacities. LOS (Level of Service) criteria for signalized intersections were shown in Table 3.1.

Table 3.1: LOS Criteria for Signalized Intersections (HCM 2010)

LOS	Control Delay per Vehicle (s/veh)
A	≤ 10
B	>10-20
C	>20-35
D	>35-55
E	>55-80
F	>80

3.3 HCM Calculations

3.3.1 Minimum Green Time

If pedestrian timing requirements exist, the minimum green time for the phase is indicated and provided for in the signal timing. Equation 3.3.1 gives the minimum green time (HCM 2010).

$$Gp = 3.2 + \frac{L}{Sp} + (0.81\frac{Nped}{WE}) \quad \text{for } W_E > 3.0 \text{ m}$$

$$Gp = 3.2 + \frac{L}{Sp} + (0.27\,Nped) \quad \text{for } W_E \leq 3.0 \text{ m} \qquad (3.3.1)$$

where

Gp = minimum green time (s),
L = crosswalk length (m),
Sp = average speed of pedestrians (m/s),
W_E = effective crosswalk width (m),
3.2 = pedestrian start-up time (s),
Nped = number of pedestrians crossing during an interval (p) (HCM 2010).

3.3.2 Determining Flow Rate

A peak 15 minutes flow rate is derived from an hourly volume by dividing the movement volumes by an appropriate peak-hour factor (PHF), which may be defined for the intersection as a whole. The flow rate is calculated by using Equation 3.3.2 (HCM 2010).

$$Vp = \frac{V}{PHF} \tag{3.3.2}$$

where

Vp = flow rate during peak 15-min period (veh/h),

V = hourly volume (veh/h),

PHF = peak-hour factor.

3.3.3 Determining Saturation Flow Rate

The saturation flow rate for each lane group is calculated by using Equation 3.3.3 (HCM, 2010).

$$s = s_o \, N f_w f_{HV} f_g f_p f_{bb} f_a f_{LU} f_{LT} f_{RT} f_{Lpb} f_{Rpb} \tag{3.3.3}$$

where

s = saturation flow rate (veh/h),

s_o = base saturation flow rate per lane (pc/h/ln),

N = number of lanes,

f_w = adjustment factor for lane width,

f_{HV} = adjustment factor for heavy vehicles in traffic stream,

f_g = adjustment factor for approach grade,

f_p = adjustment factor for existence of a parking lane and parking activity adjacent to lane group,

f_{bb} = adjustment factor for blocking effect of local buses that stop within intersection area,

f_a = adjustment factor for area type,

f_{LU} = adjustment factor for lane utilization,

f_{LT} = adjustment factor for left turns,

f_{RT} = adjustment factor for right turns,

f_{Lpb} = pedestrian adjustment factor for left turn movements,

f_{Rpb} = pedestrian-bicycle adjustment factor for right turn movements.

3.3.4 Determining Capacity and Ratio of Flow Rate to Capacity (v/c)

Capacity at a signalized intersection is based on saturation flow and saturation flow rate. By using Equation 3.3.2 and 3.3.3, capacity and ratio of flow rate to capacity (v/c) can be calculated (HCM, 2010).

$$ci = si\,\frac{gi}{C} \qquad (3.3.4a)$$

where

c_i = capacity of lane group i (veh/h),

s_i = saturation flow rate for lane group i (veh/h),

g_i/C = effective green ratio for lane group i.

The ratio of flow rate to capacity (v/c) is given symbol X in intersection analysis. It is referred to the degree of saturation (HCM, 2010).

$$Xi = \left({}^{v}/_{C}\right)i = \frac{vi}{si\left({}^{gi}/_{C}\right)} = \frac{vi\,C}{si\,gi} \qquad (3.3.4b)$$

where

X_i = ratio for lane group i,

v_i = actual or projected demand flow rate (veh/h),

s_i = saturation flow rate (veh/h),

g_i = effective green time (s),

C = cycle length (s).

3.4 Traffic Count Methods

Traffic count is the enumeration of the vehicles for determining traffic flow rate. In addition, it gives information about vehicle composition and speed. When the maximum flow is exceeded, it limits the capacity and this causes traffic congestion. Traffic count is taken every year on national highways and every 3 or 5 years on county roads. It is made a few times in a year for intersections. At intersections, traffic count must be made on each branch for each movement.

Traffic count can be made by two methods, including manual and automatic. The most general method is the manual count. It can count roads with more than one lane. On the other hand, the automatic count is used to count vehicles by using a magnetic detector. The most common detector types are pneumatic tubes, inductive loops, weigh-in-motion sensor, and micro millimeter wave radar detector (HCM, 2010).

In this study, manual counting method was used.

3.5 METIS

Metis is web-based central traffic control software which can make a live connection with intersections in accordance with international communication standards. This digital map based system has the ability to control intersections remotely. In addition, it can perform statistical analysis according to current and past traffic data (METIS, 2017).

Properties of METIS;

- ✓ Analysis of traffic intensity
- ✓ Network management, event and strategy management
- ✓ Communication management
- ✓ Adding intersection via map
- ✓ Monitoring more than one intersection at the same time
- ✓ Making weekly signal schedule and screening past intersection plan
- ✓ SSM (Synchronous Strobe Module) data records and analysis
- ✓ Screening SSM history and analysis
- ✓ Reporting (Cross-comparison of vehicle numbers with green light times, the frequency of error data, etc.) (METIS, 2017)

3.5.1 Gaziantep METIS Platform Modules

a) Intersection Management Systems

By means of this system, the number and density of vehicles are calculated through the cameras placed at the intersections, and then, green light times with constant duration are made dynamic. Thus, there is an improvement in waiting times in the city centers. Currently, 288 intersections in Gaziantep are managed by this system (METIS, 2017).

b) Management of Cameras

To monitor the traffic situation, instantly, to detect, to track and to intervene in events such as traffic accidents, 45 cameras in the city are watched live. This number is determined according to the vehicle density at the main arteries in the city center (METIS, 2017).

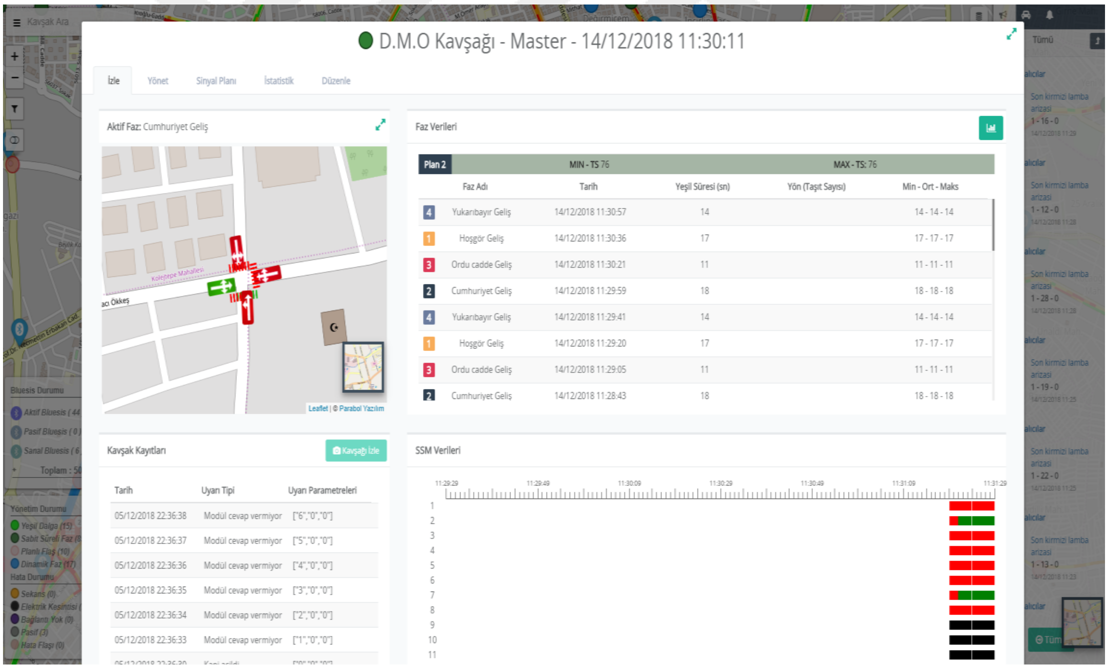

Figure 3.8: Intersection Management

c) Traffic Volume and Analysis

Values of speed and density are produced in every minute, in 50-meter section of the road and in all city road network (METIS, 2017).

d) Sensor Management

Travel time calculation is made on the determined road sections by Bluetooth devices placed at 50 different points (METIS, 2017).

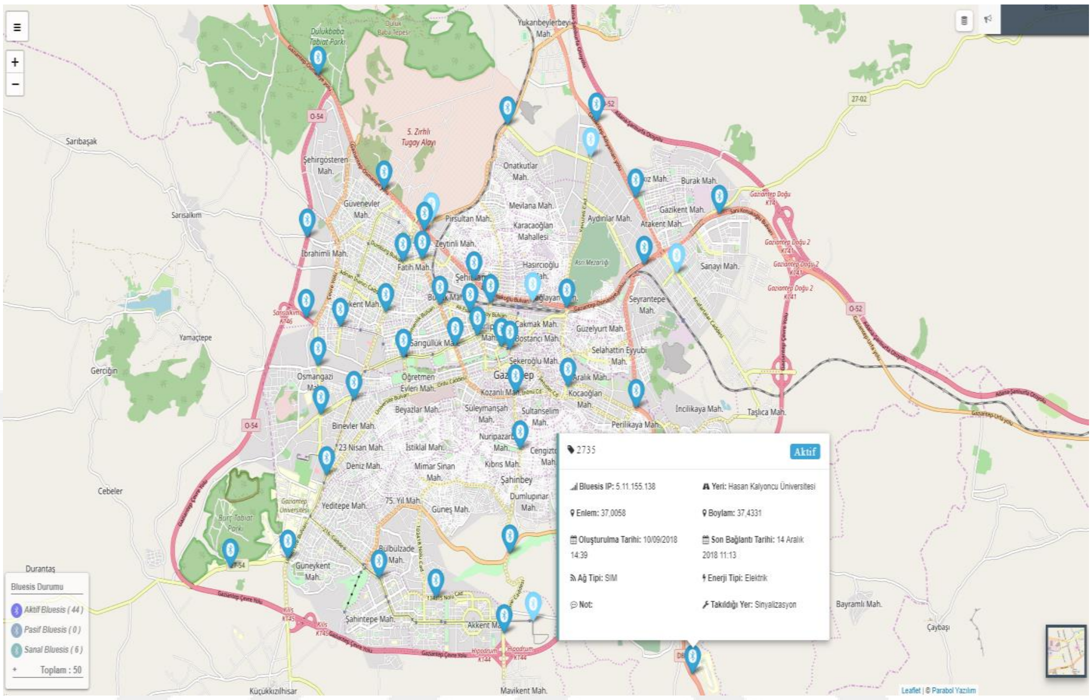

Figure 3.9: Sensor Management

e) Management Systems of Variable Message Signs

The traffic information collected and evaluated over the system is sent to vehicle drivers with 8 different variable message signs (VMS). Travel times acquired by using Bluetooth sensors are displayed on VMS and presented to the citizens. Through this module, operators can send their warnings against traffic incidents which are important in traffic management such as road congestion, speed condition, maintenance work (METIS, 2017).

Figure 3.10: Variable Message Signs

f) Barrier Management

By means of barriers that can be controlled remotely by operators in real time, municipal car parks or public areas can be opened to vehicles with priority vehicle pass-over advantage in emergency cases. Thus, time loss can be prevented and traffic disturbance can be minimized (METIS, 2017).

g) Automatic Incident Detection

In the main arteries of the city, the incident is detected within 15 minutes, and the system is validated with the cameras. Intersection information in the data base in the system, traffic abnormalities (accidents, etc.) are detected in real time, and the solution is produced quickly (METIS, 2017).

h) Intelligent Transportation Systems Performance Management

In the system, improvements in the traffic waiting times and consequently the reductions in carbon emissions and fuel consumption can be analyzed. Thus, users can observe and analyze the contributions of the system and use it as a reference for their planning (METIS, 2017).

i) Traffic Prediction Analysis

Traffic behaviors, seasonal variations, bottlenecks, points of attraction and traffic impact analysis of events can be predicted by using machine techniques. For example, operators can predict of 15, 30 and 60 minutes forward traffic density and analyze traffic behaviors (METIS, 2017).

j) Task Management

With this module, the processes between operators, field workers and departments can be followed in a map-based manner and the necessary information about the operation of the city can be easily accessed (METIS, 2017).

k) Traffic Editor

The structures in the city (signalization, parking etc.) and events (accident, road works etc.) are easily identified by traffic operators on the map and their domains are determined with this module. This traffic information is shared with the citizen through VMS and applications (METIS, 2017).

l) Primary Vehicle Passage System

It is an application that is used for preventing of losing time of ambulance and fire brigade vehicles on traffic. The system detects the position of the vehicle approaching the intersection by taking position information from the GPS module in the vehicle and instantly changes the signal pattern at the intersection. Thus, the confusion experienced during the passage of vehicles at the intersections such as ambulance and fire brigade vehicles is minimized and potential accidents can be prevented (METIS, 2017).

3.5.2 Technologies and Technical Specifications Used in Software

METIS (2017), which is used by Gaziantep Transportation and Rail Systems Department on the web and mobile platforms, utilizes the technologies listed below;

a) Cloud Computing

METIS platform can operate in open and closed cloud infrastructures. There are certain criteria used to measure the quality of service in cloud computing (METIS, 2017). Those are;

Availability is the ratio of the time at which the service is available within the defined time interval to the total defined time. Availability of METIS is 99%. **Reliability** is the ratio of the error-free rate within the defined time interval to the total defined time. Reliability of METIS is 99%. **Expandability** is the suitability of service for future additions and extensions. Since 2016, METIS has been working in Gaziantep Metropolitan Municipality, and nowadays, it manages over 200 devices and uses 5 sub-software. **Scalability** is the ability of the system to continue at the same level of performance, although the scope or content of the service has changed to meet user requirements. METIS has developed both technical and functional over the years (It can process 4 billion traffic data a day, manage up to 200 devices at the same time and share real-time traffic information with users), but maintains the same performance in service quality criteria as availability, reliability, and security during this development (METIS, 2017).

b) Integration, API, and SDK

The well-documented API (Application Programming Interface) and the SDK (Software Development Kit -provided to third-party software developers) reduce the time and costs of installing, configuring and maintaining software for up to 70%. Thanks to the architecture designed in accordance with international intelligent transportation systems communication protocols such as NTCIP (The National Transportation Communications for Intelligent Transportation System Protocol) and OCIT (Open Communication Interface for Traffic Control), today, different hardware types (intersection control devices, variable message signs, cameras, Bluetooth devices, barriers etc.) offered by many different manufacturers in traffic management can be managed through a single software interface (METIS, 2017).

c) Internet of Things (IoT) and Modularity

METIS is a platform software developed based on the principles of interoperability and modularity, is designed with the IoT architecture, which enables different types of equipment to communicate with each other and coordinate. It uses IoT communication protocols in accordance with international standards such as MQTT (Message Queuing Telemetry Transport), CoaP (The Constrained Application Protocol), and Message Queue. Thus, the user can be shaped the system according to his requests and requirements and not limited himself to a uniform software solution (METIS, 2017).

d) Big Data and Artificial Intelligence

METIS processes 4 billion daily data collected from many different data sources such as Bluetooth, GPS, camera, etc. by means of the machine and deep learning algorithms. As a result of the processing of this “Big Traffic Data”, analyzes are made to understand the travel behaviors, seasonality and abnormal traffic conditions in the city. METIS has been designed with a capacity to process over 1 trillion data per day with the foresight that citizens will be provided with traffic information that will help them during their travels and provide citizen-municipal communication (METIS, 2017).

e) Mobile Traffic Center

METIS offers two stages security level smartphone applications that allow all systems to be managed from the field in one interface to help municipalities make their traffic management services more efficient (METIS, 2017).

f) Unique Algorithms and Capabilities

Dynamic Intersection Management Algorithm is that reducing unnecessary green times according to traffic conditions. Waiting times at intersections have decreased by up to 35%. **Integrated Corridor Management Algorithm** is that optimizing traffic speed by creating a green wave. Traffic congestion has decreased by 20%. **Automatic Incident Detection and Strategy Algorithm** is that detection of traffic incidents with a 90% detection rate and 8% false alarm rate. Event detection and management have increased by 70%. **Traffic Condition Analysis and Reporting** provides traffic forecasts of 15, 30, 45 and 60 minutes and helps to make a holistic assessment. **Evaluating and Reporting of Traffic Management Systems** helps decision makers evaluate the effectiveness of traffic management systems (METIS, 2017).

g) User-Friendly Interface and Accessing

METIS offers great advantages in terms of operational costs and training requirements. Gaziantep Metropolitan Municipality can easily monitor, analyze and control all city traffic without the need for continuous technical support and guidance. Unlike existing traffic management centers in the world, METIS can be run from a single screen, a web interface, or a mobile application. User interfaces of METIS include each module unit, and operators can easily understand the cause and effect relations between modules. It helps traffic managers and decision-makers to obtain a holistic view of a city's transport network and all active systems at any time, and help them to respond quickly if necessary (METIS, 2017).

3.5.3 Software Architecture

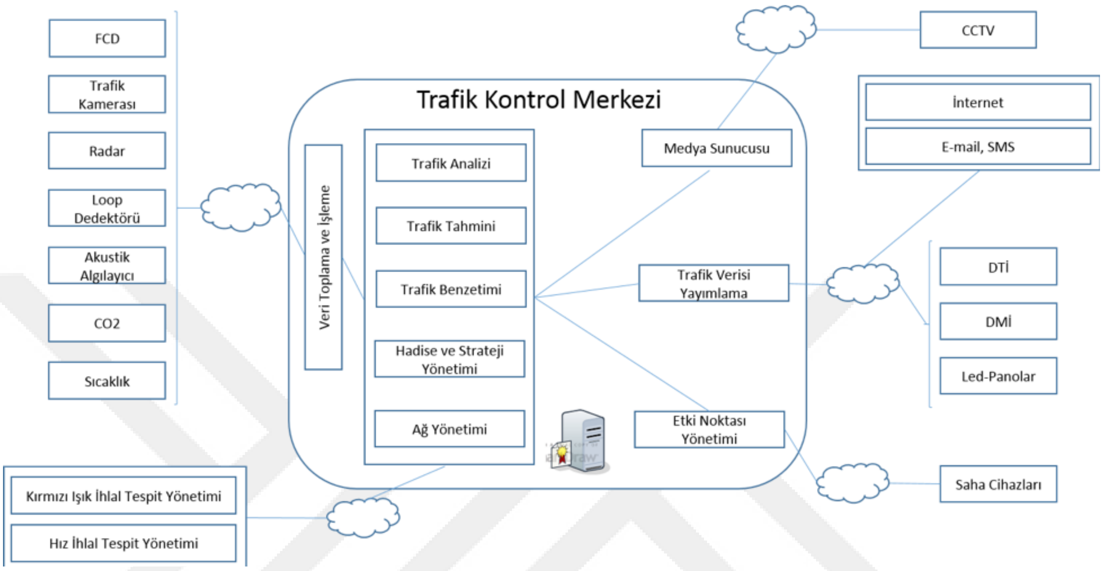

Figure 3.11: Central Management Systems of Intelligent Transportation System (METIS, 2017)

METIS is a multi-functional, platform software that provides remote and dynamic control and management about transportation management to users. METIS;

- It provides management of different field information and control devices such as dynamic intersection, VMS, camera.
- It can provide real-time traffic density information and prediction from non-sensor data sources such as FCD (Floating Car Data).
- By transforming the data collected from sensors such as FCD and Bluetooth, camera, loop detector etc. into significant information, it supports the sub-software which can provide statistical and intuitional analysis to understand the travel behavior of the users of different transportation modes such as anomalies in the transportation network, seasonality and driver, bicycle and pedestrian.

- Monitoring, analysis, control and management functions of sub-software are independent of each other but at the same time, a distributed structure that allows interoperability (METIS, 2017).

The sub-software running in METIS is divided into two as basic and functional. Basic software are software that will be used by each user and enable to communicate of functional software and their connection. Functional software are applications that enable the user to perform proactive transportation management and control at different levels (microscopic, mesoscopic and macroscopic) (METIS, 2017).

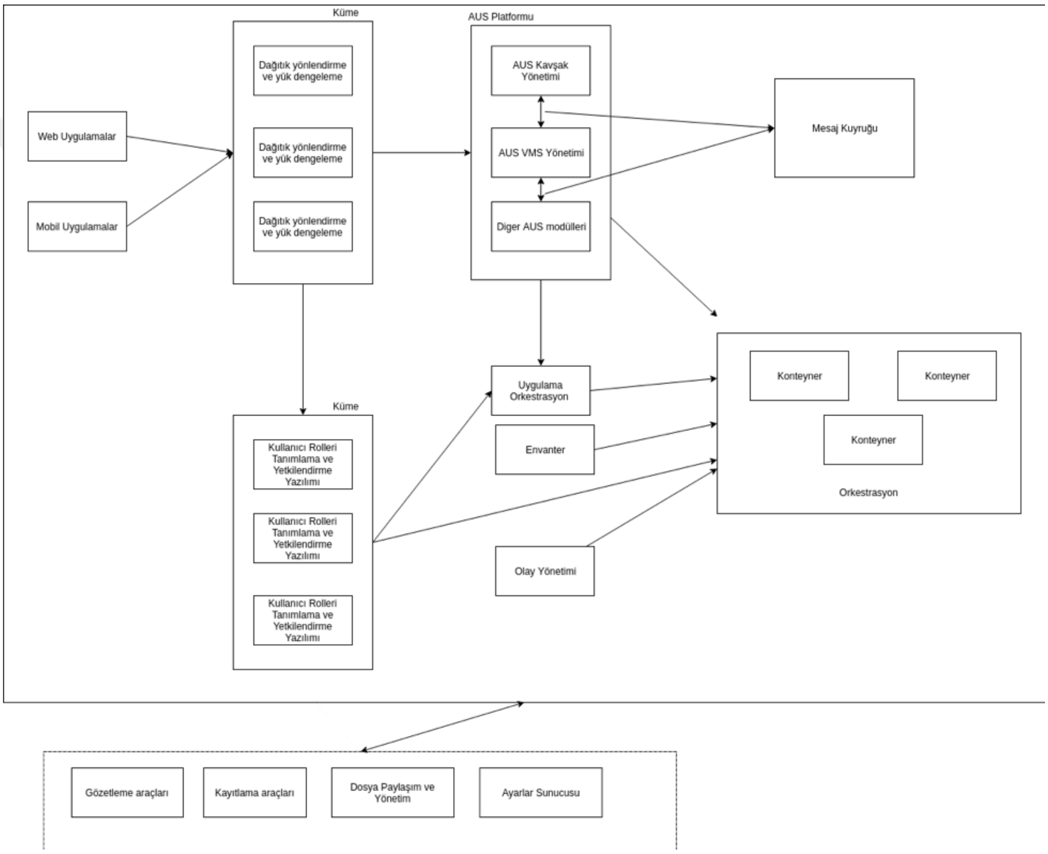

Figure 3.12: Software Reasonable Architecture

3.6 VISSIM

VISSIM is a microscopic simulation model which was developed in Germany during the early 1970s. The model is used to analyze highways and urban operations. It is possible to model different intersection geometries and different transport modes by using this software. In addition to these, pedestrian flow can be modeled. The inputs of VISSIM are road network construction, signal timing, vehicle composition input and flow input. The outputs of the model are the vehicle average delay, travel time, queue lengths and etc.

According to information that taken from PTV VISSIM (VISSIM the software by Planung Transport Verkehr Network Company) User Manual (2011), basic steps for designing network;

1. Open VISSIM and save a new network file.
2. Define simulation parameters.
3. Define desired speed distribution.
4. Define vehicle types.
5. Define vehicle compositions.
6. Load the project area map
7. Positioning, scaling and save the background.
8. Draw links and connectors for lanes and crosswalks.
9. Enter vehicle inputs at the end points of the network.
10. Enter routing decisions and correspond routes.
11. Define changes to the desired speed.
12. Edit conflict areas at non-signalized intersections.
13. Define stop signs for non-signalized intersections.
14. Define SC (Signal Controls) with signal groups, select times for fixed time controllers.
15. Insert signal heads.
16. Create detectors at intersections with traffic-actuated signal control.
17. Insert stop signs for right turning vehicles at a red light.
18. Enter priority rules for left turning vehicles at a red light.

19. Define dwell time distributions.

20. Define PT (Public Transport) lines.

21. Activate travel times, delays, measurements.

22. Perform simulations.

VISSIM contains two main components, including *Simulator* and *Signal State Generator (SSG)*. The simulator is a traffic flow model, including vehicle tracking. SSG is signal control software that uses detector information from the simulator. According to the detector information, it determines signal status for the next time step and returns this information to the simulator. The communication between simulator and SSG was shown in Figure 3.13 (PTV User Manual, 2011).

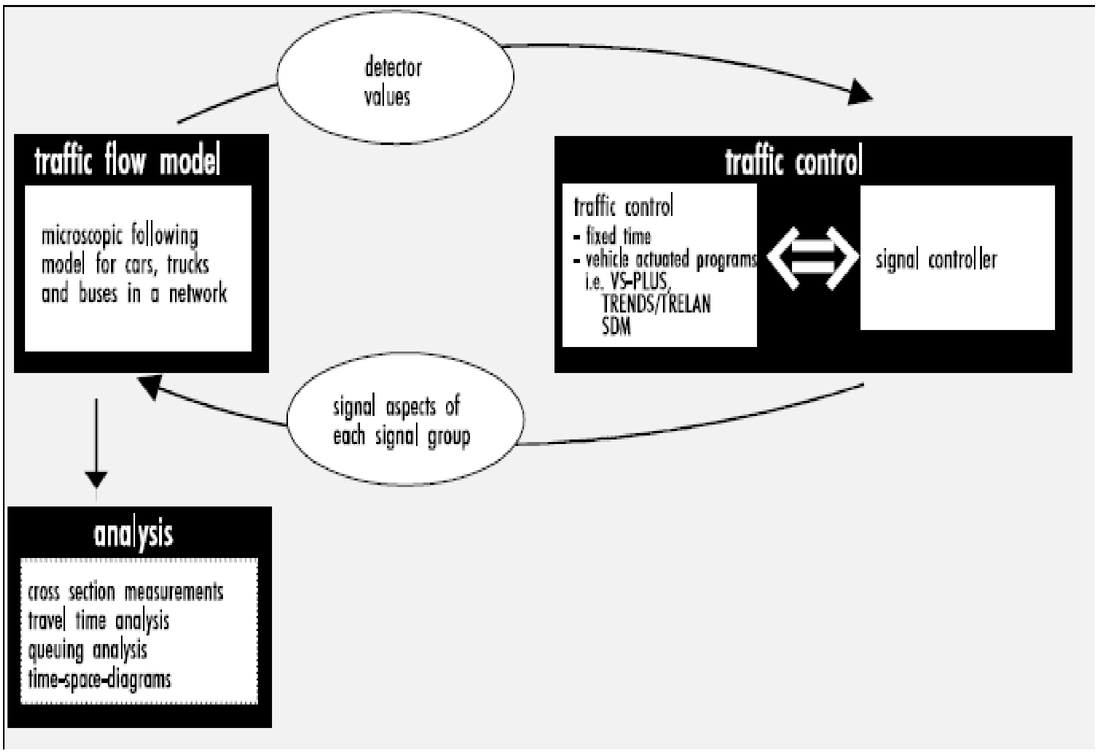

Figure 3.13: Communication between Simulator and SSG (PTV User Manual, 2011)

The essential parameters for using this model are;

Input values: Traffic counts, signal plans and project baselined.

Output values: Final report.

CHAPTER 4

RESULTS AND DISCUSSION

4.1 Study Area

Iconova intersection is the most comprehensive and largest project of eastern Turkey. The number of people to start living in towers is approximately 2400. This living number will directly affect the intersection capacities of the orbit roads. Iconova houses and commercial area are still in the construction stage. There is one of the popular shopping malls of Gaziantep which is called Prime Mall opposite the Iconova houses. There are 4 directions connected to an intersection in this area.Figure 4.1 shows the AutoCAD drawing of Iconova intersection.

Figure 4.1: AutoCAD Drawing of Iconova Intersection

Traffic flow in ICONOVA intersection has been shown in Figure 4.2, in detail.

Figure 4.2: ICONOVA Road Directions

Figure 4.3: Iconova Intersection Connected Directions

In Figure 4.3, connection ways are explained by using numbers;

- ✓ 1st direction is the connection way between Ezogelin and Primemall. (South)
- ✓ 2nd direction is the connection way between Ibrahimli and Primemall. (East)
- ✓ 3rd direction is the connection way between Mosque and Primemall. (North)
- ✓ 4th direction is the connection way between Acarsan and Primemall. (West)

4.2 Data Collection

According to the information received from the Municipality, the number of vehicles in Gaziantep;

• The license plates with "S" = **3400** (1300 school buses + 2100 personnel vehicles)
• The license plates with "H" = **841**

(487 yellow public buses + 184 blue public buses + 170 municipality buses)

• The license plates with "T" = **2288** (Taxis)

Following table shows the number of vehicles according to counting in specific hours at Primemall intersection (Table 4.1).

Table 4.1: Number of vehicles at Primemall intersection

	1st	2nd	3rd	4th	Total
MORNING	**929**	**1252**	**443**	**1689**	**4313**
1-U Turn	0	10	8	16	**34**
2- Left Turn	155	263	80	388	**886**
3- Straight Line	252	873	168	1126	**2419**
4-Right Turn	522	106	187	159	**974**
NOON	**435**	**704**	**555**	**887**	**2581**
1-U Turn	0	8	9	145	**162**
2- Left Turn	148	152	126	169	**595**
3- Straight Line	148	486	173	451	**1258**
4-Right Turn	139	58	247	122	**566**
EVENING	**610**	**1634**	**721**	**1091**	**4056**
1-U Turn	0	13	6	143	**162**
2- Left Turn	269	314	214	188	**985**
3- Straight Line	127	1243	203	629	**2202**
4-Right Turn	214	64	298	131	**707**

These results are the inputs of VISSIM.

4.2.1 VISSIM Results

The results obtained from VISSIM software are available in following tables (Table 4.2, 4.3, 4.4, 4.5, 4.6, 4.7, 4.8, 4.9, 4.10). According to directions of intersection; length of queue (Q_{LEN}- calculated instantaneous and last seen value), maximum length of queue (Q_{MAX}- the highest length of queue during simulation), number of vehicles (Vehs), number of persons (Pers), number of stops during simulation (stops) and fuel consumption have been listed. Stops (all), as a result of an average number of stops on the entire network. Therefore, they are not expressed as exact numbers. For example, if the total number of vehicles entering the intersection is 3200 and the total number of stops is 3000, the result is 3000/3200 = 0.94. In addition, since the program assumes that there is only one person in each vehicle, the number of vehicles and persons are equal. Simrun takes the average up to every running time of the program. It means that how many times the simulation runs, simrun takes the average up to that point. Since the simulation has run, it gives the average of all the values that have received up to average, standard deviation, minimum and maximum lines.

Table 4.2: Movement Evaluation-1

Movement Evaluation: SIMRUN	Direction	Q_{LEN}	Q_{LEN} (max)	Vehs (all)	Pers (all)	Stop (all)	Fuel Con sumpt ion
1	NE-NE	17,82	63,54	2	2	1	0,035
1	NE-N	2,31	68,91	557	557	0,22	5,727
1	NE-S	17,82	63,54	428	428	0,83	8,75
1	NE-SW	17,82	63,54	321	321	0,8	6,8
1	S-NE	22,24	110,93	247	247	1	5,344
1	S-N	31,33	103,07	1109	1109	0,9	23,791
1	S-S	31,33	103,07	48	48	0,77	0,836
1	S-SW	31,33	103,07	469	469	0,83	9,351
1	SW-NE	21,13	68,86	471	471	0,9	10,449
1	SW-N	21,13	68,86	278	278	0,81	5,84
1	SW-S	13,58	58,01	215	215	0,93	4,345
1	SW-SW	21,13	68,86	7	7	0,86	0,14
1	N-NE	25,62	86,76	414	414	0,85	8,975
1	N-N	25,62	86,76	9	9	0,78	0,188
1	N-S	25,62	86,76	941	941	0,93	20,914
1	N-SW	15,5	92,75	191	191	0,76	3,773
1	Total	18,69	110,93	5707	5707	0,81	115,263
1	S-NE	0	0	0	0		0

1	S-S	0	0	0	0		0
1	S-SW	0	0	0	0		0
1	S-N	0	0	0	0		0
1	S-E	0	0	0	0		0
1	S-E	0	0	0	0		0
1	S-S	0	0	0	0		0
1	SW-NE	5,12	44,4	198	198	0,86	3,661
1	SW-S	2,56	44,4	0	0		0
1	SW-SW	5,12	44,4	0	0		0
1	SW-N	5,12	44,4	63	63	1,59	1,546
1	SW-E	5,12	44,4	0	0		0
1	SW-S	5,12	44,4	0	0		0
1	N-NE	2,54	19,84	200	200	1,41	4,814
1	N-S	2,54	19,84	0	0		0
1	N-SW	2,54	19,84	96	96	0,5	1,241
1	N-N	2,54	19,84	12	12	2,58	0,425
1	N-E	2,54	19,84	0	0		0
1	N-S	2,54	19,84	0	0		0
1	E-NE	0	0	128	128	0,01	1,155
1	E-S	0	6,57	218	218	0	0,953
1	S-NE	0	0	0	0		0
1	S-E	0,02	6,41	109	109	0	0,287
1	NE-NE	4,23	50,32	489	489	0,7	10,275
1	NE-S	4,23	50,32	3	3	0	0,034
1	NE-SW	4,23	50,32	238	238	0,31	3,306
1	NE-N	2,11	50,32	479	479	0,03	4,277
1	NE-E	4,23	50,32	94	94	0,84	2,107
1	NE-S	4,23	50,32	0	0		0
1	Total	1,08	50,32	2327	2327	0,49	34,06

Table 4.3: Movement Evaluation-2

Movement Evaluation: SIMRUN	**Direction**	**QLEN**	**QLEN (max)**	**Vehs (all)**	**Pers (all)**	**Stop (all)**	**Fuel Con sump.**
2	NE-NE	19,43	78,06	3	3	1,33	0,076
2	NE-N	2,25	64,63	558	558	0,25	5,887
2	NE-S	19,43	78,06	414	414	0,87	8,806
2	NE-SW	19,43	78,06	306	306	0,81	6,596
2	S-NE	16,54	97,74	241	241	0,88	4,876
2	S-N	30,23	108,71	1097	1097	0,9	23,239
2	S-S	30,23	108,71	45	45	0,82	0,843
2	S-SW	30,23	108,71	460	460	0,79	8,931
2	SW-NE	22,47	74,53	453	453	0,92	10,024
2	SW-N	22,47	74,53	278	278	0,83	6,07
2	SW-S	16,04	63,68	239	239	1	5,169
2	SW-SW	22,47	74,53	8	8	0,75	0,166

2	N-NE	26,14	88,74	387	387	0,87	8,527
2	N-N	26,14	88,74	11	11	0,91	0,272
2	N-S	26,14	88,74	926	926	0,94	20,769
2	N-SW	17,5	93,02	196	196	0,81	4,056
2	Total	18,83	108,71	5622	5622	0,82	114,296
2	S-NE	0	0	0	0		0
2	S-S	0	0	0	0		0
2	S-SW	0	0	0	0		0
2	S-N	0	0	0	0		0
2	S-E	0	0	0	0		0
2	S-E	0	0	0	0		0
2	S-S	0	0	0	0		0
2	SW-NE	5,09	36,47	192	192	0,8	3,451
2	SW-S	2,54	36,47	0	0		0
2	SW-SW	5,09	36,47	0	0		0
2	SW-N	5,09	36,47	95	95	1,73	2,478
2	SW-E	5,09	36,47	0	0		0
2	SW-S	5,09	36,47	0	0		0
2	N-NE	2,53	27,09	197	197	1,4	4,724
2	N-S	2,53	27,09	0	0		0
2	N-SW	2,53	27,09	99	99	0,51	1,281
2	N-N	2,53	27,09	15	15	2,53	0,521
2	N-E	2,53	27,09	0	0		0
2	N-S	2,53	27,09	0	0		0
2	E-NE	0	0	136	136	0,03	1,249
2	E-S	0	0	194	194	0	0,0843
2	S-NE	0	0	0	0		0
2	S-E	0,02	6,12	104	104	0	0,276
2	NE-NE	3,8	31,35	507	507	0,64	10,358
2	NE-S	3,8	31,35	1	1	0	0,012
2	NE-SW	3,8	31,35	242	242	0,31	3,349
2	NE-N	1,9	31,35	467	467	0,03	4,132
2	NE-E	3,8	31,35	80	80	0,72	1,712
2	NE-S	3,8	31,35	0	0		0
2	Total	1,04	36,47	2329	2329	0,5	34,356

Table 4.4: Movement Evaluation-3

Movement Evaluation: SIMRUN	Direction	QLEN	QLEN (max)	Vehs (all)	Pers (all)	Stop (all)	Fuel Con sump.
3	NE-NE	19,75	76,8	0	0		0
3	NE-N	3,05	83,44	555	555	0,28	6,018
3	NE-S	19,75	76,8	434	434	0,88	9,305
3	NE-SW	19,75	76,8	318	318	0,85	6,954
3	S-NE	16,32	101,13	224	224	0,85	4,37
3	S-N	26,7	93,27	1106	1106	0,83	22,117
3	S-S	26,7	93,27	55	55	0,85	1,039
3	S-SW	26,7	93,27	444	444	0,77	8,525
3	SW-NE	20,13	64,82	429	429	0,95	9,708
3	SW-N	20,13	64,82	311	311	0,91	6,962
3	SW-S	12,37	50,81	208	208	0,86	4,058
3	SW-SW	20,13	64,82	8	8	0,88	0,169
3	N-NE	24,05	75,7	434	434	0,84	9,325
3	N-N	24,05	75,7	7	7	0,57	0,13
3	N-S	24,05	75,7	866	866	0,9	18,823
3	N-SW	14,8	79,98	194	194	0,81	4,029
3	Total	17,15	101,13	5593	5593	0,8	111,518
3	S-NE	0	0	0	0		0
3	S-S	0	0	0	0		0
3	S-SW	0	0	0	0		0
3	S-N	0	0	0	0		0
3	S-E	0	0	0	0		0
3	S-E	0	0	0	0		0
3	S-S	0	0	0	0		0
3	SW-NE	4,78	31,03	184	184	0,81	3,343
3	SW-S	2,39	31,03	0	0		0
3	SW-SW	4,78	31,03	0	0		0
3	SW-N	4,78	31,03	89	89	1,73	2,298
3	SW-E	4,78	31,03	0	0		0
3	SW-S	4,78	31,03	0	0		0
3	N-NE	2,6	24,02	211	211	1,36	4,993
3	N-S	2,6	24,02	0	0		0
3	N-SW	2,6	24,02	93	93	0,48	1,207
3	N-N	2,6	24,02	7	7	2,86	0,253
3	N-E	2,6	24,02	0	0		0
3	N-S	2,6	24,02	0	0		0
3	E-NE	0	0	135	135	0,01	1,215
3	E-S	0	0	188	188	0	0,814
3	S-NE	0	0	0	0		0
3	S-E	0,03	6,13	121	121	0,02	0,335
3	NE-NE	3,82	44,22	487	487	0,63	9,894
3	NE-S	3,82	44,22	4	4	0,5	0,068
3	NE-SW	3,82	44,22	241	241	0,27	3,251
3	NE-N	1,92	44,22	478	478	0,03	4,21
3	NE-E	3,82	44,22	77	77	0,7	1,612

3	NE-S	3,82	44,22	0	0		0
3	Total	1,02	44,22	2315	2315	0,48	33,498

Table 4.5: Movement Evaluation-4

Movement Evaluation: SIMRUN	**Direction**	**QLEN**	**QLEN (max)**	**Vehs (all)**	**Pers (all)**	**Stop (all)**	**Fuel Con sump.**
4	NE-NE	18,54	75,8	3	3	0,67	0,063
4	NE-N	2,89	89,17	557	557	0,24	5,843
4	NE-S	18,54	75,8	388	388	0,88	8,251
4	NE-SW	18,54	75,8	308	308	0,85	6,753
4	S-NE	20,29	137,09	223	223	0,89	4,545
4	S-N	29,69	129,23	1133	1133	0,86	23,355
4	S-S	29,69	129,23	49	49	0,8	0,883
4	S-SW	29,69	129,23	476	476	0,8	9,349
4	SW-NE	20,65	75,27	456	456	0,92	9,879
4	SW-N	20,65	75,27	272	272	0,88	5,95
4	SW-S	14,23	64,43	238	238	0,93	4,829
4	SW-SW	20,65	75,27	12	12	0,92	0,263
4	N-NE	23,55	72,07	427	427	0,8	9,028
4	N-N	23,55	72,07	11	11	0,55	0,191
4	N-S	23,55	72,07	877	877	0,9	18,972
4	N-SW	13,17	76,34	187	187	0,78	3,675
4	Total	17,88	137,09	5617	5617	0,8	111,82
4	S-NE	0	0	0	0		0
4	S-S	0	0	0	0		0
4	S-SW	0	0	0	0		0
4	S-N	0	0	0	0		0
4	S-E	0	0	0	0		0
4	S-E	0	0	0	0		0
4	S-S	0	0	0	0		0
4	SW-NE	4,21	32,95	187	187	0,7	3,199
4	SW-S	2,1	32,95	0	0		0
4	SW-SW	4,21	32,95	0	0		0
4	SW-N	4,21	32,95	88	88	1,65	2,17
4	SW-E	4,21	32,95	0	0		0
4	SW-S	4,21	32,95	0	0		0
4	N-NE	2,68	24,12	248	248	1,4	5,928
4	N-S	2,68	24,12	0	0		0
4	N-SW	2,68	24,12	73	73	0,59	1,005
4	N-N	2,68	24,12	14	14	2,14	0,428
4	N-E	2,68	24,12	0	0		0
4	N-S	2,68	24,12	0	0		0
4	E-NE	0	0	145	145	0	1,305
4	E-S	0,01	6,01	177	177	0,01	0,781

4	S-NE	0	0	0	0		0
4	S-E	0,03	6,03	80	80	0,05	0,24
4	NE-NE	3,55	43,21	450	450	0,61	9,011
4	NE-S	3,55	43,21	7	7	0,43	0,114
4	NE-SW	3,55	43,21	237	237	0,34	3,374
4	NE-N	1,78	43,21	476	476	0,02	4,161
4	NE-E	3,55	43,21	93	93	0,66	1,94
4	NE-S	3,55	43,21	0	0		0
4	Total	0,95	43,21	2275	2275	0,5	33,652

Table 4.6: Movement Evaluation-5

Movement Evaluation: SIMRUN	**Direction**	**QLEN**	**QLEN (max)**	**Vehs (all)**	**Pers (all)**	**Stop (all)**	**Fuel Con sump.**
5	NE-NE	18,79	88,4	3	3	0,67	0,06
5	NE-N	3,57	105,31	450	450	0,22	4,638
5	NE-S	18,79	88,4	325	325	0,87	6,91
5	NE-SW	18,79	88,4	267	267	0,88	5,946
5	S-NE	19,92	105,7	179	179	0,88	3,599
5	S-N	28,96	105,48	868	868	0,88	18,061
5	S-S	28,96	105,48	36	36	0,64	0,592
5	S-SW	28,96	105,48	367	367	0,78	7,155
5	SW-NE	20,22	60,34	324	324	0,92	7,263
5	SW-N	20,24	60,34	239	239	0,87	5,283
5	SW-S	13,69	49,5	184	184	0,94	3,671
5	SW-SW	20,22	60,34	14	14	0,86	0,305
5	N-NE	23,44	68,61	305	305	0,84	6,63
5	N-N	23,44	68,61	6	6	1,17	0,156
5	N-S	23,44	68,61	714	714	0,9	15,41
5	N-SW	12,36	72,88	144	144	0,74	2,834
5	Total	17,62	105,7	4425	4425	0,8	88,518
5	S-NE	0	0	0	0		0
5	S-S	0	0	0	0		0
5	S-SW	0	0	0	0		0
5	S-N	0	0	0	0		0
5	S-E	0	0	0	0		0
5	S-E	0	0	0	0		0
5	S-S	0	0	0	0		0
5	SW-NE	4,42	32,37	165	165	0,68	2,771
5	SW-S	2,21	32,37	0	0		0
5	SW-SW	4,42	32,37	0	0		0
5	SW-N	4,42	32,37	60	60	1,65	1,502
5	SW-E	4,42	32,37	0	0		0
5	SW-S	4,42	32,37	0	0		0
5	N-NE	2,72	25,37	171	171	1,36	4,067
5	N-S	2,72	25,37	0	0		0

5	N-SW	2,72	25,37	77	77	0,47	0,991
5	N-N	2,72	25,37	11	11	2,45	0,368
5	N-E	2,72	25,37	0	0		0
5	N-S	2,72	25,37	0	0		0
5	E-NE	0	0	117	117	0	1,048
5	E-S	0	0	153	153	0	0,666
5	S-NE	0	0	0	0		0
5	S-E	0,01	6,18	92	92	0	0,244
5	NE-NE	3,94	39,91	358	358	0,63	7,259
5	NE-S	3,94	39,91	1	1	0	0,012
5	NE-SW	3,94	39,91	168	168	0,37	2,426
5	NE-N	1,97	39,91	394	394	0,02	3,463
5	NE-E	3,94	39,91	70	70	0,79	1,531
5	NE-S	3,94	39,91	0	0		0
5	Total	1,01	39,91	1837	1837	0,47	26,334

Table 4.7: Movement Evaluation-Average

Movement Evaluation: SIMRUN	**Direction**	**QLEN**	**QLEN (max)**	**Vehs (all)**	**Pers (all)**	**Stop (all)**	**Fuel Con sump.**
AVG	NE-NE	18,87	76,52	2	2	0,92	0,047
AVG	NE-N	2,81	82,29	535	535	0,24	5,622
AVG	NE-S	18,87	76,52	398	398	0,87	8,405
AVG	NE-SW	18,87	76,52	304	304	0,84	6,61
AVG	S-NE	19,06	110,52	223	223	0,9	4,547
AVG	S-N	29,38	107,95	1063	1063	0,87	22,113
AVG	S-S	29,38	107,95	47	47	0,78	0,839
AVG	S-SW	29,38	107,95	443	443	0,79	8,662
AVG	SW-NE	20,92	68,76	427	427	0,92	9,465
AVG	SW-N	20,92	68,76	276	276	0,86	6,021
AVG	SW-S	13,98	57,28	217	217	0,93	4,414
AVG	SW-SW	20,92	68,76	10	10	0,85	0,209
AVG	N-NE	24,56	78,38	393	393	0,84	8,497
AVG	N-N	24,56	78,38	9	9	0,79	0,187
AVG	N-S	24,56	78,38	865	865	0,91	18,978
AVG	N-SW	14,67	82,99	182	182	0,78	3,674
AVG	Total	18,3	112,71	5393	5393	0,81	108,283
AVG	S-NE	0	0	0	0		0
AVG	S-S	0	0	0	0		0
AVG	S-SW	0	0	0	0		0
AVG	S-N	0	0	0	0		0
AVG	S-E	0	0	0	0		0
AVG	S-E	0	0	0	0		0
AVG	S-S	0	0	0	0		0
AVG	SW-NE	4,72	35,44	185	185	0,77	3,285
AVG	SW-S	2,36	35,44	0	0		0

AVG	SW-SW	4,72	35,44	0	0		0
AVG	SW-N	4,72	35,44	79	79	1,67	1,999
AVG	SW-E	4,72	35,44	0	0		0
AVG	SW-S	4,72	35,44	0	0		0
AVG	N-NE	2,61	24,09	205	205	1,39	4,905
AVG	N-S	2,61	24,09	0	0		0
AVG	N-SW	2,61	24,09	88	88	0,51	1,145
AVG	N-N	2,61	24,09	12	12	2,51	0,399
AVG	N-E	2,61	24,09	0	0		0
AVG	N-S	2,61	24,09	0	0		0
AVG	E-NE	0	0	132	132	0,01	1,194
AVG	E-S	0	2,52	186	186	0	0,811
AVG	S-NE	0	0	0	0		0
AVG	S-E	0,02	6,17	101	101	0,01	0,276
AVG	NE-NE	3,87	41,8	458	458	0,64	9,36
AVG	NE-S	3,87	41,8	3	3	0,19	0,048
AVG	NE-SW	3,87	41,8	225	225	0,32	3,141
AVG	NE-N	1,93	41,8	459	459	0,02	4,049
AVG	NE-E	3,87	41,8	83	83	0,74	1,785
AVG	NE-S	3,87	41,8	0	0		0
AVG	Total	1,02	42,83	2217	2217	0,48	32,38

Table 4.8: Movement Evaluation-Standard Deviation

Movement Evaluation: SIMRUN	Direction	QLEN	QLEN (max)	Vehs (all)	Pers (all)	Stop (all)	Fuel Con sump.
STDDEV	NE-NE	0,76	8,84	1	1	0,32	0,03
STDDEV	NE-N	0,55	16,35	48	48	0,03	0,56
STDDEV	NE-S	0,76	8,84	44	44	0,02	0,915
STDDEV	NE-SW	0,76	8,84	22	22	0,03	0,393
STDDEV	S-NE	2,56	15,66	27	27	0,06	0,647
STDDEV	S-N	1,73	13,22	110	110	0,03	2,348
STDDEV	S-S	1,73	13,22	7	7	0,08	0,16
STDDEV	S-SW	1,73	13,22	44	44	0,03	0,91
STDDEV	SW-NE	0,95	6,37	59	59	0,02	1,261
STDDEV	SW-N	0,95	6,37	26	26	0,04	0,606
STDDEV	SW-S	1,33	6,98	23	23	0,05	0,597
STDDEV	SW-SW	0,95	6,37	3	3	0,06	0,071
STDDEV	N-NE	1,24	8,94	53	53	0,02	1,082
STDDEV	N-N	1,24	8,94	2	2	0,26	0,053
STDDEV	N-S	1,24	8,94	90	90	0,02	2,22
STDDEV	N-SW	2,02	9,37	22	22	0,03	0,497
STDDEV	Total	0,71	14,11	543	543	0,01	11,164
STDDEV	S-NE	0	0	0	0		0
STDDEV	S-S	0	0	0	0		0
STDDEV	S-SW	0	0	0	0		0

STDDEV	S-N	0	0	0	0		0
STDDEV	S-E	0	0	0	0		0
STDDEV	S-E	0	0	0	0		0
STDDEV	S-S	0	0	0	0		0
STDDEV	SW-NE	0,4	5,39	12	12	0,08	0,333
STDDEV	SW-S	0,2	5,39	0	0		0
STDDEV	SW-SW	0,4	5,39	0	0		0
STDDEV	SW-N	0,4	5,39	16	16	0,06	0,447
STDDEV	SW-E	0,4	5,39	0	0		0
STDDEV	SW-S	0,4	5,39	0	0		0
STDDEV	N-NE	0,08	2,68	28	28	0,02	0,67
STDDEV	N-S	0,08	2,68	0	0		0
STDDEV	N-SW	0,08	2,68	12	12	0,05	0,137
STDDEV	N-N	0,08	2,68	3	3	0,26	0,098
STDDEV	N-E	0,08	2,68	0	0		0
STDDEV	N-S	0,08	2,68	0	0		0
STDDEV	E-NE	0	0	10	10	0,01	0,098
STDDEV	E-S	0	3,45	24	24	0	0,104
STDDEV	S-NE	0	0	0	0		0
STDDEV	S-E	0,01	0,15	16	16	0,02	0,039
STDDEV	NE-NE	0,25	6,95	60	60	0,03	1,29
STDDEV	NE-S	0,25	6,95	2	2	0,26	0,044
STDDEV	NE-SW	0,25	6,95	32	32	0,04	0,403
STDDEV	NE-N	0,12	6,95	37	37	0	0,332
STDDEV	NE-E	0,25	6,95	10	10	0,07	0,238
STDDEV	NE-S	0,25	6,95	0	0		0
STDDEV	Total	0,05	5,18	213	213	0,01	3,396

Table 4.9: Movement Evaluation-Minimum

Movement Evaluation: SIMRUN	**Direction**	**QLEN**	**QLEN (max)**	**Vehs (all)**	**Pers (all)**	**Stop (all)**	**Fuel Con sump.**
MIN	NE-NE	17,82	63,54	0	0	0,67	0
MIN	NE-N	2,25	64,63	450	450	0,22	4,638
MIN	NE-S	17,82	63,54	325	325	0,83	6,91
MIN	NE-SW	17,82	63,54	267	267	0,8	5,946
MIN	S-NE	16,32	97,74	179	179	0,85	3,599
MIN	S-N	26,7	93,27	868	868	0,83	18,061
MIN	S-S	26,7	93,27	36	36	0,64	0,592
MIN	S-SW	26,7	93,27	367	367	0,77	7,155
MIN	SW-NE	20,13	63,34	324	324	0,9	7,263
MIN	SW-N	20,13	60,34	239	239	0,81	5,283
MIN	SW-S	12,37	49,5	184	184	0,86	3,671
MIN	SW-SW	20,13	60,34	7	7	0,75	0,14
MIN	N-NE	23,44	68,61	305	305	0,8	6,63
MIN	N-N	23,44	68,61	6	6	0,55	0,13

MIN	N-S	23,44	68,61	714	714	0,9	15,41
MIN	N-SW	12,36	72,88	144	144	0,74	2,834
MIN	Total	17,15	101,13	4425	4425	0,8	88,518
MIN	S-NE	0	0	0	0		0
MIN	S-S	0	0	0	0		0
MIN	S-SW	0	0	0	0		0
MIN	S-N	0	0	0	0		0
MIN	S-E	0	0	0	0		0
MIN	S-E	0	0	0	0		0
MIN	S-S	0	0	0	0		0
MIN	SW-NE	4,21	31,03	165	165	0,68	2,771
MIN	SW-S	2,1	31,03	0	0		0
MIN	SW-SW	4,21	31,03	0	0		0
MIN	SW-N	4,21	31,03	60	60	1,59	1,502
MIN	SW-E	4,21	31,03	0	0		0
MIN	SW-S	4,21	31,03	0	0		0
MIN	N-NE	2,53	19,84	171	171	1,36	4,067
MIN	N-S	2,53	19,84	0	0		0
MIN	N-SW	2,53	19,84	73	73	0,47	0,991
MIN	N-N	2,53	19,84	7	7	2,14	0,253
MIN	N-E	2,53	19,84	0	0		0
MIN	N-S	2,53	19,84	0	0		0
MIN	E-NE	0	0	117	117	0	1,048
MIN	E-S	0	0	153	153	0	0,666
MIN	S-NE	0	0	0	0		0
MIN	S-E	0,01	6,03	80	80	0	0,24
MIN	NE-NE	3,55	31,35	358	358	0,61	7,259
MIN	NE-S	3,55	31,35	1	1	0	0,012
MIN	NE-SW	3,55	31,35	168	168	0,27	2,426
MIN	NE-N	1,78	31,35	394	394	0,02	3,463
MIN	NE-E	3,55	31,35	70	70	0,66	1,531
MIN	NE-S	3,55	31,35	0	0		0
MIN	Total	0,95	36,47	1837	1837	0,47	26,334

Table 4.10: Movement Evaluation-Maximum

Movement Evaluation: SIMRUN	**Direction**	**Q_{LEN}**	**Q_{LEN} (max)**	**Vehs (all)**	**Pers (all)**	**Stop (all)**	**Fuel Con sump.**
MAX	NE-NE	19,75	88,4	3	3	1,33	0,076
MAX	NE-N	3,57	105,31	558	558	0,28	6,018
MAX	NE-S	19,75	88,4	434	434	0,88	9,305
MAX	NE-SW	19,75	88,4	321	321	0,88	6,954
MAX	S-NE	22,24	137,09	247	247	1	5,344
MAX	S-N	31,33	129,23	1133	1133	0,9	23,791
MAX	S-S	31,33	129,23	55	55	0,85	1,039
MAX	S-SW	31,33	129,23	476	476	0,83	9,351

MAX	SW-NE	22,47	75,27	471	471	0,95	10,449
MAX	SW-N	22,47	75,27	311	311	0,91	6,962
MAX	SW-S	16,04	64,43	239	239	1	5,169
MAX	SW-SW	22,47	75,27	14	14	0,92	0,305
MAX	N-NE	26,14	88,74	434	434	0,87	9,325
MAX	N-N	26,14	88,74	11	11	1,17	0,272
MAX	N-S	26,14	88,74	941	941	0,94	20,914
MAX	N-SW	17,5	93,02	196	196	0,81	4,056
MAX	Total	18,83	137,09	5707	5707	0,82	115,263
MAX	S-NE	0	0	0	0		0
MAX	S-S	0	0	0	0		0
MAX	S-SW	0	0	0	0		0
MAX	S-N	0	0	0	0		0
MAX	S-E	0	0	0	0		0
MAX	S-E	0	0	0	0		0
MAX	S-S	0	0	0	0		0
MAX	SW-NE	5,12	44,4	198	198	0,86	3,661
MAX	SW-S	2,56	44,4	0	0		0
MAX	SW-SW	5,12	44,4	0	0		0
MAX	SW-N	5,12	44,4	95	95	1,73	2,478
MAX	SW-E	5,12	44,4	0	0		0
MAX	SW-S	5,12	44,4	0	0		0
MAX	N-NE	2,72	27,09	248	248	1,41	5,928
MAX	N-S	2,72	27,09	0	0		0
MAX	N-SW	2,72	27,09	99	99	0,59	1,281
MAX	N-N	2,72	27,09	15	15	2,86	0,521
MAX	N-E	2,72	27,09	0	0		0
MAX	N-S	2,72	27,09	0	0		0
MAX	E-NE	0	0	145	145	0,03	1,305
MAX	E-S	0,01	6,57	218	218	0,01	0,953
MAX	S-NE	0	0	0	0		0
MAX	S-E	0,03	6,41	121	121	0,05	0,335
MAX	NE-NE	4,23	50,32	507	507	0,7	10,358
MAX	NE-S	4,23	50,32	7	7	0,5	0,114
MAX	NE-SW	4,23	50,32	242	242	0,37	3,374
MAX	NE-N	2,11	50,32	479	479	0,03	4,277
MAX	NE-E	4,23	50,32	94	94	0,84	2,107
MAX	NE-S	4,23	50,32	0	0		0
MAX	Total	1,08	50,32	2329	2329	0,5	34,356

Table 4.11: Level of Service of Primemall Intersection

Intersection	Morning Peak		Afternoon Peak		Evening Peak	
	Delaying	LOS	Delaying	LOS	Delaying	LOS

	sec/bo		sec/bo		sec/bo	
Primemall Intersection	14,1	B	12,6	B	15,6	B

According to the results obtained from VISSIM (between Table 4.2 and 4.10) and LOS criteria for signalized intersections (Table 3.1), Primemall intersection is B level of service. This level of service is an ideal one in reference to traffic engineering standards for intersections. Delaying time is 14 seconds on an average for morning, afternoon and evening. This level will decrease from B to F because of the increasing in traffic intensity due to the location of Primemall. Directly, it caused to decrease in level of service and intersection capacity. Therefore, it should be done geometric regulation and signal timing to increase the intersection capacity and minimize the delaying time.

CHAPTER 5

CONCLUSION AND RECOMMENDATION

5.1 Conclusion

ICONOVA intersection is an intensive junction due to its position. It's located near Primemall the shopping mall, Iconova Towers, schools and gas station. Besides, the transition from this point to the University of Gaziantep and University Hospital increases the traffic intensity. Unfortunately, nowadays, long-term planning cannot be done during the making of zoning regulation and population growth is not considered.

It is proposed that the effects of high-rise buildings on zoning alterations must be made on the basis of similar projects in our country and worldwide. The number of specialists who made highway capacity calculations and can apply these calculations to new arranged plans for the municipality is very limited in our city or even the country.

Gaziantep has a borderline with Syria due to its geographical location. After the civil war in Syria, the city lets in immigrants around 500.000. As a result of this migration, city population and number of vehicles have increased (nearly 4000 vehicles). Hereby, it is recommended to make more accurate calculations in city planning for Gaziantep which is the most important industrial city in the region. The aim of this study is that to offer solution proposal against to current problem at ICONOVA intersection and provide to use this proposal as an example for similar projects. When making master plans of metropolitan cities and ensuring their actuality, the principles of applicable zoning plan should be taken into consideration. The traffic management software that is used for Gaziantep is METIS.

The main problem at ICONOVA intersection is the presence of a popular shopping mall (Primemall) and high rise building (Iconova Towers) at the intersection. Therefore, a more detailed solution must be found for approximately 1000 vehicles that will be added to the traffic after completing the construction of Iconova Towers by using modern engineering. In the course of time, schools constructed on this route and traffic intensity has increased more at entry and exit times. Due to all these reasons, this work has been done to create a society with an increased life quality and to leave an impression on the science world.

5.2 Recommendation

Preparing a long term and sustainable transportation for future is the main objectives of the planners. The most important reason of transportation problems is the inefficient use of existing capacities. Long-term solutions to urban transportation problems can be achieved through efficient use of existing resources. The road project of 51^{st} street which is still under construction and 50 meters wide, will connected to the Iconova intersection. After construction completed, it is foreseen that it is a high quality highway corridor. Due to its connection to the other routes, it is expected to work as an orbit road. All intersections connected to the Iconova are at the grade intersection. It should be known that one of these intersections will be replaced by bridge crossing and the traffic pressure on other intersections will be increased.

In Figure 5.1, since the application cost of the width changing of the existing roads, the duration of the implementation and the problems that will occur will not be appropriate, a proposal presented to provide the most efficient use of existing capacity. When considering the circulation of commercial areas, schools and residential areas at the Iconova intersection, it should be taken into consideration that a bridge crossing should not be carried out at this intersection. By taking into the consideration of the physical arrangement, signaling changes and pedestrian traffic of the intersection area, the presented proposal (signalized roundabout) shown in Figure 5.1.

Figure 5.1: Solution Proposal for Current Problem at Iconova Intersection

As a long term solution proposal, it was provided to ensure the efficient operation of the Iconova intersection for many years by connecting it directly to the orbit road with the intersections that will be new zoned for construction (Yamactepe region) will be accessible to the Ibrahimli and the University of Gaziantep.

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APPENDIX-A

Table A1: VISSIM resuts

SIMRUN	DIRECTION	MOVEMENT	QLEN	QLEN$_{MAX}$	VEHS$_{ALL}$	PERS$_{ALL}$	VEH$_{DELAY}$	PERS$_{DELAY}$	STOP$_{DELAY}$	STOPS$_{ALL}$	EMISSIONS$_{CO}$	EMISSIONS$_{NOX}$	EMISSIONS$_{VOC}$	FUEL CONSUMPTION
1	NE-NE	7-35@207.9-36@130.2	17,82	63,54	2	2	12,45	12,45	4,76	1	2,478	0,482	0,574	0,035
1	NE-N	7-35@207.9-90@46.6	2,31	68,91	557	557	4,03	4,03	1,04	0,22	400,331	77,89	92,781	5,727
1	NE-S	7-35@207.9-181@46.9	17,82	63,54	428	428	31,52	31,52	23,71	0,83	611,647	119,004	141,755	8,75
1	NE-SW	7-35@207.9-190@4.8	17,82	63,54	321	321	31,58	31,58	24,42	0,8	475,303	92,477	110,156	6,8
1	S-NE	7-88@22.0-36@130.2	22,24	110,93	247	247	34,92	34,92	26,24	1	373,565	72,682	86,577	5,344
1	S-N	7-88@22.0-90@46.6	31,33	103,07	1109	1109	32,78	32,78	24,64	0,9	1663,014	323,562	385,42	23,791
1	S-S	7-88@22.0-181@46.9	31,33	103,07	48	48	24,73	24,73	17,98	0,77	58,402	11,363	13,535	0,836
1	S-SW	7-88@22.0-190@4.8	31,33	103,07	469	469	28,43	28,43	20,69	0,83	653,614	127,17	151,481	9,351
1	SW-NE	7-97@325.0-36@130.2	21,13	68,86	471	471	33,26	33,26	25,32	0,9	730,383	142,106	169,273	10,449
1	SW-N	7-97@325.0-90@46.6	21,13	68,86	278	278	28,85	28,85	20,98	0,81	408,197	79,42	94,603	5,84
1	SW-S	7-97@325.0-181@46.9	13,58	58,01	215	215	34,56	34,56	26,44	0,93	303,714	59,092	70,389	4,345
1	SW-SW	7-97@325.0-190@4.8	21,13	68,86	7	7	26,3	26,3	18,48	0,86	9,806	1,908	2,273	0,14
1	N-NE	7-183@96.6-36@130.2	25,62	86,76	414	414	32,29	32,29	24,29	0,85	627,329	122,055	145,389	8,975
1	N-N	7-183@96.6-90@46.6	25,62	86,76	9	9	30,32	30,32	23,58	0,78	13,162	2,561	3,051	0,188
1	N-S	7-183@96.6-181@46.9	25,62	86,76	941	941	35,8	35,8	27,43	0,93	1461,858	284,424	338,8	20,914
1	N-SW	7-183@96.6-190@4.8	15,5	92,75	191	191	27,36	27,36	20,47	0,76	263,729	51,312	61,122	3,773
1	Total	7	18,69	110,93	5707	5707	29,66	29,66	22,17	0,81	8056,874	1567,58	1867,258	115,263
1	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
1	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
1	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
1	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
1	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
1	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
1	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
1	SW-NE	10-105@29.6-98@61.8	5,12	44,4	198	198	19,19	19,19	10,63	0,86	255,934	49,795	59,315	3,661
1	SW-S	10-105@29.6-103@124.5	2,56	44,4	0	0					0	0	0	0
1	SW-SW	10-105@29.6-104@116.7	5,12	44,4	0	0					0	0	0	0
1	SW-N	10-105@29.6-107@76.0	5,12	44,4	63	63	30,97	30,97	15,94	1,59	108,057	21,024	25,043	1,546
1	SW-E	10-105@29.6-118@137.0	5,12	44,4	0	0					0	0	0	0
1	SW-S	10-105@29.6-121@31.3	5,12	44,4	0	0					0	0	0	0
1	N-NE	10-108@93.2-98@61.8	2,54	19,84	200	200	21,58	21,58	8,81	1,41	336,51	65,473	77,989	4,814
1	N-S	10-108@93.2-103@124.5	2,54	19,84	0	0					0	0	0	0
1	N-SW	10-108@93.2-104@116.7	2,54	19,84	96	96	9,26	9,26	4,47	0,5	86,748	16,878	20,105	1,241
1	N-N	10-108@93.2-107@76.0	2,54	19,84	12	12	44,63	44,63	22,09	2,58	29,673	5,773	6,877	0,425
1	N-E	10-108@93.2-118@137.0	2,54	19,84	0	0					0	0	0	0
1	N-S	10-108@93.2-121@31.3	2,54	19,84	0	0					0	0	0	0
1	E-NE	10-117@232.0-98@61.8	0	0	128	128	0,99	0,99	0,04	0,01	80,707	15,703	18,705	1,155
1	E-S	10-117@232.0-121@31.3	0	6,57	218	218	0,4	0,4	0	0	66,593	12,957	15,433	0,953
1	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
1	S-E	10-119@31.4-118@137.0	0,02	6,41	109	109	1	1	0	0	20,066	3,904	4,65	0,287
1	NE-NE	10-190@341.6-98@61.8	4,23	50,32	489	489	16,18	16,18	5,1	0,7	718,228	139,741	166,456	10,275
1	NE-S	10-190@341.6-103@124.5	4,23	50,32	3	3	1,5	1,5	0	0	2,367	0,461	0,549	0,034
1	NE-SW	10-190@341.6-104@116.7	4,23	50,32	238	238	6,2	6,2	2,16	0,31	231,119	44,967	53,564	3,306
1	NE-N	10-190@341.6-107@76.0	2,11	50,32	479	479	2,84	2,84	0,1	0,03	298,959	58,167	69,287	4,277
1	NE-E	10-190@341.6-118@137.0	4,23	50,32	94	94	18,98	18,98	6,33	0,84	147,271	28,654	34,131	2,107
1	NE-S	10-190@341.6-121@31.3	4,23	50,32	0	0					0	0	0	0
1	Total	10	1,08	50,32	2327	2327	10,46	10,46	3,96	0,49	2380,804	463,218	551,774	34,06
2	NE-NE	7-35@207.9-36@130.2	19,43	78,06	3	3	37,43	37,43	26,28	1,33	5,338	1,039	1,237	0,076
2	NE-N	7-35@207.9-90@46.6	2,25	64,63	558	558	4,35	4,35	1,19	0,25	411,468	80,057	95,362	5,887
2	NE-S	7-35@207.9-181@46.9	19,43	78,06	414	414	34,38	34,38	26,53	0,87	615,528	119,759	142,654	8,806
2	NE-SW	7-35@207.9-190@4.8	19,43	78,06	306	306	32,93	32,93	25,68	0,81	461,074	89,708	106,858	6,596
2	S-NE	7-88@22.0-36@130.2	16,54	97,74	241	241	31,61	31,61	23,82	0,88	340,83	66,313	78,991	4,876
2	S-N	7-88@22.0-90@46.6	30,23	108,71	1097	1097	31,33	31,33	23,41	0,9	1624,394	316,048	376,469	23,239
2	S-S	7-88@22.0-181@46.9	30,23	108,71	45	45	28,9	28,9	20,99	0,82	58,96	11,471	13,664	0,843
2	S-SW	7-88@22.0-190@4.8	30,23	108,71	460	460	27,3	27,3	19,96	0,79	624,273	121,461	144,681	8,931
2	SW-NE	7-97@325.0-36@130.2	22,47	74,53	453	453	32,31	32,31	24,32	0,92	700,672	136,325	162,388	10,024
2	SW-N	7-97@325.0-90@46.6	22,47	74,53	278	278	32,01	32,01	24	0,83	424,288	82,551	98,333	6,07

2	SW-S	7-97@325.0-181@46.9	16,04	63,68	239	239	39,1	39,1	30,58	1	361,33	70,302	83,742	5,169
2	SW-SW	7-97@325.0-190@4.8	22,47	74,53	8	8	33,18	33,18	25,08	0,75	11,574	2,252	2,682	0,166
2	N-NE	7-183@96.6-36@130.2	26,14	88,74	387	387	33,6	33,6	25,7	0,87	596,068	115,973	138,144	8,527
2	N-N	7-183@96.6-90@46.6	26,14	88,74	11	11	43,95	43,95	35,67	0,91	19,005	3,698	4,405	0,272
2	N-S	7-183@96.6-181@46.9	26,14	88,74	926	926	36,59	36,59	28,29	0,94	1451,778	282,463	336,464	20,769
2	N-SW	7-183@96.6-190@4.8	17,5	93,02	196	196	30,31	30,31	23,32	0,81	283,509	55,161	65,706	4,056
2	Total	7	18,83	108,71	5622	5622	30,09	30,09	22,67	0,82	7989,312	1554,43	1851,6	114,296
2	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
2	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
2	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
2	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
2	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
2	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
2	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
2	SW-NE	10-105@29.6-98@61.8	5,09	36,47	192	192	18,5	18,5	10,05	0,8	241,21	46,931	55,903	3,451
2	SW-S	10-105@29.6-103@124.5	2,54	36,47	0	0					0	0	0	0
2	SW-SW	10-105@29.6-104@116.7	5,09	36,47	0	0					0	0	0	0
2	SW-N	10-105@29.6-107@76.0	5,09	36,47	95	95	34,04	34,04	17,74	1,73	173,18	33,694	40,136	2,478
2	SW-E	10-105@29.6-118@137.0	5,09	36,47	0	0					0	0	0	0
2	SW-S	10-105@29.6-121@31.3	5,09	36,47	0	0					0	0	0	0
2	N-NE	10-108@93.2-98@61.8	2,53	27,09	197	197	21,67	21,67	9,1	1,4	330,211	64,247	76,53	4,724
2	N-S	10-108@93.2-103@124.5	2,53	27,09	0	0					0	0	0	0
2	N-SW	10-108@93.2-104@116.7	2,53	27,09	99	99	9,09	9,09	4,28	0,51	89,516	17,416	20,746	1,281
2	N-N	10-108@93.2-107@76.0	2,53	27,09	15	15	42,08	42,08	22,17	2,53	36,383	7,079	8,432	0,521
2	N-E	10-108@93.2-118@137.0	2,53	27,09	0	0					0	0	0	0
2	N-S	10-108@93.2-121@31.3	2,53	27,09	0	0					0	0	0	0
2	E-NE	10-117@232.0-98@61.8	0	0	136	136	1,19	1,19	0,04	0,03	87,297	16,985	20,232	1,249
2	E-S	10-117@232.0-121@31.3	0	0	194	194	0,28	0,28	0	0	58,954	11,47	13,663	0,843
2	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
2	S-E	10-119@31.4-118@137.0	0,02	6,12	104	104	1,02	1,02	0	0	19,285	3,752	4,469	0,276
2	NE-NE	10-190@341.6-98@61.8	3,8	31,35	507	507	15,37	15,37	4,81	0,64	724,015	140,867	167,798	10,358
2	NE-S	10-190@341.6-103@124.5	3,8	31,35	1	1	0,31	0,31	0	0	0,807	0,157	0,187	0,012
2	NE-SW	10-190@341.6-104@116.7	3,8	31,35	242	242	5,98	5,98	2,04	0,31	234,1	45,547	54,255	3,349
2	NE-N	10-190@341.6-107@76.0	1,9	31,35	467	467	2,37	2,37	0,11	0,03	288,847	56,199	66,943	4,132
2	NE-E	10-190@341.6-118@137.0	3,8	31,35	80	80	17,57	17,57	5,54	0,72	119,679	23,285	27,737	1,712
2	NE-S	10-190@341.6-121@31.3	3,8	31,35	0	0					0	0	0	0
2	Total	10	1,04	36,47	2329	2329	10,59	10,59	4,12	0,5	2401,483	467,241	556,567	34,356
3	NE-NE	7-35@207.9-36@130.2	19,75	76,8	0	0					0	0	0	0
3	NE-N	7-35@207.9-90@46.6	3,05	83,44	555	555	4,75	4,75	1,13	0,28	420,663	81,846	97,493	6,018
3	NE-S	7-35@207.9-181@46.9	19,75	76,8	434	434	34,72	34,72	26,71	0,88	650,432	126,55	150,744	9,305
3	NE-SW	7-35@207.9-190@4.8	19,75	76,8	318	318	33,09	33,09	25,3	0,85	486,102	94,578	112,659	6,954
3	S-NE	7-88@22.0-36@130.2	16,32	101,13	224	224	29,27	29,27	21,76	0,85	305,459	59,431	70,793	4,37
3	S-N	7-88@22.0-90@46.6	26,7	93,27	1106	1106	27,96	27,96	20,61	0,83	1545,989	300,793	358,298	22,117
3	S-S	7-88@22.0-181@46.9	26,7	93,27	55	55	28,93	28,93	21,58	0,85	72,602	14,126	16,826	1,039
3	S-SW	7-88@22.0-190@4.8	26,7	93,27	444	444	26,91	26,91	19,83	0,77	595,865	115,934	138,097	8,525
3	SW-NE	7-97@325.0-36@130.2	20,13	64,82	429	429	33,86	33,86	25,7	0,95	678,617	132,034	157,276	9,708
3	SW-N	7-97@325.0-90@46.6	20,13	64,82	311	311	32,35	32,35	24,28	0,91	486,644	94,683	112,784	6,962
3	SW-S	7-97@325.0-181@46.9	12,37	50,81	208	208	33,04	33,04	25,49	0,86	283,666	55,191	65,742	4,058
3	SW-SW	7-97@325.0-190@4.8	20,13	64,82	8	8	30,8	30,8	22,26	0,88	11,837	2,303	2,743	0,169
3	N-NE	7-183@96.6-36@130.2	24,05	75,7	434	434	31,75	31,75	23,98	0,84	651,793	126,815	151,059	9,325
3	N-N	7-183@96.6-90@46.6	24,05	75,7	7	7	25,56	25,56	18,7	0,57	9,118	1,774	2,113	0,13
3	N-S	7-183@96.6-181@46.9	24,05	75,7	866	866	34,49	34,49	26,47	0,9	1315,746	255,996	304,937	18,823
3	N-SW	7-183@96.6-190@4.8	14,8	79,98	194	194	30,94	30,94	23,96	0,81	281,628	54,795	65,27	4,029
3	Total	7	17,15	101,13	5593	5593	28,75	28,75	21,47	0,8	7795,136	1516,65	1806,598	111,518
3	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
3	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
3	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
3	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
3	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
3	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
3	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
3	SW-NE	10-105@29.6-98@61.8	4,78	31,03	184	184	19,1	19,1	10,58	0,81	233,652	45,46	54,151	3,343
3	SW-S	10-105@29.6-103@124.5	2,39	31,03	0	0					0	0	0	0

3	SW-SW	10-105@29.6-104@116.7	4,78	31,03	0	0					0	0	0	0
3	SW-N	10-105@29.6-107@76.0	4,78	31,03	89	89	33,17	33,17	17,61	1,73	160,645	31,256	37,231	2,298
3	SW-E	10-105@29.6-118@137.0	4,78	31,03	0	0					0	0	0	0
3	SW-S	10-105@29.6-121@31.3	4,78	31,03	0	0					0	0	0	0
3	N-NE	10-108@93.2-98@61.8	2,6	24,02	211	211	21,42	21,42	8,8	1,36	348,994	67,902	80,883	4,993
3	N-S	10-108@93.2-103@124.5	2,6	24,02	0	0					0	0	0	0
3	N-SW	10-108@93.2-104@116.7	2,6	24,02	93	93	9,77	9,77	4,83	0,48	84,366	16,415	19,553	1,207
3	N-N	10-108@93.2-107@76.0	2,6	24,02	7	7	42,73	42,73	22,47	2,86	17,674	3,439	4,096	0,253
3	N-E	10-108@93.2-118@137.0	2,6	24,02	0	0					0	0	0	0
3	N-S	10-108@93.2-121@31.3	2,6	24,02	0	0					0	0	0	0
3	E-NE	10-117@232.0-98@61.8	0	0	135	135	0,97	0,97	0	0,01	84,952	16,529	19,688	1,215
3	E-S	10-117@232.0-121@31.3	0	0	188	188	0,26	0,26	0	0	56,88	11,067	13,183	0,814
3	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
3	S-E	10-119@31.4-118@137.0	0,03	6,13	121	121	1,1	1,1	0,02	0,02	23,446	4,562	5,434	0,335
3	NE-NE	10-190@341.6-98@61.8	3,82	44,22	487	487	14,89	14,89	4,69	0,63	691,622	134,564	160,29	9,894
3	NE-S	10-190@341.6-103@124.5	3,82	44,22	4	4	11,89	11,89	3,2	0,5	4,73	0,92	1,096	0,068
3	NE-SW	10-190@341.6-104@116.7	3,82	44,22	241	241	5,47	5,47	2,01	0,27	227,233	44,211	52,663	3,251
3	NE-N	10-190@341.6-107@76.0	1,91	44,22	478	478	2,33	2,33	0,11	0,03	294,255	57,251	68,196	4,21
3	NE-E	10-190@341.6-118@137.0	3,82	44,22	77	77	16,2	16,2	5,5	0,7	112,703	21,928	26,12	1,612
3	NE-S	10-190@341.6-121@31.3	3,82	44,22	0	0					0	0	0	0
3	Total	10	1,02	44,22	2315	2315	10,14	10,14	3,99	0,48	2341,478	455,567	542,66	33,498
4	NE-NE	7-35@207.9-36@130.2	18,54	75,8	3	3	36,89	36,89	28,92	0,67	4,398	0,856	1,019	0,063
4	NE-N	7-35@207.9-90@46.6	2,89	89,17	557	557	4,57	4,57	1,33	0,24	408,395	79,459	94,649	5,843
4	NE-S	7-35@207.9-181@46.9	18,54	75,8	388	388	33,74	33,74	25,85	0,88	576,754	112,215	133,668	8,251
4	NE-SW	7-35@207.9-190@4.8	18,54	75,8	308	308	33,47	33,47	25,74	0,85	472,033	91,841	109,398	6,753
4	S-NE	7-88@22.0-36@130.2	20,29	137,09	223	223	32,07	32,07	24,2	0,89	317,715	61,816	73,633	4,545
4	S-N	7-88@22.0-90@46.6	29,69	129,23	1133	1133	29,88	29,88	22,12	0,86	1632,535	317,632	378,356	23,355
4	S-S	7-88@22.0-181@46.9	29,69	129,23	49	49	26,41	26,41	19,03	0,8	61,746	12,014	14,31	0,883
4	S-SW	7-88@22.0-190@4.8	29,69	129,23	476	476	27,97	27,97	20,49	0,8	653,519	127,151	151,459	9,349
4	SW-NE	7-97@325.0-36@130.2	20,65	75,27	456	456	30,3	30,3	22,19	0,92	690,532	134,352	160,037	9,879
4	SW-N	7-97@325.0-90@46.6	20,65	75,27	272	272	31,05	31,05	23,21	0,88	415,932	80,925	96,396	5,95
4	SW-S	7-97@325.0-181@46.9	14,23	64,43	238	238	34,74	34,74	26,63	0,93	337,566	65,678	78,234	4,829
4	SW-SW	7-97@325.0-190@4.8	20,65	75,27	12	12	33,39	33,39	25,7	0,92	18,414	3,583	4,268	0,263
4	N-NE	7-183@96.6-36@130.2	23,55	72,07	427	427	31,02	31,02	23,21	0,8	631,063	122,782	146,255	9,028
4	N-N	7-183@96.6-90@46.6	23,55	72,07	11	11	20,24	20,24	13,8	0,55	13,35	2,597	3,094	0,191
4	N-S	7-183@96.6-181@46.9	23,55	72,07	877	877	33,9	33,9	25,93	0,9	1326,109	258,013	307,339	18,972
4	N-SW	7-183@96.6-190@4.8	13,17	76,34	187	187	26,5	26,5	19,82	0,78	256,914	49,986	59,542	3,675
4	Total	7	17,88	137,09	5617	5617	28,62	28,62	21,28	0,8	7816,226	1520,75	1811,486	111,82
4	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
4	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
4	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
4	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
4	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
4	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
4	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
4	SW-NE	10-105@29.6-98@61.8	4,21	32,95	187	187	17,47	17,47	8,92	0,7	223,588	43,502	51,819	3,199
4	SW-S	10-105@29.6-103@124.5	2,1	32,95	0	0					0	0	0	0
4	SW-SW	10-105@29.6-104@116.7	4,21	32,95	0	0					0	0	0	0
4	SW-N	10-105@29.6-107@76.0	4,21	32,95	88	88	30,44	30,44	15,21	1,65	151,682	29,512	35,154	2,17
4	SW-E	10-105@29.6-118@137.0	4,21	32,95	0	0					0	0	0	0
4	SW-S	10-105@29.6-121@31.3	4,21	32,95	0	0					0	0	0	0
4	N-NE	10-108@93.2-98@61.8	2,68	24,12	248	248	21,26	21,26	8,7	1,4	414,368	80,621	96,034	5,928
4	N-S	10-108@93.2-103@124.5	2,68	24,12	0	0					0	0	0	0
4	N-SW	10-108@93.2-104@116.7	2,68	24,12	73	73	10,5	10,5	5,33	0,59	70,247	13,667	16,28	1,005
4	N-N	10-108@93.2-107@76.0	2,68	24,12	14	14	35,05	35,05	15,26	2,14	29,911	5,82	6,932	0,428
4	N-E	10-108@93.2-118@137.0	2,68	24,12	0	0					0	0	0	0
4	N-S	10-108@93.2-121@31.3	2,68	24,12	0	0					0	0	0	0
4	E-NE	10-117@232.0-98@61.8	0	0	145	145	0,91	0,91	0	0	91,196	17,743	21,136	1,305
4	E-S	10-117@232.0-121@31.3	0,01	6,01	177	177	0,43	0,43	0,02	0,01	54,565	10,616	12,646	0,781
4	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
4	S-E	10-119@31.4-118@137.0	0,03	6,03	80	80	1,13	1,13	0,12	0,05	16,761	3,261	3,884	0,24
4	NE-NE	10-190@341.6-98@61.8	3,55	43,21	450	450	14,23	14,23	4,27	0,61	629,859	122,548	145,976	9,011
4	NE-S	10-190@341.6-103@124.5	3,55	43,21	7	7	11,33	11,33	5,22	0,43	7,989	1,554	1,852	0,114

4	NE-SW	10-190@341.6-104@116.7	3,55	43,21	237	237	6,88	6,88	2,81	0,34	235,846	45,887	54,66	3,374
4	NE-N	10-190@341.6-107@76.0	1,78	43,21	476	476	2,33	2,33	0,05	0,02	290,862	56,591	67,41	4,161
4	NE-E	10-190@341.6-118@137.0	3,55	43,21	93	93	17,37	17,37	5,51	0,66	135,623	26,387	31,432	1,94
4	NE-S	10-190@341.6-121@31.3	3,55	43,21	0	0					0	0	0	0
4	Total	10	0,95	43,21	2275	2275	10,38	10,38	3,93	0,5	2352,26	457,664	545,159	33,652
5	NE-NE	7-35@207.9-36@130.2	18,79	88,4	3	3	32,87	32,87	26,9	0,67	4,213	0,82	0,976	0,06
5	NE-N	7-35@207.9-90@46.6	3,57	105,31	450	450	4,39	4,39	0,86	0,22	324,194	63,076	75,135	4,638
5	NE-S	7-35@207.9-181@46.9	18,79	88,4	325	325	34,29	34,29	26,53	0,87	483,042	93,982	111,95	6,91
5	NE-SW	7-35@207.9-190@4.8	18,79	88,4	267	267	34,13	34,13	26,52	0,88	415,602	80,861	96,32	5,946
5	S-NE	7-88@22.0-36@130.2	19,92	105,7	179	179	31,15	31,15	23,34	0,88	251,565	48,945	58,303	3,599
5	S-N	7-88@22.0-90@46.6	28,96	105,48	868	868	30,57	30,57	22,89	0,88	1262,461	245,629	292,588	18,061
5	S-S	7-88@22.0-181@46.9	28,96	105,48	36	36	23,79	23,79	17,45	0,64	41,4	8,055	9,595	0,592
5	S-SW	7-88@22.0-190@4.8	28,96	105,48	367	367	28	28	20,69	0,78	500,129	97,307	115,91	7,155
5	SW-NE	7-97@325.0-36@130.2	20,22	60,34	324	324	33,74	33,74	25,88	0,92	507,671	98,774	117,658	7,263
5	SW-N	7-97@325.0-90@46.6	20,22	60,34	239	239	32,36	32,36	24,36	0,87	369,315	71,855	85,592	5,283
5	SW-S	7-97@325.0-181@46.9	13,69	49,5	184	184	32,45	32,45	24,63	0,94	256,583	49,922	59,466	3,671
5	SW-SW	7-97@325.0-190@4.8	20,22	60,34	14	14	34,94	34,94	27,63	0,86	21,3	4,144	4,936	0,305
5	N-NE	7-183@96.6-36@130.2	23,44	68,61	305	305	33,08	33,08	25,23	0,84	463,413	90,163	107,4	6,63
5	N-N	7-183@96.6-90@46.6	23,44	68,61	6	6	43,78	43,78	36,9	1,17	10,885	2,118	2,523	0,156
5	N-S	7-183@96.6-181@46.9	23,44	68,61	714	714	33,59	33,59	25,57	0,9	1077,174	209,579	249,645	15,41
5	N-SW	7-183@96.6-190@4.8	12,36	72,88	144	144	27,74	27,74	21,18	0,74	198,131	38,549	45,919	2,834
5	Total	7	17,62	105,7	4425	4425	29,16	29,16	21,87	0,8	6187,399	1203,84	1433,989	88,518
5	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
5	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
5	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
5	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
5	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
5	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
5	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
5	SW-NE	10-105@29.6-98@61.8	4,42	32,37	165	165	16,65	16,65	8,93	0,68	193,659	37,679	44,882	2,771
5	SW-S	10-105@29.6-103@124.5	2,21	32,37	0	0					0	0	0	0
5	SW-SW	10-105@29.6-104@116.7	4,42	32,37	0	0					0	0	0	0
5	SW-N	10-105@29.6-107@76.0	4,42	32,37	60	60	32,31	32,31	16,24	1,65	104,996	20,428	24,334	1,502
5	SW-E	10-105@29.6-118@137.0	4,42	32,37	0	0					0	0	0	0
5	SW-S	10-105@29.6-121@31.3	4,42	32,37	0	0					0	0	0	0
5	N-NE	10-108@93.2-98@61.8	2,72	25,37	171	171	21,73	21,73	8,87	1,36	284,256	55,306	65,879	4,067
5	N-S	10-108@93.2-103@124.5	2,72	25,37	0	0					0	0	0	0
5	N-SW	10-108@93.2-104@116.7	2,72	25,37	77	77	9,93	9,93	4,79	0,47	69,245	13,472	16,048	0,991
5	N-N	10-108@93.2-107@76.0	2,72	25,37	11	11	40,27	40,27	20,35	2,45	25,711	5,002	5,959	0,368
5	N-E	10-108@93.2-118@137.0	2,72	25,37	0	0					0	0	0	0
5	N-S	10-108@93.2-121@31.3	2,72	25,37	0	0					0	0	0	0
5	E-NE	10-117@232.0-98@61.8	0	0	117	117	1,05	1,05	0	0	73,272	14,256	16,981	1,048
5	E-S	10-117@232.0-121@31.3	0	0	153	153	0,31	0,31	0	0	46,548	9,056	10,788	0,666
5	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
5	S-E	10-119@31.4-118@137.0	0,01	6,18	92	92	1,03	1,03	0	0	17,064	3,32	3,955	0,244
5	NE-NE	10-190@341.6-98@61.8	3,94	39,91	358	358	14,82	14,82	4,46	0,63	507,423	98,726	117,6	7,259
5	NE-S	10-190@341.6-103@124.5	3,94	39,91	1	1	0	0	0	0	0,817	0,159	0,189	0,012
5	NE-SW	10-190@341.6-104@116.7	3,94	39,91	168	168	6,98	6,98	2,78	0,37	169,562	32,991	39,298	2,426
5	NE-N	10-190@341.6-107@76.0	1,97	39,91	394	394	2,33	2,33	0,12	0,02	242,088	47,101	56,106	3,463
5	NE-E	10-190@341.6-118@137.0	3,94	39,91	70	70	17,96	17,96	6,48	0,79	107,025	20,823	24,804	1,531
5	NE-S	10-190@341.6-121@31.3	3,94	39,91	0	0					0	0	0	0
5	Total	10	1,01	39,91	1837	1837	10,09	10,09	3,88	0,47	1840,771	358,147	426,616	26,334
AVG	NE-NE	7-35@207.9-36@130.2	18,87	76,52	2	2	29,91	29,91	21,72	0,92	3,285	0,639	0,761	0,047
AVG	NE-N	7-35@207.9-90@46.6	2,81	82,29	535	535	4,42	4,42	1,11	0,24	393,01	76,465	91,084	5,622
AVG	NE-S	7-35@207.9-181@46.9	18,87	76,52	398	398	33,73	33,73	25,87	0,87	587,481	114,302	136,154	8,405
AVG	NE-SW	7-35@207.9-190@4.8	18,87	76,52	304	304	33,04	33,04	25,53	0,84	462,023	89,893	107,078	6,61
AVG	S-NE	7-88@22.0-36@130.2	19,06	110,52	223	223	31,8	31,8	23,87	0,9	317,827	61,838	73,659	4,547
AVG	S-N	7-88@22.0-90@46.6	29,38	107,95	1063	1063	30,5	30,5	22,73	0,87	1545,679	300,733	358,226	22,113
AVG	S-S	7-88@22.0-181@46.9	29,38	107,95	47	47	26,55	26,55	19,4	0,78	58,622	11,406	13,586	0,839
AVG	S-SW	7-88@22.0-190@4.8	29,38	107,95	443	443	27,72	27,72	20,33	0,79	605,48	117,804	140,326	8,662
AVG	SW-NE	7-97@325.0-36@130.2	20,92	68,76	427	427	32,69	32,69	24,68	0,92	661,575	128,718	153,326	9,465
AVG	SW-N	7-97@325.0-90@46.6	20,92	68,76	276	276	31,32	31,32	23,37	0,86	420,875	81,887	97,542	6,021
AVG	SW-S	7-97@325.0-181@46.9	13,98	57,28	217	217	34,78	34,78	26,75	0,93	308,572	60,037	71,515	4,414

AVG	SW-SW	7-97@325.0-190@4.8	20,92	68,76	10	10	31,72	31,72	23,83	0,85	14,586	2,838	3,38	0,209
AVG	N-NE	7-183@96.6-36@130.2	24,56	78,38	393	393	32,35	32,35	24,48	0,84	593,933	115,558	137,65	8,497
AVG	N-N	7-183@96.6-90@46.6	24,56	78,38	9	9	32,77	32,77	25,73	0,79	13,104	2,55	3,037	0,187
AVG	N-S	7-183@96.6-181@46.9	24,56	78,38	865	865	34,88	34,88	26,74	0,91	1326,533	258,095	307,437	18,978
AVG	N-SW	7-183@96.6-190@4.8	14,67	82,99	182	182	28,57	28,57	21,75	0,78	256,782	49,96	59,512	3,674
AVG	Total	7	18,03	112,71	5393	5393	29,25	29,25	21,89	0,81	7568,989	1472,65	1754,186	108,283
AVG	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
AVG	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
AVG	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
AVG	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
AVG	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
AVG	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
AVG	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
AVG	SW-NE	10-105@29.6-98@61.8	4,72	35,44	185	185	18,18	18,18	9,82	0,77	229,609	44,673	53,214	3,285
AVG	SW-S	10-105@29.6-103@124.5	2,36	35,44	0	0					0	0	0	0
AVG	SW-SW	10-105@29.6-104@116.7	4,72	35,44	0	0					0	0	0	0
AVG	SW-N	10-105@29.6-107@76.0	4,72	35,44	79	79	32,19	32,19	16,55	1,67	139,712	27,183	32,38	1,999
AVG	SW-E	10-105@29.6-118@137.0	4,72	35,44	0	0					0	0	0	0
AVG	SW-S	10-105@29.6-121@31.3	4,72	35,44	0	0					0	0	0	0
AVG	N-NE	10-108@93.2-98@61.8	2,61	24,09	205	205	21,53	21,53	8,86	1,39	342,868	66,71	79,463	4,905
AVG	N-S	10-108@93.2-103@124.5	2,61	24,09	0	0					0	0	0	0
AVG	N-SW	10-108@93.2-104@116.7	2,61	24,09	88	88	9,71	9,71	4,74	0,51	80,024	15,57	18,546	1,145
AVG	N-N	10-108@93.2-107@76.0	2,61	24,09	12	12	40,95	40,95	20,47	2,51	27,87	5,423	6,459	0,399
AVG	N-E	10-108@93.2-118@137.0	2,61	24,09	0	0					0	0	0	0
AVG	N-S	10-108@93.2-121@31.3	2,61	24,09	0	0					0	0	0	0
AVG	E-NE	10-117@232.0-98@61.8	0	0	132	132	1,02	1,02	0,02	0,01	83,485	16,243	19,348	1,194
AVG	E-S	10-117@232.0-121@31.3	0	2,52	186	186	0,34	0,34	0	0	56,708	11,033	13,143	0,811
AVG	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
AVG	S-E	10-119@31.4-118@137.0	0,02	6,17	101	101	1,06	1,06	0,03	0,01	19,324	3,76	4,479	0,276
AVG	NE-NE	10-190@341.6-98@61.8	3,87	41,8	458	458	15,1	15,1	4,66	0,64	654,229	127,289	151,624	9,36
AVG	NE-S	10-190@341.6-103@124.5	3,87	41,8	3	3	5,01	5,01	1,68	0,19	3,342	0,65	0,774	0,048
AVG	NE-SW	10-190@341.6-104@116.7	3,87	41,8	225	225	6,3	6,3	2,36	0,32	219,572	42,721	50,888	3,141
AVG	NE-N	10-190@341.6-107@76.0	1,93	41,8	459	459	2,44	2,44	0,1	0,02	283,002	55,062	65,588	4,049
AVG	NE-E	10-190@341.6-118@137.0	3,87	41,8	83	83	17,61	17,61	5,87	0,74	124,46	24,215	28,845	1,781
AVG	NE-S	10-190@341.6-121@31.3	3,87	41,8	0	0					0	0	0	0
AVG	Total	10	1,02	42,83	2217	2217	10,33	10,33	3,98	0,48	2263,359	440,367	524,555	32,38
STDDEV	NE-NE	7-35@207.9-36@130.2	0,76	8,84	1	1	11,82	11,82	11,36	0,32	2,107	0,41	0,488	0,03
STDDEV	NE-N	7-35@207.9-90@46.6	0,55	16,35	48	48	0,27	0,27	0,17	0,03	39,152	7,617	9,074	0,56
STDDEV	NE-S	7-35@207.9-181@46.9	0,76	8,84	44	44	1,28	1,28	1,25	0,02	63,945	12,441	14,82	0,915
STDDEV	NE-SW	7-35@207.9-190@4.8	0,76	8,84	22	22	0,94	0,94	0,76	0,03	27,442	5,339	6,36	0,393
STDDEV	S-NE	7-88@22.0-36@130.2	2,56	15,66	27	27	2,04	2,04	1,62	0,06	45,22	8,798	10,48	0,647
STDDEV	S-N	7-88@22.0-90@46.6	1,73	13,22	110	110	1,78	1,78	1,5	0,03	164,104	31,929	38,033	2,348
STDDEV	S-S	7-88@22.0-181@46.9	1,73	13,22	7	7	2,35	2,35	1,82	0,08	11,202	2,18	2,596	0,16
STDDEV	S-SW	7-88@22.0-190@4.8	1,73	13,22	44	44	0,61	0,61	0,41	0,03	63,579	12,37	14,735	0,91
STDDEV	SW-NE	7-97@325.0-36@130.2	0,95	6,37	59	59	1,47	1,47	1,52	0,02	88,146	17,15	20,429	1,261
STDDEV	SW-N	7-97@325.0-90@46.6	0,95	6,37	26	26	1,48	1,48	1,41	0,04	42,37	8,244	9,82	0,606
STDDEV	SW-S	7-97@325.0-181@46.9	1,33	6,98	23	23	2,61	2,61	2,28	0,05	41,745	8,122	9,675	0,597
STDDEV	SW-SW	7-97@325.0-190@4.8	0,95	6,37	3	3	3,37	3,37	3,56	0,06	4,98	0,969	1,154	0,071
STDDEV	N-NE	7-183@96.6-36@130.2	1,24	8,94	53	53	1,03	1,03	0,99	0,02	75,634	14,716	17,529	1,082
STDDEV	N-N	7-183@96.6-90@46.6	1,24	8,94	2	2	10,74	10,74	10,24	0,26	3,732	0,726	0,865	0,053
STDDEV	N-S	7-183@96.6-181@46.9	1,24	8,94	90	90	1,28	1,28	1,12	0,02	155,158	30,188	35,959	2,22
STDDEV	N-SW	7-183@96.6-190@4.8	2,02	9,37	22	22	1,94	1,94	1,81	0,03	34,713	6,754	8,045	0,497
STDDEV	Total	7	0,71	14,11	543	543	0,62	0,62	0,56	0,01	780,347	151,827	180,853	11,164
STDDEV	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
STDDEV	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
STDDEV	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
STDDEV	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
STDDEV	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
STDDEV	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
STDDEV	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
STDDEV	SW-NE	10-105@29.6-98@61.8	0,4	5,39	12	12	1,1	1,1	0,85	0,08	23,305	4,534	5,401	0,333
STDDEV	SW-S	10-105@29.6-103@124.5	0,2	5,39	0	0					0	0	0	0
STDDEV	SW-SW	10-105@29.6-104@116.7	0,4	5,39	0	0					0	0	0	0

STDDEV	SW-N	10-105@29.6-107@76.0	0,4	5,39	16	16	1,49	1,49	1,1	0,06	31,26	6,082	7,245	0,447
STDDEV	SW-E	10-105@29.6-118@137.0	0,4	5,39	0	0					0	0	0	0
STDDEV	SW-S	10-105@29.6-121@31.3	0,4	5,39	0	0					0	0	0	0
STDDEV	N-NE	10-108@93.2-98@61.8	0,08	2,68	28	28	0,19	0,19	0,15	0,02	46,866	9,119	10,862	0,67
STDDEV	N-S	10-108@93.2-103@124.5	0,08	2,68	0	0					0	0	0	0
STDDEV	N-SW	10-108@93.2-104@116.7	0,08	2,68	12	12	0,56	0,56	0,4	0,05	9,565	1,861	2,217	0,137
STDDEV	N-N	10-108@93.2-107@76.0	0,08	2,68	3	3	3,65	3,65	3,03	0,26	6,865	1,336	1,591	0,098
STDDEV	N-E	10-108@93.2-118@137.0	0,08	2,68	0	0					0	0	0	0
STDDEV	N-S	10-108@93.2-121@31.3	0,08	2,68	0	0					0	0	0	0
STDDEV	E-NE	10-117@232.0-98@61.8	0	0	10	10	0,11	0,11	0,02	0,01	6,859	1,334	1,59	0,098
STDDEV	E-S	10-117@232.0-121@31.3	0	3,45	24	24	0,08	0,08	0,01	0	7,256	1,412	1,682	0,104
STDDEV	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
STDDEV	S-E	10-119@31.4-118@137.0	0,01	0,15	16	16	0,06	0,06	0,05	0,02	2,703	0,526	0,626	0,039
STDDEV	NE-NE	10-190@341.6-98@61.8	0,25	6,95	60	60	0,73	0,73	0,32	0,03	90,153	17,54	20,894	1,29
STDDEV	NE-S	10-190@341.6-103@124.5	0,25	6,95	2	2	6,06	6,06	2,41	0,26	3,053	0,594	0,707	0,044
STDDEV	NE-SW	10-190@341.6-104@116.7	0,25	6,95	32	32	0,63	0,63	0,4	0,04	28,147	5,476	6,523	0,403
STDDEV	NE-N	10-190@341.6-107@76.0	0,12	6,95	37	37	0,22	0,22	0,03	0	23,19	4,512	5,375	0,332
STDDEV	NE-E	10-190@341.6-118@137.0	0,25	6,95	10	10	1,01	1,01	0,49	0,07	16,658	3,241	3,861	0,238
STDDEV	NE-S	10-190@341.6-121@31.3	0,25	6,95	0	0					0	0	0	0
STDDEV	Total	10	0,05	5,18	213	213	0,21	0,21	0,09	0,01	237,412	46,192	55,023	3,396
MIN	NE-NE	7-35@207.9-36@130.2	17,82	63,54	0	0	12,45	12,45	4,76	0,67	0	0	0	0
MIN	NE-N	7-35@207.9-90@46.6	2,25	64,63	450	450	4,03	4,03	0,86	0,22	324,194	63,076	75,135	4,638
MIN	NE-S	7-35@207.9-181@46.9	17,82	63,54	325	325	31,52	31,52	23,71	0,83	483,042	93,982	111,95	6,91
MIN	NE-SW	7-35@207.9-190@4.8	17,82	63,54	267	267	31,58	31,58	24,42	0,8	415,602	80,861	96,32	5,946
MIN	S-NE	7-88@22.0-36@130.2	16,32	97,74	179	179	29,27	29,27	21,76	0,85	251,565	48,945	58,303	3,599
MIN	S-N	7-88@22.0-90@46.6	26,7	93,27	868	868	27,96	27,96	20,61	0,83	1262,461	245,629	292,588	18,061
MIN	S-S	7-88@22.0-181@46.9	26,7	93,27	36	36	23,79	23,79	17,45	0,64	41,4	8,055	9,595	0,592
MIN	S-SW	7-88@22.0-190@4.8	26,7	93,27	367	367	26,91	26,91	19,83	0,77	500,129	97,307	115,91	7,155
MIN	SW-NE	7-97@325.0-36@130.2	20,13	60,34	324	324	30,3	30,3	22,19	0,9	507,671	98,774	117,658	7,263
MIN	SW-N	7-97@325.0-90@46.6	20,13	60,34	239	239	28,85	28,85	20,98	0,81	369,315	71,855	85,592	5,283
MIN	SW-S	7-97@325.0-181@46.9	12,37	49,5	184	184	32,45	32,45	24,63	0,86	256,583	49,922	59,466	3,671
MIN	SW-SW	7-97@325.0-190@4.8	20,13	60,34	7	7	26,3	26,3	18,48	0,75	9,806	1,908	2,273	0,14
MIN	N-NE	7-183@96.6-36@130.2	23,44	68,61	305	305	31,02	31,02	23,21	0,8	463,413	90,163	107,4	6,63
MIN	N-N	7-183@96.6-90@46.6	23,44	68,61	6	6	20,24	20,24	13,8	0,55	9,118	1,774	2,113	0,13
MIN	N-S	7-183@96.6-181@46.9	23,44	68,61	714	714	33,59	33,59	25,57	0,9	1077,174	209,579	249,645	15,41
MIN	N-SW	7-183@96.6-190@4.8	12,36	72,88	144	144	26,5	26,5	19,82	0,74	198,131	38,549	45,919	2,834
MIN	Total	7	17,15	101,13	4425	4425	28,62	28,62	21,28	0,8	6187,399	1203,84	1433,989	88,518
MIN	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
MIN	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
MIN	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
MIN	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
MIN	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
MIN	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
MIN	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
MIN	SW-NE	10-105@29.6-98@61.8	4,21	31,03	165	165	16,65	16,65	8,92	0,68	193,659	37,679	44,882	2,771
MIN	SW-S	10-105@29.6-103@124.5	2,1	31,03	0	0					0	0	0	0
MIN	SW-SW	10-105@29.6-104@116.7	4,21	31,03	0	0					0	0	0	0
MIN	SW-N	10-105@29.6-107@76.0	4,21	31,03	60	60	30,44	30,44	15,21	1,59	104,996	20,428	24,334	1,502
MIN	SW-E	10-105@29.6-118@137.0	4,21	31,03	0	0					0	0	0	0
MIN	SW-S	10-105@29.6-121@31.3	4,21	31,03	0	0					0	0	0	0
MIN	N-NE	10-108@93.2-98@61.8	2,53	19,84	171	171	21,26	21,26	8,7	1,36	284,256	55,306	65,879	4,067
MIN	N-S	10-108@93.2-103@124.5	2,53	19,84	0	0					0	0	0	0
MIN	N-SW	10-108@93.2-104@116.7	2,53	19,84	73	73	9,09	9,09	4,28	0,47	69,245	13,472	16,048	0,991
MIN	N-N	10-108@93.2-107@76.0	2,53	19,84	7	7	35,05	35,05	15,26	2,14	17,674	3,439	4,096	0,253
MIN	N-E	10-108@93.2-118@137.0	2,53	19,84	0	0					0	0	0	0
MIN	N-S	10-108@93.2-121@31.3	2,53	19,84	0	0					0	0	0	0
MIN	E-NE	10-117@232.0-98@61.8	0	0	117	117	0,91	0,91	0	0	73,272	14,256	16,981	1,048
MIN	E-S	10-117@232.0-121@31.3	0	0	153	153	0,26	0,26	0	0	46,548	9,056	10,788	0,666
MIN	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
MIN	S-E	10-119@31.4-118@137.0	0,01	6,03	80	80	1	1	0	0	16,761	3,261	3,884	0,24
MIN	NE-NE	10-190@341.6-98@61.8	3,55	31,35	358	358	14,23	14,23	4,27	0,61	507,423	98,726	117,6	7,259
MIN	NE-S	10-190@341.6-103@124.5	3,55	31,35	1	1	0	0	0	0	0,807	0,157	0,187	0,012
MIN	NE-SW	10-190@341.6-104@116.7	3,55	31,35	168	168	5,47	5,47	2,01	0,27	169,562	32,991	39,298	2,426

MIN	NE-N	10-190@341.6-107@76.0	1,78	31,35	394	394	2,33	2,33	0,05	0,02	242,088	47,101	56,106	3,463
MIN	NE-E	10-190@341.6-118@137.0	3,55	31,35	70	70	16,2	16,2	5,5	0,66	107,025	20,823	24,804	1,531
MIN	NE-S	10-190@341.6-121@31.3	3,55	31,35	0	0					0	0	0	0
MIN	Total	10	0,95	36,47	1837	1837	10,09	10,09	3,88	0,47	1840,771	358,147	426,616	26,334
MAX	NE-NE	7-35@207.9-36@130.2	19,75	88,4	3	3	37,43	37,43	28,92	1,33	5,338	1,039	1,237	0,076
MAX	NE-N	7-35@207.9-90@46.6	3,57	105,31	558	558	4,75	4,75	1,33	0,28	420,663	81,846	97,493	6,018
MAX	NE-S	7-35@207.9-181@46.9	19,75	88,4	434	434	34,72	34,72	26,71	0,88	650,432	126,55	150,744	9,305
MAX	NE-SW	7-35@207.9-190@4.8	19,75	88,4	321	321	34,13	34,13	26,52	0,88	486,102	94,578	112,659	6,954
MAX	S-NE	7-88@22.0-36@130.2	22,24	137,09	247	247	34,92	34,92	26,24	1	373,565	72,682	86,577	5,344
MAX	S-N	7-88@22.0-90@46.6	31,33	129,23	1133	1133	32,78	32,78	24,64	0,9	1663,014	323,562	385,42	23,791
MAX	S-S	7-88@22.0-181@46.9	31,33	129,23	55	55	28,93	28,93	21,58	0,85	72,602	14,126	16,826	1,039
MAX	S-SW	7-88@22.0-190@4.8	31,33	129,23	476	476	28,43	28,43	20,69	0,83	653,614	127,17	151,481	9,351
MAX	SW-NE	7-97@325.0-36@130.2	22,47	75,27	471	471	33,86	33,86	25,88	0,95	730,383	142,106	169,273	10,449
MAX	SW-N	7-97@325.0-90@46.6	22,47	75,27	311	311	32,36	32,36	24,36	0,91	486,644	94,683	112,784	6,962
MAX	SW-S	7-97@325.0-181@46.9	16,04	64,43	239	239	39,1	39,1	30,58	1	361,33	70,302	83,742	5,169
MAX	SW-SW	7-97@325.0-190@4.8	22,47	75,27	14	14	34,94	34,94	27,63	0,92	21,3	4,144	4,936	0,305
MAX	N-NE	7-183@96.6-36@130.2	26,14	88,74	434	434	33,6	33,6	25,7	0,87	651,793	126,815	151,059	9,325
MAX	N-N	7-183@96.6-90@46.6	26,14	88,74	11	11	43,95	43,95	36,9	1,17	19,005	3,698	4,405	0,272
MAX	N-S	7-183@96.6-181@46.9	26,14	88,74	941	941	36,59	36,59	28,29	0,94	1461,858	284,424	338,8	20,914
MAX	N-SW	7-183@96.6-190@4.8	17,5	93,02	196	196	30,94	30,94	23,96	0,81	283,509	55,161	65,706	4,056
MAX	Total	7	18,83	137,09	5707	5707	30,09	30,09	22,67	0,82	8056,874	1567,58	1867,258	115,263
MAX	S-NE	10-102@76.7-98@61.8	0	0	0	0					0	0	0	0
MAX	S-S	10-102@76.7-103@124.5	0	0	0	0					0	0	0	0
MAX	S-SW	10-102@76.7-104@116.7	0	0	0	0					0	0	0	0
MAX	S-N	10-102@76.7-107@76.0	0	0	0	0					0	0	0	0
MAX	S-E	10-102@76.7-115@42.7	0	0	0	0					0	0	0	0
MAX	S-E	10-102@76.7-118@137.0	0	0	0	0					0	0	0	0
MAX	S-S	10-102@76.7-121@31.3	0	0	0	0					0	0	0	0
MAX	SW-NE	10-105@29.6-98@61.8	5,12	44,4	198	198	19,19	19,19	10,63	0,86	255,934	49,795	59,315	3,661
MAX	SW-S	10-105@29.6-103@124.5	2,56	44,4	0	0					0	0	0	0
MAX	SW-SW	10-105@29.6-104@116.7	5,12	44,4	0	0					0	0	0	0
MAX	SW-N	10-105@29.6-107@76.0	5,12	44,4	95	95	34,04	34,04	17,74	1,73	173,18	33,694	40,136	2,478
MAX	SW-E	10-105@29.6-118@137.0	5,12	44,4	0	0					0	0	0	0
MAX	SW-S	10-105@29.6-121@31.3	5,12	44,4	0	0					0	0	0	0
MAX	N-NE	10-108@93.2-98@61.8	2,72	27,09	248	248	21,73	21,73	9,1	1,41	414,368	80,621	96,034	5,928
MAX	N-S	10-108@93.2-103@124.5	2,72	27,09	0	0					0	0	0	0
MAX	N-SW	10-108@93.2-104@116.7	2,72	27,09	99	99	10,5	10,5	5,33	0,59	89,516	17,416	20,746	1,281
MAX	N-N	10-108@93.2-107@76.0	2,72	27,09	15	15	44,63	44,63	22,47	2,86	36,383	7,079	8,432	0,521
MAX	N-E	10-108@93.2-118@137.0	2,72	27,09	0	0					0	0	0	0
MAX	N-S	10-108@93.2-121@31.3	2,72	27,09	0	0					0	0	0	0
MAX	E-NE	10-117@232.0-98@61.8	0	0	145	145	1,19	1,19	0,04	0,03	91,196	17,743	21,136	1,305
MAX	E-S	10-117@232.0-121@31.3	0,01	6,57	218	218	0,43	0,43	0,02	0,01	66,593	12,957	15,433	0,953
MAX	S-NE	10-119@31.4-98@61.8	0	0	0	0					0	0	0	0
MAX	S-E	10-119@31.4-118@137.0	0,03	6,41	121	121	1,13	1,13	0,12	0,05	23,446	4,562	5,434	0,335
MAX	NE-NE	10-190@341.6-98@61.8	4,23	50,32	507	507	16,18	16,18	5,1	0,7	724,015	140,867	167,798	10,358
MAX	NE-S	10-190@341.6-103@124.5	4,23	50,32	7	7	11,89	11,89	5,22	0,5	7,989	1,554	1,852	0,114
MAX	NE-SW	10-190@341.6-104@116.7	4,23	50,32	242	242	6,98	6,98	2,81	0,37	235,846	45,887	54,66	3,374
MAX	NE-N	10-190@341.6-107@76.0	2,11	50,32	479	479	2,84	2,84	0,12	0,03	298,959	58,167	69,287	4,277
MAX	NE-E	10-190@341.6-118@137.0	4,23	50,32	94	94	18,98	18,98	6,48	0,84	147,271	28,654	34,131	2,107
MAX	NE-S	10-190@341.6-121@31.3	4,23	50,32	0	0					0	0	0	0
MAX	Total	10	1,08	50,32	2329	2329	10,59	10,59	4,12	0,5	2401,483	467,241	556,567	34,356