Capacity Building, Education, and Technology Transfer

Final Report

UAB UTC Domain 2: Development of a Dynamic Traffic Assignment and Simulation Model for Incident and Emergency Management Applications in the Birmingham Region (Aim 1)

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16 Abstract

A number of initiatives were undertaken to support education, training, and technology transfer objectives related to UAB UTC Domain 2 Project: Development of a Dynamic Traffic Assignment and Simulation Model for Incident and Emergency Management Applications in the Birmingham Region. Examples include planning and delivery of technical workshops, short courses, seminars and scientific papers as well as development of training manuals and informational materials. These initiatives aimed at advancing the knowledge and practice in incident and emergency management.

This report highlights education and technology transfer initiatives and provides samples of products developed under this contract. The transfer of research results into practice performed in this study provides a wide range of opportunities for training students as well as the scientific community and authorities responsible for emergency planning, response and recovery, and operation of transportation facilities emergency management personnel.

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ABSTRACT

A number of initiatives were undertaken to support education, training, and technology transfer objectives related to UAB UTC Domain 2 Project: Development of a Dynamic Traffic Assignment and Simulation Model for Incident and Emergency Management Applications in the Birmingham Region. Examples include planning and delivery of technical workshops, short courses, seminars and scientific papers as well as development of training manuals and informational materials. These initiatives aimed at advancing the knowledge and practice in incident and emergency management.

This report highlights education and technology transfer initiatives and provides samples of products developed under this contract. The transfer of research results into practice performed in this study provides a wide range of opportunities for training students as well as the scientific community and authorities responsible for emergency planning, response and recovery, and operation of transportation facilities emergency management personnel.

Keywords: Technology Transfer, Education

1. INTRODUCTION

Technology Transfer has been a strategic goal of the University of Alabama at Birmingham University Transportation Center (UAB UTC) since its inception. This report documents the accomplishments of the UAB UTC Domain 2 research team in support of its educational and technology transfer objectives.

Examples of initiatives undertaken during the course of the project include planning and delivery of technical workshops, short courses, seminars and scientific papers as well as development of training manuals and informational materials. Moreover, a number of ancillary activities took place where the work related to UAB UTC Domain 2 was positively represented.

The following sections highlight education and technology transfer initiatives and provide examples of products developed under this contract. As a result of these initiatives, UAB UTC was active in technology transfer and provided a wide range of opportunities for training students as well as the scientific community and authorities responsible for emergency planning, response and recovery, and operation of transportation facilities emergency management personnel.

2. PROGRAM DEVELOPMENT AND ACCOMPLISHMENTS

A number of outreach and development activities have been contacted since the start of the project in the summer of 2008. Each of these is descried briefly in the sections below.

2.1. Training Materials

The VISTA platform used in the Domain 2 research is a complex, recently developed simulation and optimization model. As such many practitioners, academics, and transportation agency employees are not familiar with the concepts, structure, requirements, and use of the model. The need to develop training materials was recognized early on in order to guide potential users on the features and requirements of the model. Thus, on the onset of the project, members of the research team put together a document to serve as a guide for using the VISTA software. The document contains instructions on:

- Logging into and out of VISTA
- Viewing and editing data inputs
- Running the Dynamic Traffic Assignment (DTA) module
- Running reporting modules, and
- Running the simulation animation

This software walk-through provided detailed instructions and illustrations on how to use the VISTA software from both the GIS Java GIS Interface and the web interface, and is available in **Appendix A.**

2.2. Short Courses

A short training course on VISTA was developed and delivered in 2008 as a webinar series. The short course provided training on:

- VISTA's features and capabilities
- Steps involved in preparing and running a base case network in VISTA
- Details on how to prepare reports and visualize outputs
- Demonstrations on how to introduce changes in the base case in order to evaluate different scenarios

The training was offered by the CCNY and VTG Inc. and facilitated by UAB. The course was made available to students, ALDOT, state, and MPO and other interested agencies and attracted seventeen (17) participants. The participants were able to get step-by-step instructions as well as become involved in hands on use of the VISTA model.

The course had three parts that were delivered on October 29th, November 5th, and November 12th, 2008 respectively. The first session provided details on the VISTA model capabilities and focused on model introduction and base case preparation. Session 2 demonstrated the steps to be taken in order to modify the network, run the VISTA simulator and DTA, and obtain results using the add lanes scenario as a case study. Session 3 covered an incident case study and showcased how to add a temporary closure to the traffic network and analyze the effects of the closure on traffic. **Appendix B** provides details about the scenarios developed for the 3-session short course on VISTA.

In order to allow access to the short course to other interested parties in the future, the webinars were archived with the assistance of UAB UTC personnel and are available at the following links:

Session 1: http://uab.wimba.com/launcher.cgi?room=_uab_s_368952178011_344623_2008_1027_1103_38

Session 2: http://uab.wimba.com/launcher.cgi?room=_uab_s_368952178011_344623_2008_1105_1047_41

Session 3: http://uab.wimba.com/launcher.cgi?room=_uab_s_368952178011_344623_2008_1112_1040_26

2.3. Research Briefs

The research-oriented newsletters, *The UAB University Transportation Center Update*, featured articles on the project that highlighted the project scope and objectives, project progress, and accomplishments, and preliminary findings. Related information can be found at the following issues:

- Summer 2010 edition of *UPDATE* (To view please click here)
- Winter 2010 edition of *UPDATE* (To view please click here)
- Spring 2009 edition of *UPDATE* (To view please click here)
- Winter 2009 edition of *UPDATE* (To view please click here)
- Summer 2008 edition of *UPDATE* (To view please click here)

Moreover, articles on the Domain 2 project were included in the:

- UAB UTC Annual Report 2007-2008[1] (pages 15, 16)
- UAB UTC Annual Report 2008-2009[2] (pages 22, 23)
- UAB UTC Annual Report 2009-2010[3] (page 28)

2.4. Seminars and Presentations

A number of technical seminars and presentations directly resulting from to the UAB UTC Domain 2 Project were delivered at regional, national and international scientific meetings during the course of the project. Examples include the following:

1. "Modeling Incidents and Emergencies in the Birmingham Area Using VISTA", Transportation Research Board 90th Annual Meeting, ANB10 (4) – TRB Subcommittee on Emergency Evacuation, Washington, D.C. 2011, Presenter: V. Sisiopiku, forthcoming.
2. "Emergency Response and Traffic Congestion: The Dispatchers Perspective", Conference on Disaster Management and Human Health: Reducing Risk, Improving Outcomes, Orlando, FL, 2011, Presenter: V. Sisiopiku, forthcoming.
3. Emergency Response: Models, Formulations, and Insights. Decision Sciences Institute Annual Conference, San Diego, CA, November 20-23, 2010, Presenter: S. Melouk.
4. "Incident Management Study in the Birmingham Region", 5th Annual Student Awards Luncheon', Birmingham, AL, 2010, Presenter: Ozge Cavusoglu.

[1] Available at http://www.uab.edu/utc/PDF%20Files/2007-2008%20UTC%20Annual%20Report.pdf
[2] Available at http://www.uab.edu/utc/PDF%20Files/UTC%20Annual%20Report%202008-2009.pdf
[3] Available at http://www.uab.edu/utc/PDF%20Files/UTC_AnnualReport_2010_Final%20v8.pdf

5. "Impacts of Traffic Incidents and Disasters on Traffic Network Operations and Emergency Response", 2010 Huntsville Simulation Conference, Huntsville, AL, 2010, Presenter: Ozge Cavusoglu.
6. "Transportation-Oriented Communications with Vulnerable Populations During Major Emergencies: Current Challenges and Best Practices", 89th Transportation Research Board Annual Meeting, Washington, D.C., 2010, Presenter: D. Turner.
7. "Mitigating Traffic Congestion Using Simulation and Optimization", INFORMS 2010 Southern Regional Conference, Huntsville, AL, 2010, Presenters: C. Armbrester and S. H. Melouk.
8. "A Holistic Approach to Incident Management", INFORMS 2010 Southern Regional Conference, Huntsville, AL, 2010, Presenter: V. Sisiopiku.
9. "Emergency Response and Traffic Congestion: Dispatchers' Perspectives", National Evacuation Conference, New Orleans, LA, 2010, Presenter: V. Sisiopiku.
10. "Contra Flow Operations for Hurricane evacuation: Lessons learned from an Alabama case study. National Evacuation Conference, New Orleans, LA, 2010, Presenter: V. Sisiopiku.
11. "Modeling Traffic Incidents in VISTA". Traffic Simulation Workshop, Graz, Austria, 2008 Presenter: V. Sisiopiku.
12. "Traffic Management Strategies for Hurricane Evacuations in the Southeastern United States", 2008 TSITE/ALSITE Joint Fall Meeting, Chattanooga, TN, 2008, Presenter: V. Sisiopiku.

Moreover, faculty and students associated with the project delivered relevant presentations at the UAB University Transportation Center's *"Research in Progress Seminar Series"*, including the following:

- July 2010, Speaker: Cheng Zhong, PhD Candidate, V.P. Sisiopiku, Advisor, Civil, Construction, and Environmental Engineering, UAB, Crash Prediction on Rural Roads
- February 2010, Speaker: Ozge Cavusoglu, PhD Candidate, V.P. Sisiopiku, Advisor, Civil, Construction, and Environmental Engineering, UAB, Transit Practices for Evacuation Preparedness and Response for Vulnerable Populations
- October 2008, Speaker: Virginia Sisiopiku, PhD, Civil, Construction, and Environmental Engineering, UAB, Traffic Management Strategies for Hurricane Evacuations in the Southeastern United States.

Project briefings and progress report updates were also given at the UAB UTC Annual Advisory Board Meetings held on May 20th, 2010; and December 9th, 2008. In addition to UTC Advisory Board members and representatives from the Research and Innovative Technology Administration (RITA) and the academia, numerous transportation professionals attended these events and took advantage of the opportunity to network as well as learn more about incident and emergency management and the effects of traffic congestion on the effectiveness of EMS response.

2.5. Certificate Program

The Department of Civil, Construction, and Environmental Engineering (CCEE) offers four Category A Certificates, including one in the area of Transportation Engineering. During the course of the project UAB UTC and CCEE leadership met and discuss the establishment and promotion of a new **Certificate in Transportation Safety and Injury Control Engineering.** The intent of this Certificate is to allow UAB students and professionals to obtain formal specialization in topics related to transportation safety, public health, and injury control engineering. The first such certificate was awarded to a UAB student on Dec. 12, 2009.

2.6. Study Abroad Opportunity for UAB/UA Students

Study abroad programs provide exceptional educational experiences for students and expand their academic and cultural experiences. During the academic year 2009-2010 the project PI, Dr. Sisiopiku, led an initiative to establish a new faculty led study abroad program to Greece. The UAB Alabama-in-Greece Study Away program was established in collaboration with the University of Alabama (UA). Promotional materials were developed in support of the program, including a recruitment brochure, and a detailed informational document. These documents are displayed in Appendix C and are also available on-line at http://www.uab.edu/engineering/departments-research/civil/people/273-virginia-p-sisiopiku-

FIGURE 1 Alabama-in-Greece, June 2010

The **"Alabama-in-Greece Study Away"** program was very successful and drew a total of twenty eight (28) students between the UAB and UA campuses who traveled to Greece for three weeks in the summer of 2010 (6/2/10 to 6/23/10). Participants enrolled in and attended two 3-credit courses while in Greece. Dr. Tsakiropoulou-Summers (Dept. of Classics- UA) served as the program director and Dr. Sisiopiku (CCEE Dept- UAB) was the program facilitator.

Due to the popularity and success of the program the PI is considering potential additional offerings of the UAB Alabama-in-Greece Study Away program in the future. Moreover, she plans to explore the opportunity for incorporation of a course on transportation planning and urban development as part of future curriculum offerings.

2.7. Annual Student Awards Luncheon

During the course of the project, the UAB Institute of Transportation Engineers under the leadership of faculty advisor and project PI, Dr. Sisiopiku organized and hosted at UAB the Annual Student Awards luncheon three years in a row. The events were co-sponsored by the University Transportation Center for Alabama (UTCA) and the Department of Civil, Construction, and Environmental Engineering. Each event drew 25-30 participants representing a mix from academia, transportation professionals/consultants, and local and regional transportation agencies.

The events took place on December 5th, 2008; November 20th, 2009; and November 19, 2010. The technical program for each event included technical presentations from students at UAB, UA, and UAH universities showcasing their research activities (see **Appendix D** for a sample). During the event, awards were presented to 3-4 selected transportation students from each university to cover travel expenses to the Annual Meeting of the Transportation Research Board.

FIGURE 2 Student Awardees and their advisors Drs. Sisiopiku (UAB), Turner (UA), and Anderson (UAH) at the 4th Annual Student Awards Luncheon at UAB (11/20/2009)

2.8. UAB UTC Student of the Year

Each year the UAB University Transportation Center has the opportunity to select one UTC-affiliated student participating in transportation-related research as Student of the Year. The UAB project team nominated students in response to the call for Outstanding Student of the Year Nominations. Ms. Cavusoglu was selected as the 2009-2010 **UAB University Transportation Center's Student of the Year**.

Ms. Cavusoglu is a PhD Candidate in Transportation Engineering at the department of CCEE at UAB and a valuable member of the research team for the UAB UTC Domain 2 Project. Her PhD dissertation is titled: "Modeling incident and emergency management from a regional perspective".

The U.S. Department of Transportation (USDOT) honors one outstanding student from each UTC at a special ceremony held during the TRB Annual Meeting. Ms. Cavusoglu was recognized at the 19th Annual Outstanding Student of the Year Awards ceremony that took place as part of the Council of University Transportation Centers (CUTC) annual banquet on Saturday, January 9, 2010. Ms. Cavusoglu was accompanied by Dr. Russ Fine, Director of UAB UTC and Dr. Virginia Sisiopiku, Faculty Advisor.

FIGURE 3 Ms Cavusoglu with Dr. Sisiopiku at the UTC Outstanding Student of the Year Ceremony in Washington D.C.

2.9. Student Training and Mentoring

Six graduate students and one undergraduate student were funded through UAB UTC recourses during the course of the UAB UTC Domain 2 study. These include:

1. Ozge Cavusoglu (Ph.D., expected graduation: Summer 2011- CCEE UAB).
2. Abdul Muqueet Abro (Ph.D., expected graduation: Spring 2012- CCEE UAB).
3. Cheng Zhong (Ph.D., expected graduation: Fall 2013- CCEE UAB).
4. Sara Alnazer (M.S., expected graduation: Fall 2011- CCEE UAB).
5. Sujit Rathi, (M.S., graduated: Fall 2009- CCEE UAB).
6. Germin Fadel (M.S., graduated: Summer 2009- CCEE UAB).
7. Chris Armbrester (B.S., Information Systems, Statistics & Management Science-UA)

The students became actively involved in literature review, data collection, data processing, simulation modeling, and technical writing as a result of the grant. A number of other graduate transportation students also received indirect benefits from the grant's education and technology transfer activities. These include the following:

8. **Imran Md. S.** (M.S., expected graduation: Spring 2012- CCEE UAB).
9. **Islam Md. Saidul** (M.S., expected graduation: Spring 2012- CCEE UAB).
10. **Santosh Chitikesi** (M.S., graduated: Spring 2010- CCEE UAB).
11. **Sujit Rathi**, (M.S., graduated: Fall 2009- CCEE UAB).
12. **Michael Shinouda**, (M.S., graduated: Summer 2009- CCEE UAB).
13. **Germin Fadel,** (M.S., graduated: Summer 2009- CCEE UAB).
14. **Shrikanth Mamidipalli,** (M.S., graduated: Spring 2009- CCEE UAB).
15. **Jugnu Chemmannur**, (M.S., graduated: Fall 2008- CCEE UAB).
16. **Suman R. Surabhi**, (M.S., graduated: Fall 2008- CCEE UAB).

2.10. Technical Publications

Technical papers were developed by the research team to disseminate widely the information on project methods and study results. This task is still on-going and will be completed following the publication of the final project report and project completion. Examples of related publications to date include the following:

1. **Sisiopiku, V. P.**, Sullivan, A.J., Fine P.R. and Foster P.J. (2011). "Emergency Response and Traffic Congestion: The Dispatchers Perspective". Proceedings of the 2nd International Conference on Disaster Management and Human Health: Reducing Risk, Improving Outcomes, under review.
2. Turner D., Wolshon B., Dixit V., Evans W., **Sisiopiku V.P.**, Islam S., Anderson M., Teklewold M. (2011). "Transportation-Oriented Communications with Vulnerable Populations during Major Emergencies: Current Challenges and Best Practices", Accepted for publication in the *Journal of the Transportation Research Board, Transportation Research Record (TRR), forthcoming.*
3. Melouk, S., Keskin, B. and Capar, I. (2010). "Emergency Response: Models, Formulations, and Insights". Decision Sciences Institute Annual Conference, San Diego, CA. November 20-23.
4. **Sisiopiku, V.P.,** Acharya, A., Anderson M., and Turner D. (2009). "Evaluation of Traffic Signal Performance under Oversaturated Conditions Using VISTA". Proceedings of the 2009 Transportation Simulation Symposium (TSS 09), Spring Simulation Multiconference 2009, San Diego, CA.
5. **Sisiopiku, V.P.,** Mouskos K., Barrett C., Abro A.M., and Parker N. (2008) "Evaluation of Transit Operations Using a Regional Dynamic Traffic Assignment and Simulation Approach", Proceedings of the 10th International Conference on Application of Advanced Technologies in Transportation (AATT), Athens, GR.

2.11. Other

Throughout the course of the study, project team members became engaged in a number of other activities that provided significant service to the profession on the national and local levels. Efforts include serving on Technical Advisory Committees, organizing conferences and workshops, serving on several national professional committees and societies, chairing technical sessions at conferences, performing manuscript reviews for national journals in the field, and contributions to local professional groups. Such initiatives showcase the commitment of the research team to outreach and service and help enhance UAB UTC's local and national visibility.

Moreover, faculty members involved in the study mentored undergraduate, graduate, and post-doctoral students, supervised theses and dissertations, and supported numerous student professional development activities including field trips to conferences and meetings; poster and paper presentations; guest speaker lectures; student competitions etc. It is believed that these activities further strengthened the quality of education offered at UAB and provided unique opportunities to students affiliated with the UAB UTC to engage in valuable professional and life-long learning experiences.

3. CONCLUSIONS

A variety of educational, outreach and technology transfer activities were undertaken as part of the UAB UTC Domain 2 project.

The development of training materials and the delivery of the VISTA short course offering were very successful. Main beneficiaries include students, faculty, and transportation professionals interested in using VISTA for simulation and optimization of transportation networks. The short course was an excellent opportunity for UAB UTC to provide a direct training to the transportation community in Alabama.

Technical paper publications and presentations at local, regional, national, and international transportation conferences were utilized effectively to disseminate the study findings to interested parties, including the scientific community, authorities responsible for emergency planning, response and recovery, and operation of transportation facilities, emergency management personnel, and students. Furthermore, research briefs and work-in-progress seminars and publications gave many project investigators a chance to showcase their work and receive feedback from their colleagues and peers.

Other accomplishments include the development and promotion of a new Certificate Program and a new UAB Study Abroad program. Such initiatives expand training and experiential learning opportunities at UAB and support educational objectives of the UAB UTC, in general and the Domain 2 Project in particular.

Overall, the project team engaged in numerous technology transfer activities which helped enhance the visibility of the UAB UTC at the local, regional, and national scales and support the technology transfer goals of the UAB UTC as described in its strategic plan.

APPENDIX A

VISTA SOFTWARE CHARACTERISTICS AND MODULES

Curtis Barrett VISTA Transport Group Inc. Evanston, IL, USA

Thanasis Ziliaskopoulos, PhD VISTA Transport Group Inc. Evanston, IL, USA

Kyriacos C. Mouskos, PhD Associate Director, UTMSC CCNY

Neville Parker, PhD, PE Director, UTMSC CCNY VISTA Transport Group Inc. Universal Transportation Model Simulation Center (UTMSC) at CCNY

July 10, 2008

1.0 INTRODUCTION

The Visual Interactive System for Transport Algorithms (VISTA) software can be used to view and edit data inputs, and to run modules, reports and simulation animation. These functions can be accessed through either a web interface or a JAVA Geographic Information System (GIS) Java GIS Interface, which is also called the VISTA editor. The web interface displays data and reports in detailed table format, and allows the status of analysis and reporting tasks to be observed. The GIS Java GIS Interface shows the data in graphic format, and includes windows for editing of input values. DTA and reporting modules can be run in both the web and Java GIS Interfaces. Simulation animation is only available in the Java GIS Interface, since it is inherently a graphic function. This document is a guide to using these functions in the VISTA software, beginning with instructions on logging into and out of VISTA. Appendix A provides an example of the implementation of the VISTA software in the City of Nicosia as part of the European Union Eureka program - EUNEA1204-08. In appendix A we provide the MOEs that can be produced by the VISTA General Report for the City of Nicosia. In addition, we provide a sample run of the OD report in Appendix B also for the City of Nicosia. Further, we provide an example (Appendix C) of the implementation of the VISTA Incident/Construction Management (VISTA-IM) and the VISTA-IM Variable Message Sign (VISTA-IM-VMS) modules that were developed for the European Union project called Monitor Integrated Safety System (MISS – www.missproject.net).

2.0 LOGGING INTO AND OUT OF VISTA

The VISTA software runs over a network, and can be accessed anytime from any machine; however, access is password-protected, so users must log into and out of the software. This section explains how to log into VISTA, open a network and log out of VISTA in both the web and Java GIS Interfaces.

3.1 Logging into and out of the Web Interface

Launch the server at the CCNY-CUNY of the Universal Transport Model Simulation Center (UTMSC) http://134.74.90.26/vista/ in Internet Explorer or Mozilla Firefox (see Figure 1), and login by entering your username and password in the Web Interface login box. The link in blue ―launch the GIS Interface‖ can be accessed by activating the link and then inputting the corresponding Username and password in the window that will pop-up (it usually takes from a few seconds to a few minutes). We note here that the CTL has come to an agreement with the CCNY-UTMSC to utilize their VISTA server, an SGI Altix 4700 which is a mini supercomputer and offers substantial computational speed in running the VISTA model that requires substantial computational power and computer memory.

The next screen is the Home screen that allows the user to select a network from the list under "Networks" (see Figure 2).

When a network has been selected (Figure 3), the Modules, Tasks, Reports and Database tabs along the top of the page can be selected. The Modules page allows modules such as DTA and cell generation to be run on the selected network. The Tasks page shows the completion status of the modules and reports that have been run on the network. The Reports page allows the user to run and view reports for the selected network. The Database page allows the user to view and query data

tables associated with the selected network. These pages will be described in more detail in later sections.

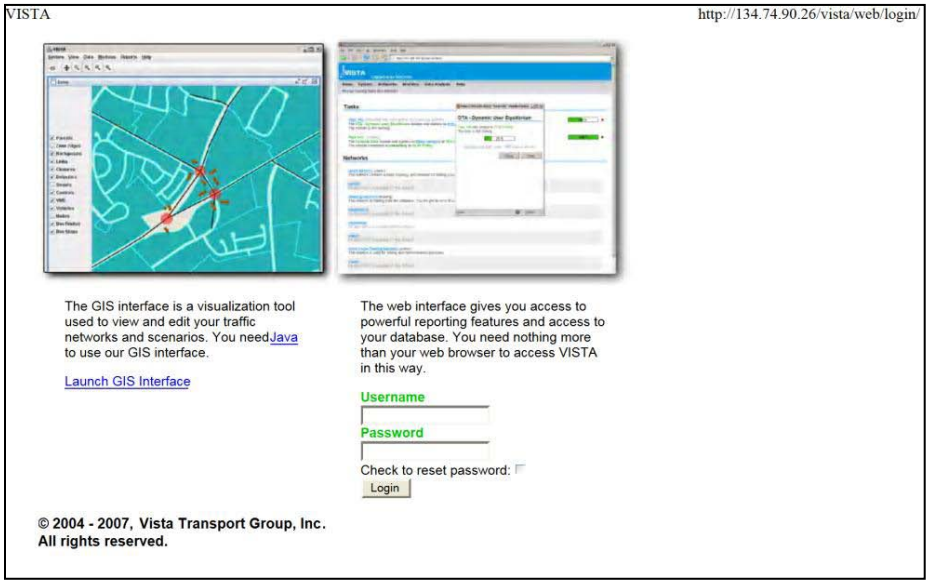


Figure 1: VISTA Web interface Login screen

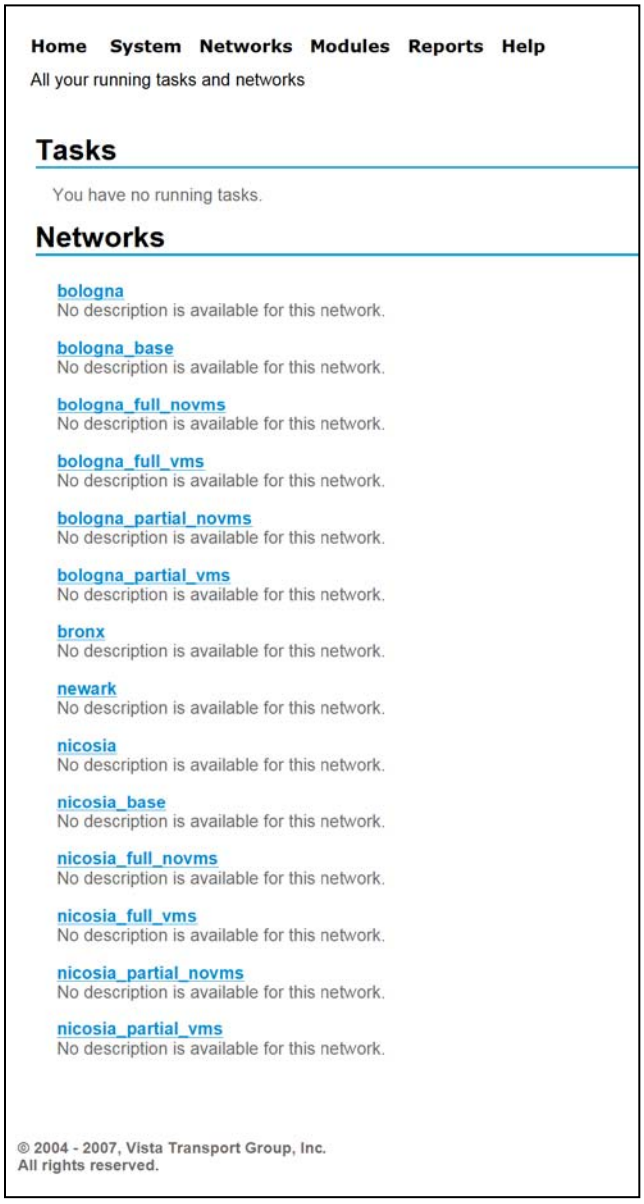


Figure 2: Web interface Overview screen

Figure 3: Selected Specific Network Screen (e.g. Nicosia-Base)

When you are finished working in the web interface, you can logout by clicking on the "logout" link in the top right-hand corner of the window. This link appears in all screens of the web interface, regardless of which network or function page (Overview, Modules, Tasks, Reports or Database) is open.

2.2 Logging into and out of the Java GIS Interface

Launch http://134.74.77.13/vista/ in Internet Explorer and click on "Launch the GIS Interface" (see Figure 2-3). The GIS Interface requires the Java Runtime Environment and Java Web Start to be installed on the client terminal – this now is loaded automatically in all newer computers. If these are not already installed on the client terminal, they can be downloaded from the Java web site.

When the login window will appears (see Figure 4), enter your personal username and password. The server name is http://134.74.77.13/vista/web/login/. The GIS Interface window will appear as shown in Figure 5. To open a network, click on the corresponding network name. The selected network will then be loaded for viewing (depending on the size of the network, this may take several minutes).

When you are finished working in the Java GIS Interface, you can logout by selecting System|Exit (see Figure 6). The VISTA client window will then close.

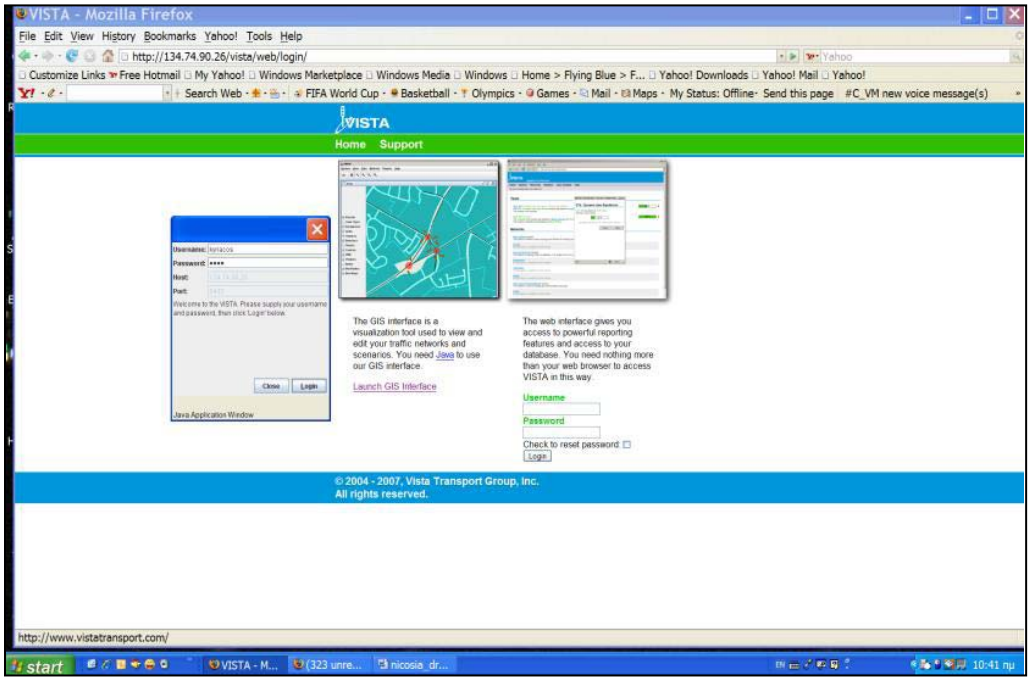


Figure 4: Access the VISTA GIS Interface (small window)

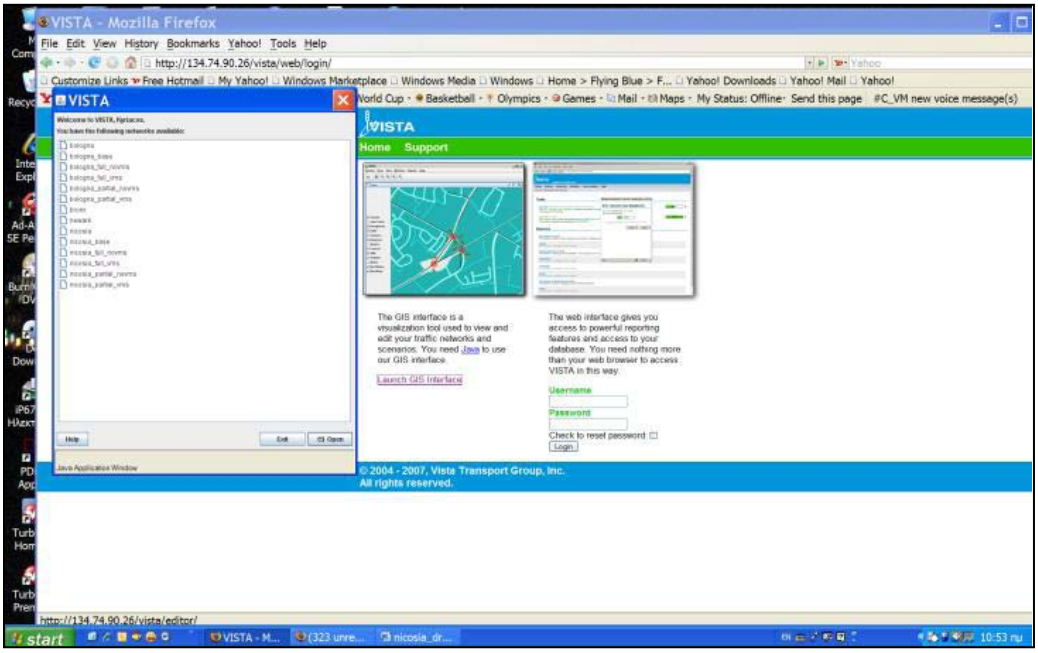


Figure 5: VISTA Open Network window (small VISTA window)

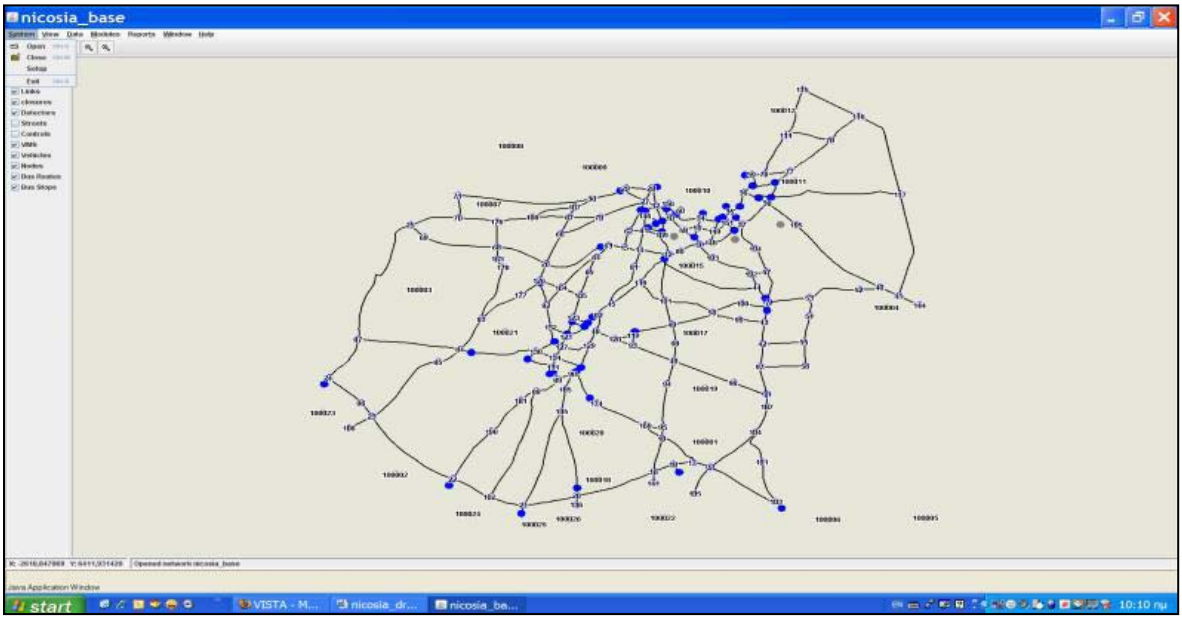


Figure 6: VISTA System|Exit menu option (Nicosia-Base network)

3.0 VIEWING AND EDITING DATA INPUTS

The web interface allows for convenient and detailed querying and editing of data tables. The Java GIS Interface allows for GIS-based viewing of the input data, as well as editing, adding and deleting of network elements.

3.1 Viewing and Editing Data in the Web Interface

The Tables page (see Figure 7) allows the user to view table fields and records associated with the selected network. The network name is shown at the top of the page where the network in the figure is “nicosia_base”. A list of database tables appears in scroll menu on the left, and a database table can be selected by clicking to highlight that table name. The fields contained in that table appear to the right, and the records in the table can be viewed by clicking on the corresponding table name (e.g. linkdetails) – the table records are shown below the table headings if there are any entries.

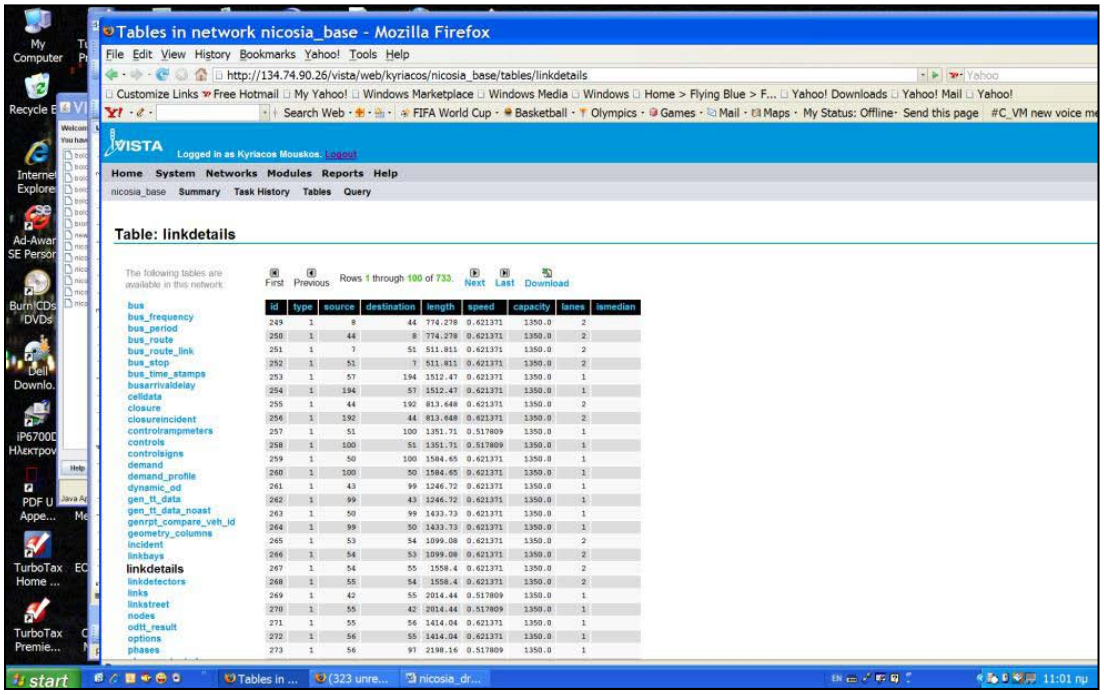


Figure 7: Web interface Tables Page (linkdetails example)

The database tables can also be queried by entering a PSQL “select” statement in the SQL query box – by clicking at the Queries link - and the resulting table will appear in the same window, below the PSQL query box. An example PSQL query is shown in Figure 8. The results can also be saved to a CSV (comma-separated text) file by clicking on “Download MS Excel” link, which is on top of the table.

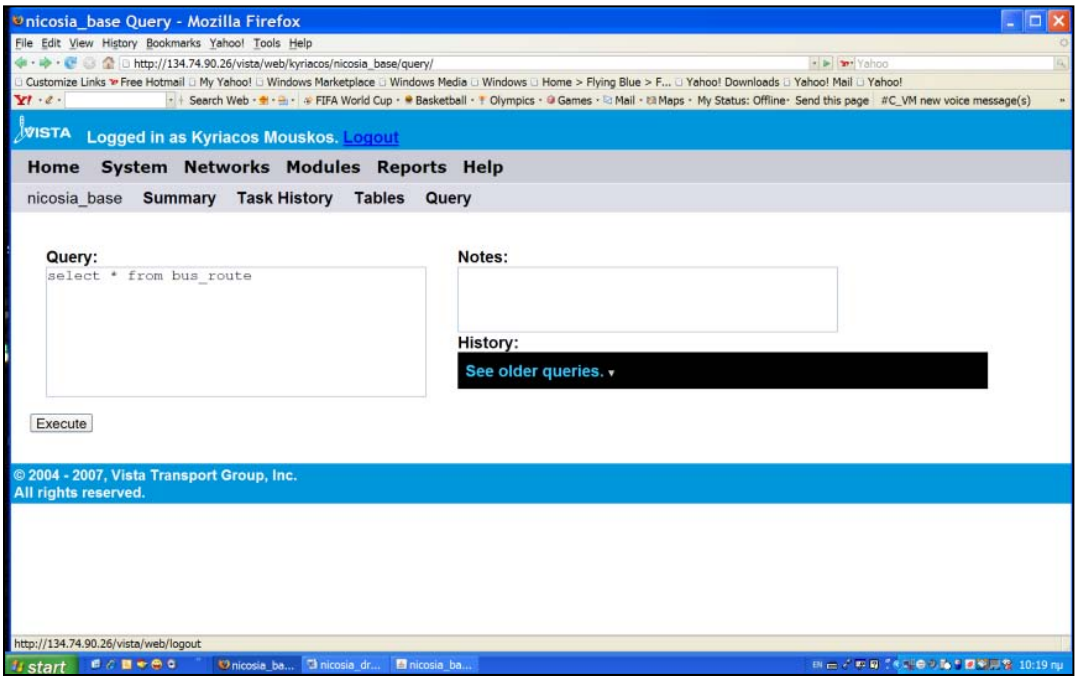


Figure 8: Sample SQL query in the VISTA web interface

Any PSQL query statement can be entered in the SQL box; for example, the statement

SELECT * FROM bus;

will return all fields (represented by *) of all records in the bus table. To narrow the search conditional expressions may also be specified in the target list; for example,

SELECT * FROM bus WHERE route=100;

will return all fields (represented by *) in the bus table, but only for buses on route 100. Boolean operators (and, or, not) are also allowed in the qualification of a query; for example,

SELECT * FROM bus WHERE route=100 AND starttime<600;

will return all fields (represented by *) in the bus table, but only for buses on route 100 that depart before 600 seconds of the simulation have elapsed.
As a final note, you can specify that the results of a select can be returned in a sorted order or with duplicate instances removed; for example,

SELECT DISTINCT route FROM bus ORDER BY preemption;

The SQL box can also be used to insert, update or delete table entries; for example, the command,

INSERT INTO bus (id,type,route,starttime,preemption) VALUES (100,1,32,5,1);

will add a record in the bus table, corresponding to a bus of type 1 on route 32 with vehicle id 100. The bus departs at time 5 and triggers preemption strategy 1. To edit records that already exist in the database, the update command can be used; for example, the command

UPDATE bus SET preemption=1 WHERE route=50;

will set all buses on route 50 to trigger preemption strategy 1. In addition, records can also be deleted from the database; for example, the command

DELETE FROM bus WHERE route=50;

will delete all bus on route 50 from the bus table.

More detailed guides to PSQL commands are widely available on the internet. Two such tutorial pages are found at

http://www.us.postgresql.org/users-lounge/docs/6.5/tutorial/query.htm
http://www.eskimo.com/~ericj/comp/sql1b.htm

3.2 Viewing and Editing Data in the Java GIS Interface

The Java GIS Interface allows the user to view and edit the data in GIS-based format, but also provides access to the Data Warehouse where data can be viewed and queried in detailed table format. This section begins with a discussion of basic tools for viewing networks, such as zooming and panning, as well as tools for adjusting the appearance and colors of network elements. Next, methods of editing data in the client are explained, and then methods of editing data through the client's data warehouse are explained.

3.2.1 GIS-based Viewing of Data

After logging into the client, a network can be opened to be viewed in GIS format (see Section 2.2). An example network, rtatest3, is shown in Figure 9.

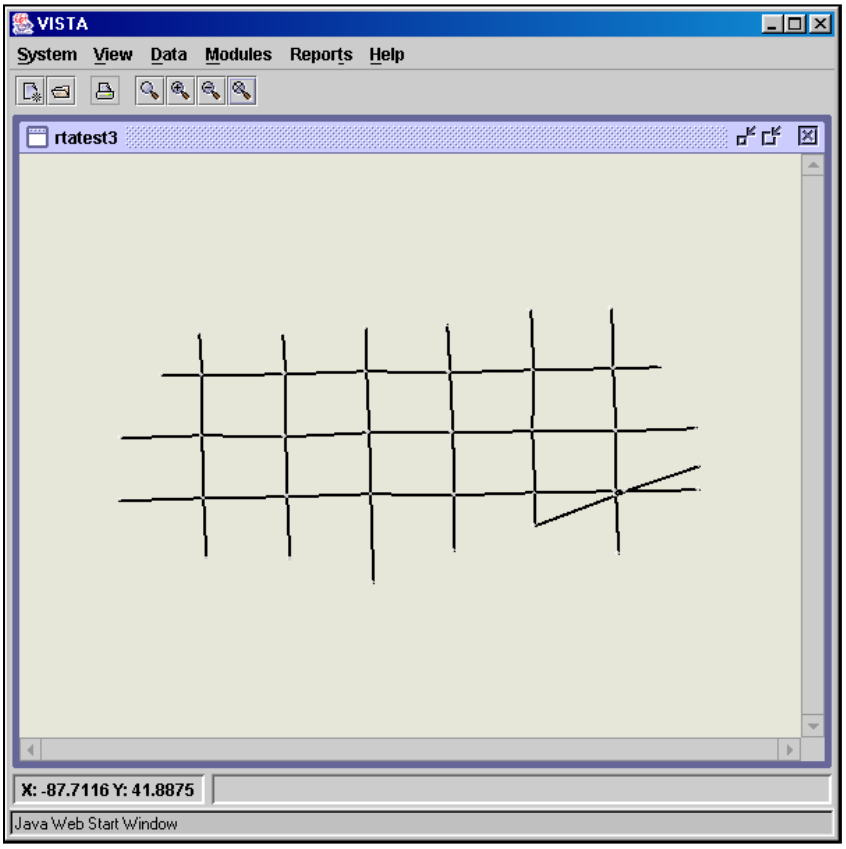


Figure 9: Sample network, rtatest3, in the Java GIS Interface

The VISTA GIS Interface window includes many options for adjusting the appearance of the network. For example, the client window can be maximized by clicking on the maximization button in the top right corner of the window (see Figure 10).

Figure 10: Client window maximization button

To zoom into a particular area of the network, click on  , then select the area you want to zoom into using the red box (see Figure 11).

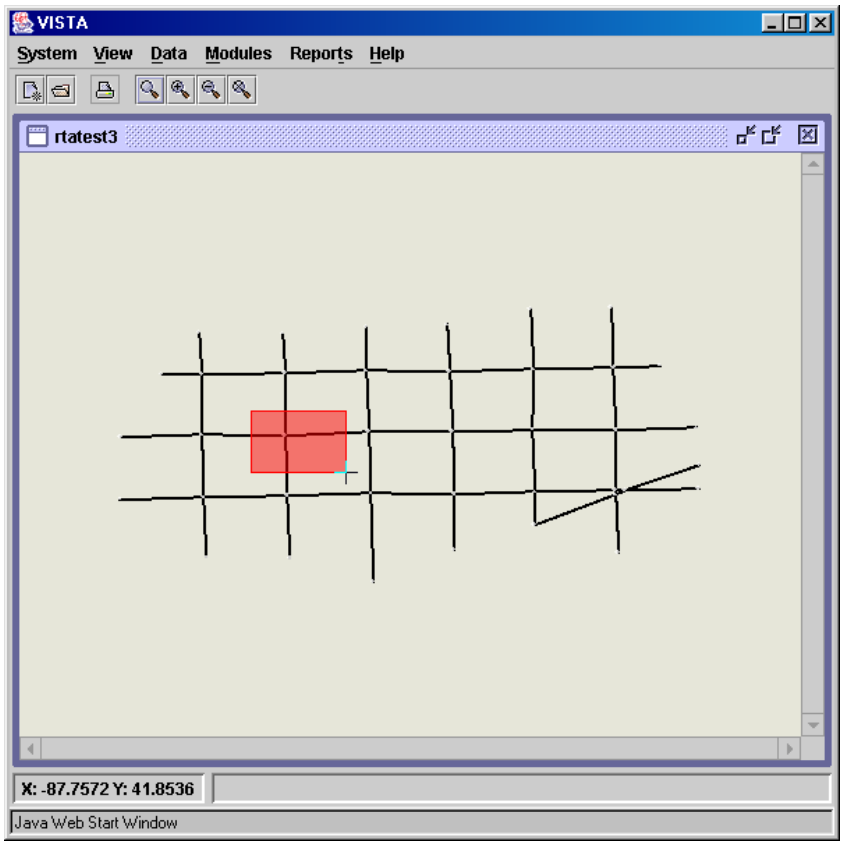


Figure 11: Java GIS Interface zoom function

To zoom into the center of the screen by a predetermined amount, click on  . To zoom out of the center of the screen by a predetermined amount, click on  . To zoom out to the full network, click on  .

In addition, a drag button  , has recently been added to the button bar. The drag button is used to reposition the section of the network shown in the GIS client window. To reposition the network first click on the  button, then click on a spot in the network and hold the mouse button as you drag the network to a new position. Let go of the mouse button to drop the network in its new position.

The color and appearance of the network nodes, links and other elements can be adjusted by right-clicking on any part of the network window to bring up the menu shown in Figure 12. The options most relevant to the transit signal priority project include adjustments to the appearance of nodes, links, controls, bus stops and bus routes.

Figure 12: Java GIS Interface element appearance editing menu

Nodes - If the "Nodes" is selected from the menu, a node appearance editing window appears (see Figure 13). Nodes and node labels, which indicate node id numbers, can be made visible or hidden. Further, the color of nodes and node labels can be adjusted by clicking on the color boxes. A Color Picker window then appears (see Figure 14), and any color in the spectrum can be selected by adjusting the amount of red, green and blue. The alpha value adjusts the contrast of the checker pattern. Further, the label font can be adjusted by clicking on the label font box. A Font Picker window then appears such that the font and font size can be adjusted (see Figure 15).

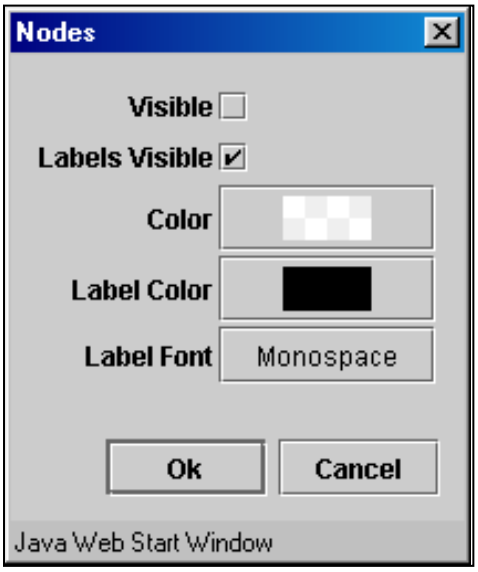


Figure 13: Java GIS Interface node appearance editor

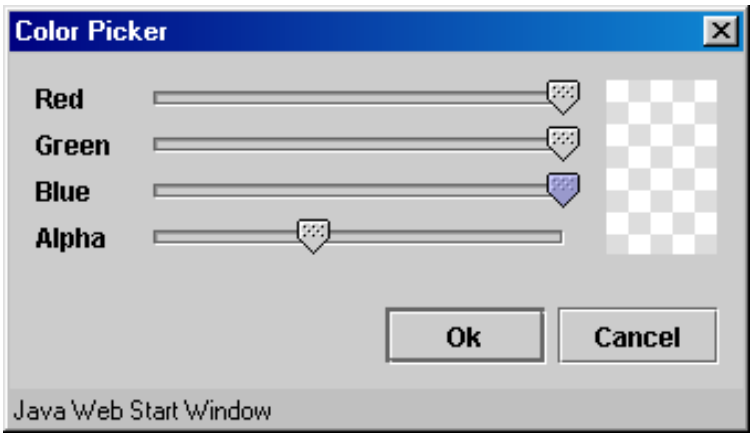


Figure 14: Java GIS Interface color picker

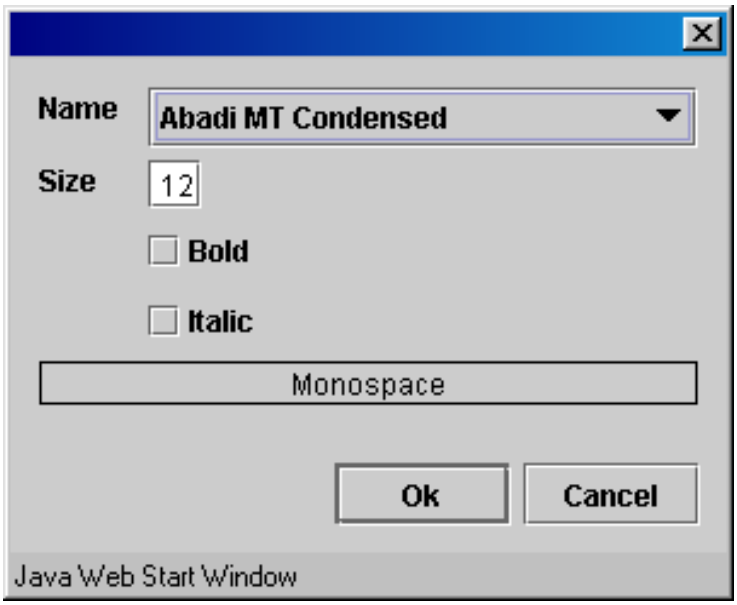


Figure 15: Java GIS Interface font picker

Links - Link appearance characteristics can also be adjusted by selecting “Links” from the element appearance editing menu (Figure 12). The link appearance editing window then appears (see Figure 16). This window allows links and link labels can also be set to be visible or hidden. Further, the colors and fonts can also be adjusted by clicking on the color and font boxes, to make Color Picker and Font Picker windows appear. Further, arrows can be made visible, so that the link directions are apparent, and lanes and centroids can also be made visible.

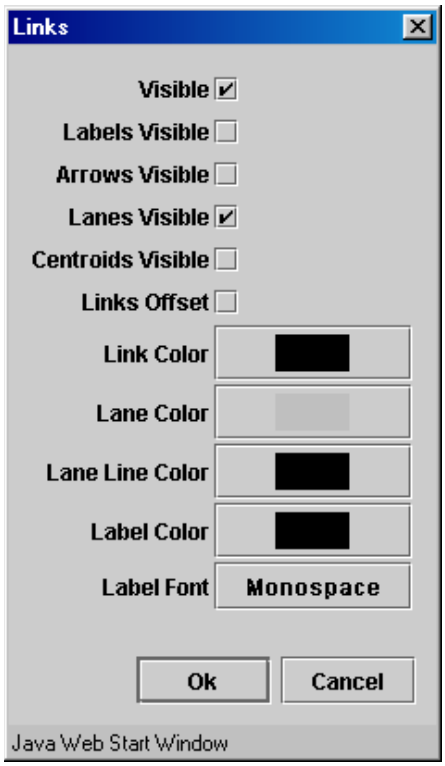


Figure 16: Java GIS Interface link appearance editor

When "Controls" are selected from the element appearance editing menu (Figure 12), a controls appearance editing window appears (see Figure 17). Controls can be made visible or hidden, and colors can be selected as they are with nodes and links. The colors selected appear only during animation, otherwise, only the "stop" color is shown as in Figure 18.

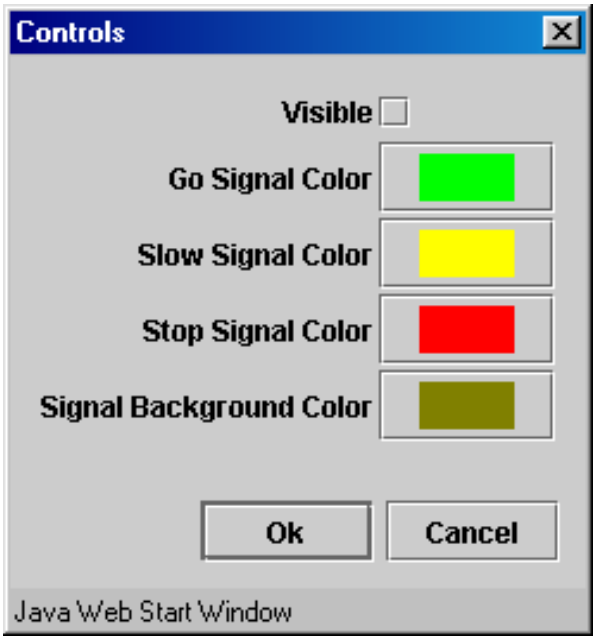


Figure 17: Java GIS Interface controls appearance editor

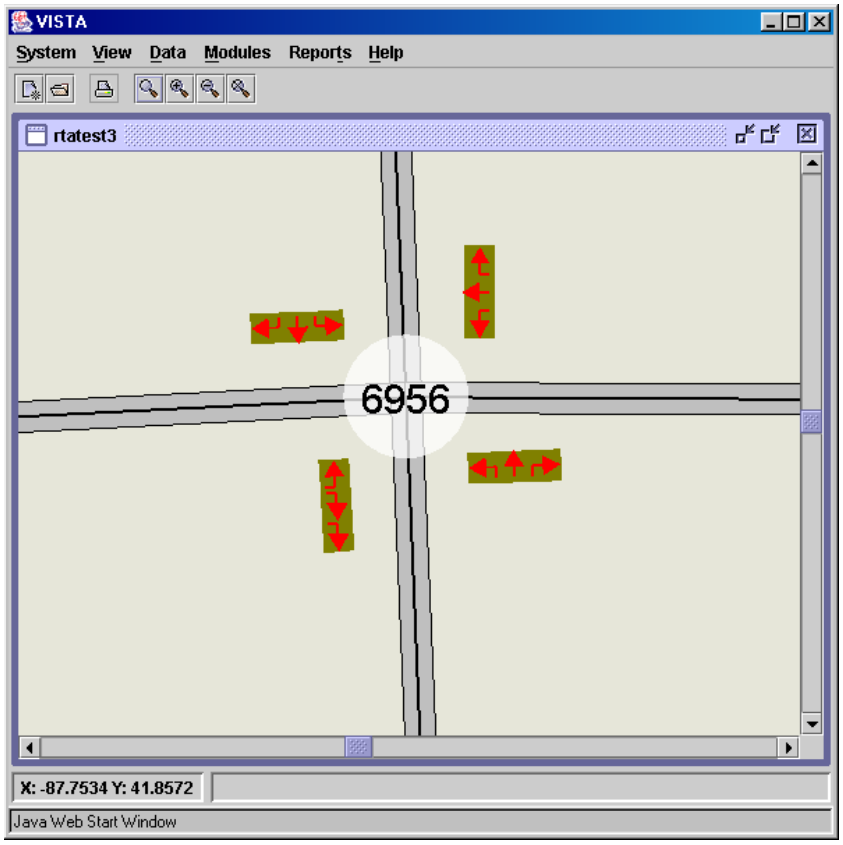


Figure 18: Representation of controls in the Java GIS Interface

When “Bus stops” are selected from the element appearance editing menu (Figure 12), a bus stop appearance editing window appears (see Figure 19). Similarly, when “Bus routes” are selected from the element appearance editing menu (Figure 12), a bus route appearance editing window appears (see Figure 20). Bus stops and bus routes can be made visible or hidden, and colors can be selected as with other network elements. Routes and stops appear slightly offset from the links, as shown in Figure 21.

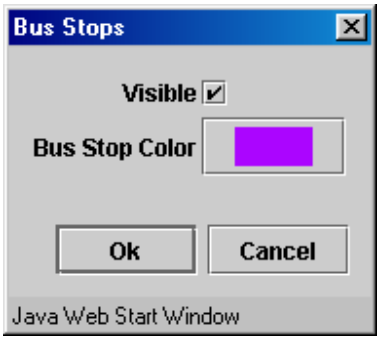


Figure 19: Java GIS Interface bus stop appearance editor

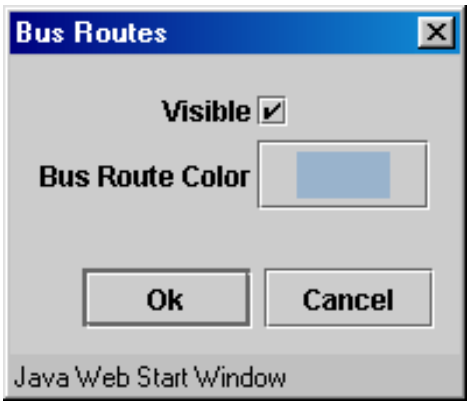


Figure 20: Java GIS Interface bus route appearance editor

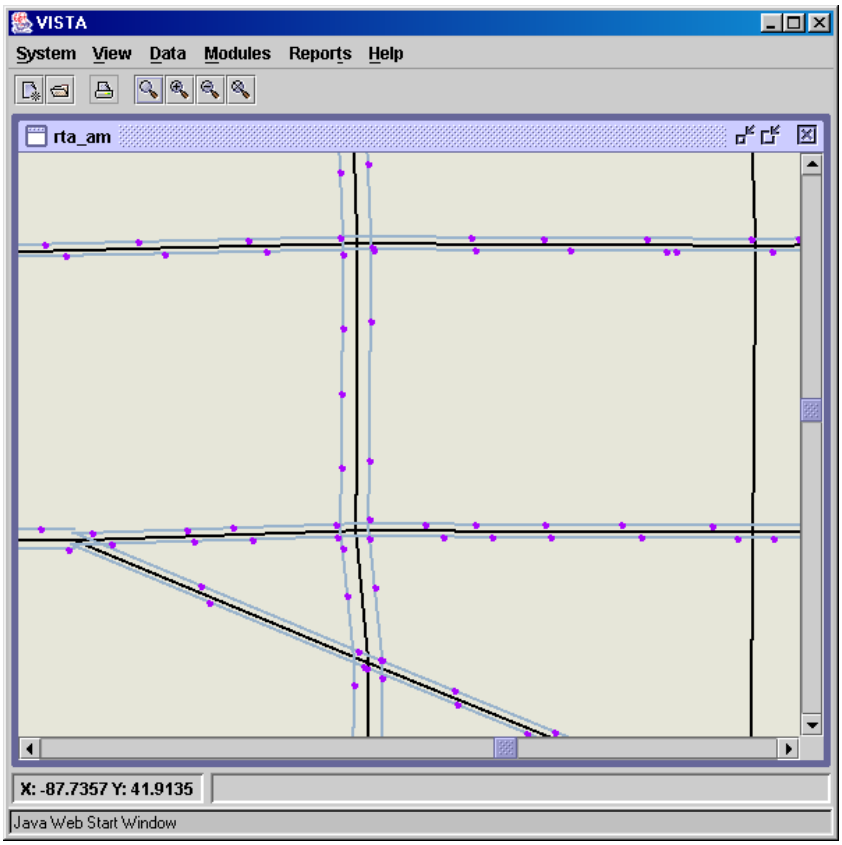


Figure 21: Java GIS Interface representation of bus routes and bus stops

3.2.2 GIS-based Editing of Data

Java GIS Interface - The *VISTA Editor or Java GIS Interface* allows network elements to be added, edited or deleted. The network data that can be altered are listed under the Data menu. The options most relevant to the transit signal priority project include adjustments to nodes, links, zones, controls and buses.

Data-Nodes - When "Nodes" is selected from the Data menu, the options of adding, removing, editing and finding a node appear (see Figure 22). When "Add Node" is selected, a node can be

added to the network by clicking in the desired location. When “Remove Node” is selected, an existing node can be removed by clicking on that node. When “Edit Node” is selected, an existing node can be selected by clicking on that node, and a window will appear in which the x and y coordinates of that node can be adjusted (see Figure 23). When “Find Node” is selected a “Find Node” window will appear, in which the desired node id can be entered (see Figure 24). That node will then be highlighted in the network window.

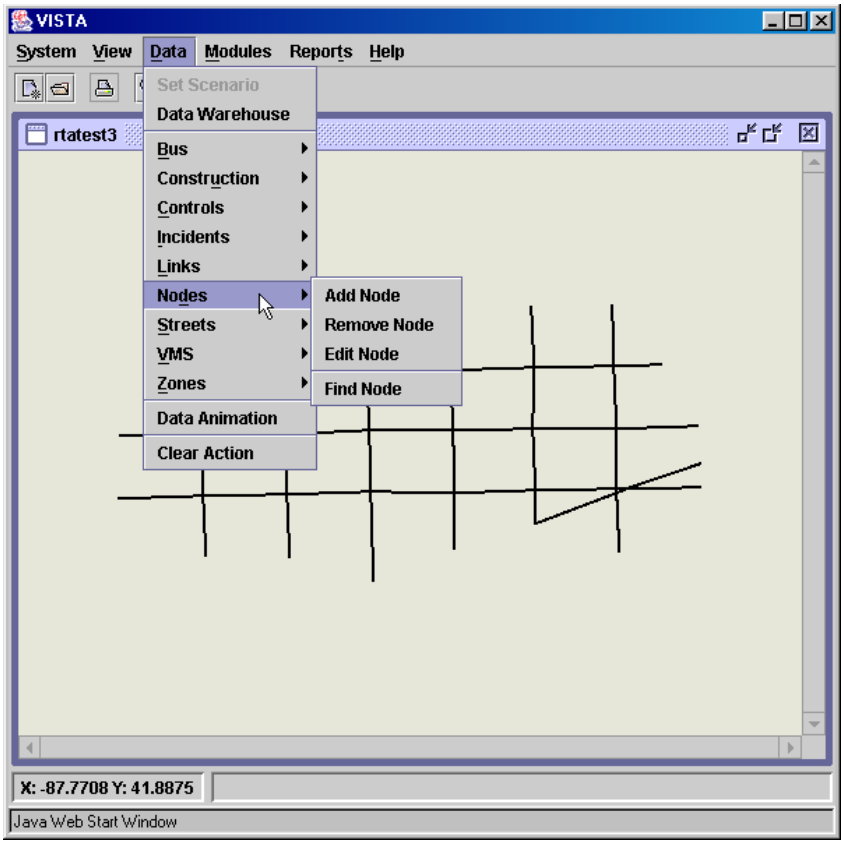


Figure 22: Java GIS Interface Data|Nodes menu option

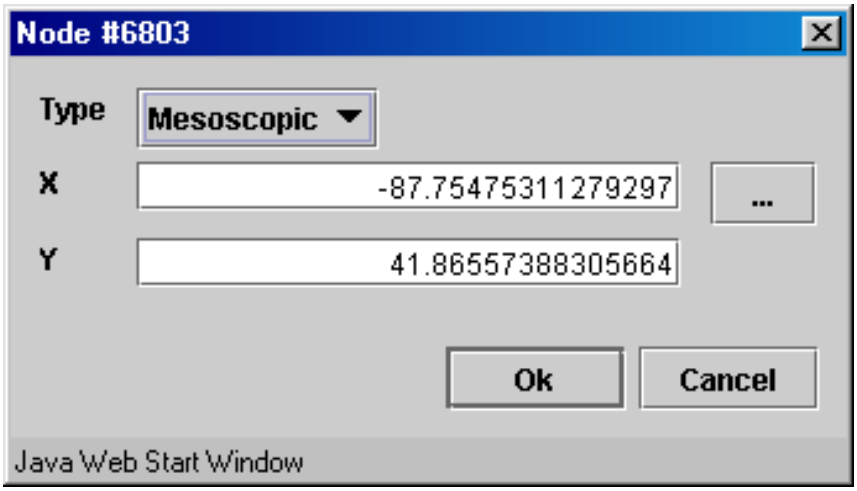


Figure 23: Java GIS Interface node editing window

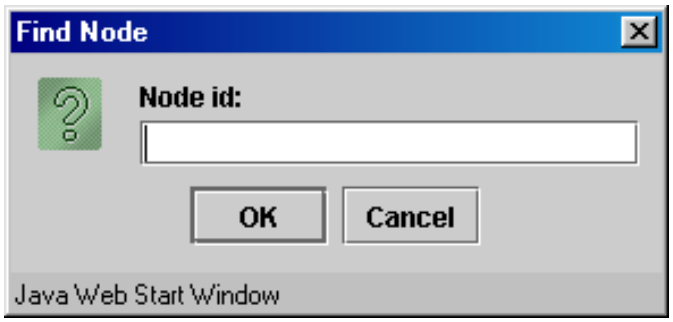


Figure 24: Java GIS Interface - Find Node window

Data-Links - When "Links" is selected from the Data menu, the options of adding, removing, editing and finding a link appear (see Figure 25). When "Add Link" is selected, a link can be added to the network by clicking to join two nodes. When "Remove Link" is selected, an existing link can be removed by clicking on that link. When "Edit Link" is selected, an existing link can be selected by clicking on that link, and a Link Editor window with tabs to Attributes, Geometry, Bays and Detectors will appear. In the Attributes section (see Figure 26), link attributes, such as origin node, destination node, length, speed, number of lanes and capacity can be edited (capacity is optional if the number of lanes is entered). In the Geometry section (see Figure 27), the polyline coordinates can be edited to adjust the appearance of the link in the GIS. In the Bays section (see Figure 28), merge lanes and turning bays can be defined. In the Detectors section (see Figure 29), link detectors can be defined for use with the OD calibration module.

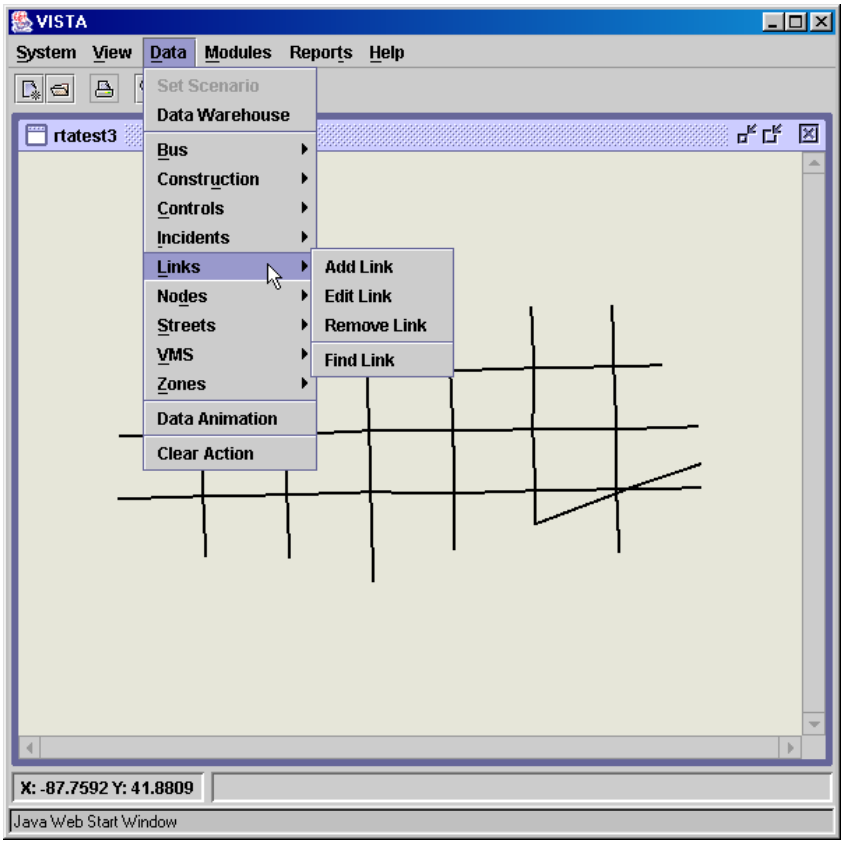


Figure 25: Java GIS Interface Data|Links menu option

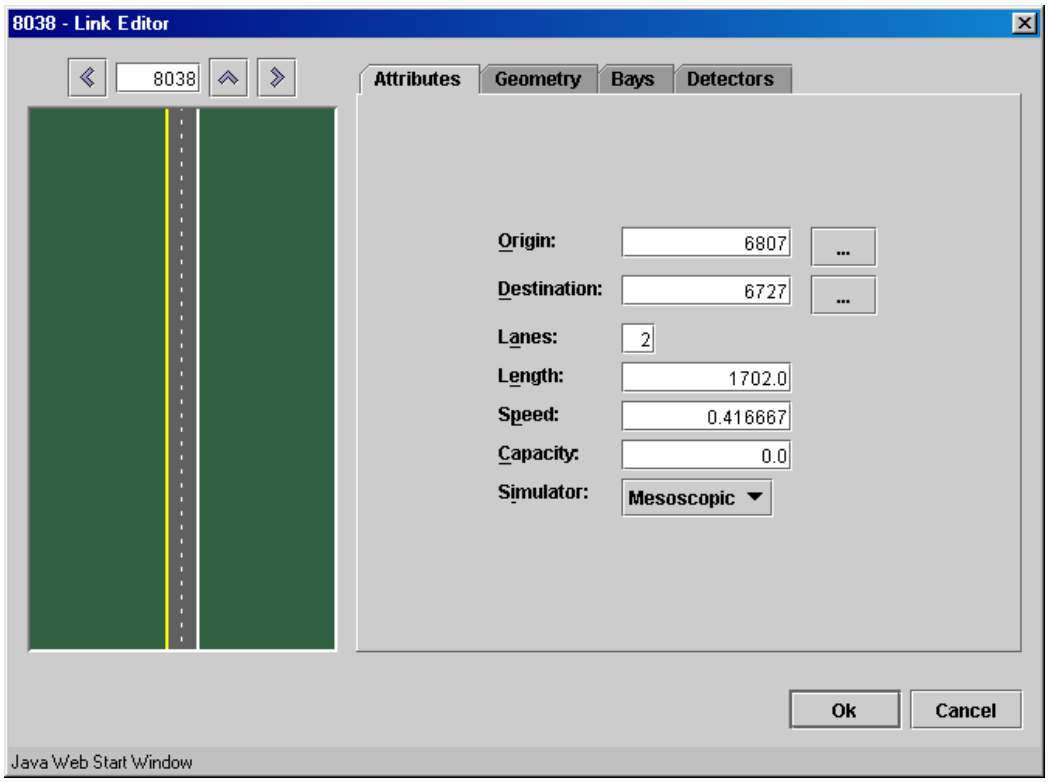


Figure 26: Java GIS Interface Link Attribute editor

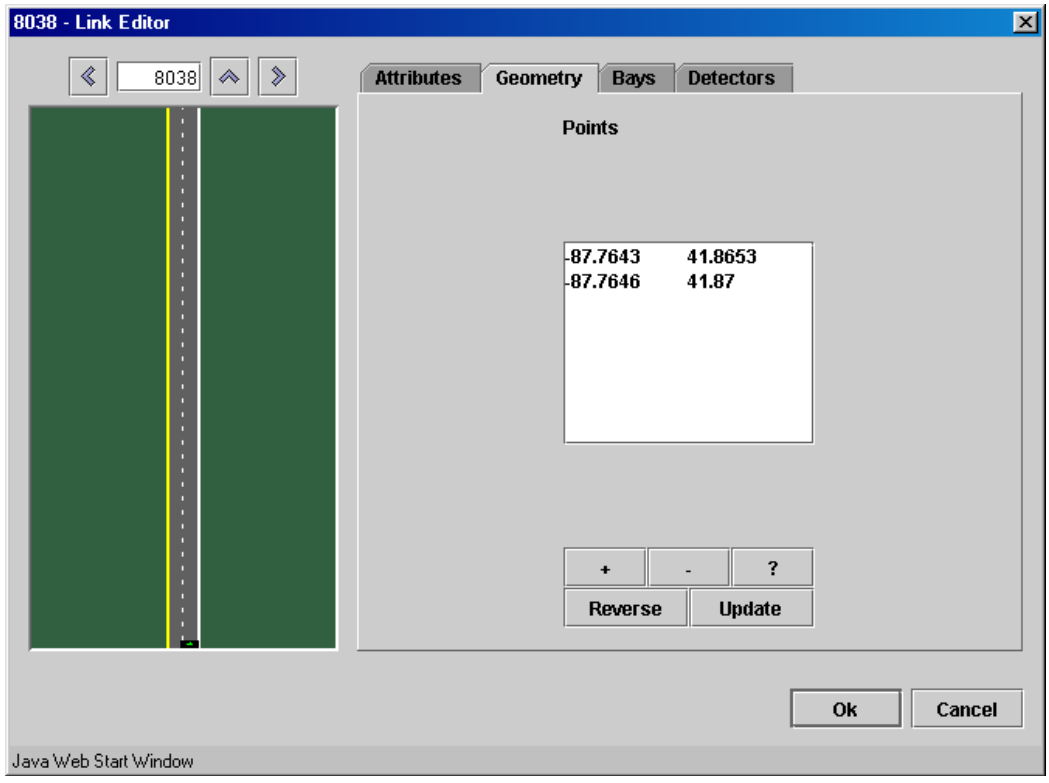


Figure 27: Java GIS Interface Link Geometry editor

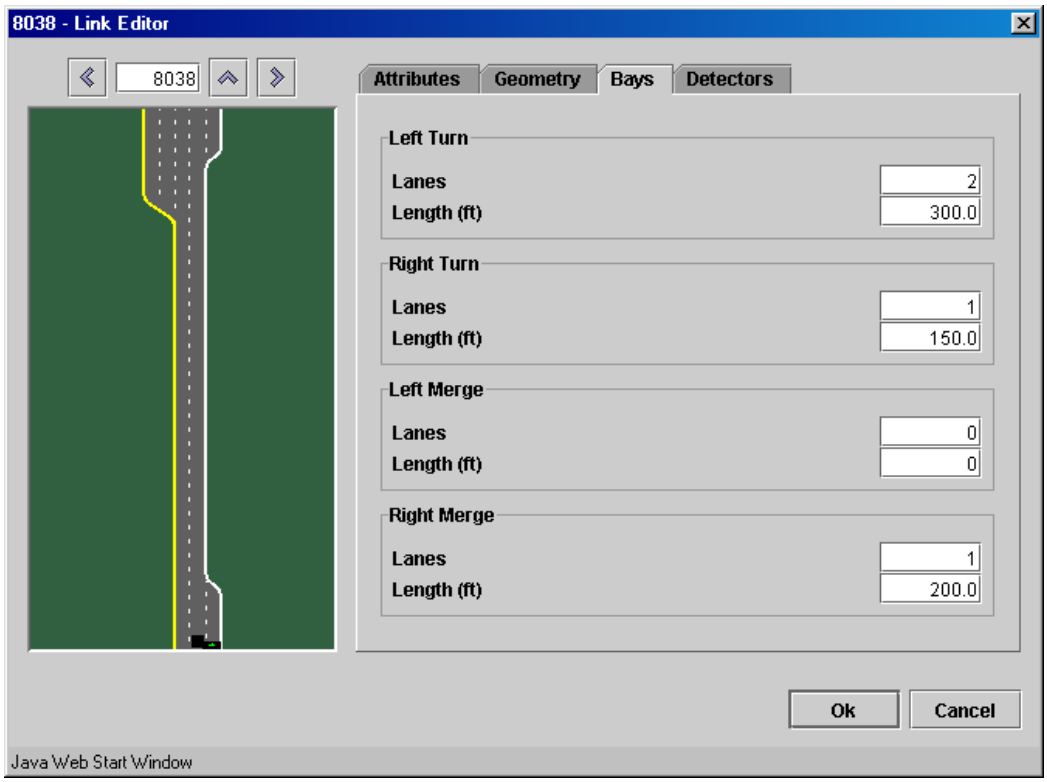


Figure 28: Java GIS Interface Link Bay editor

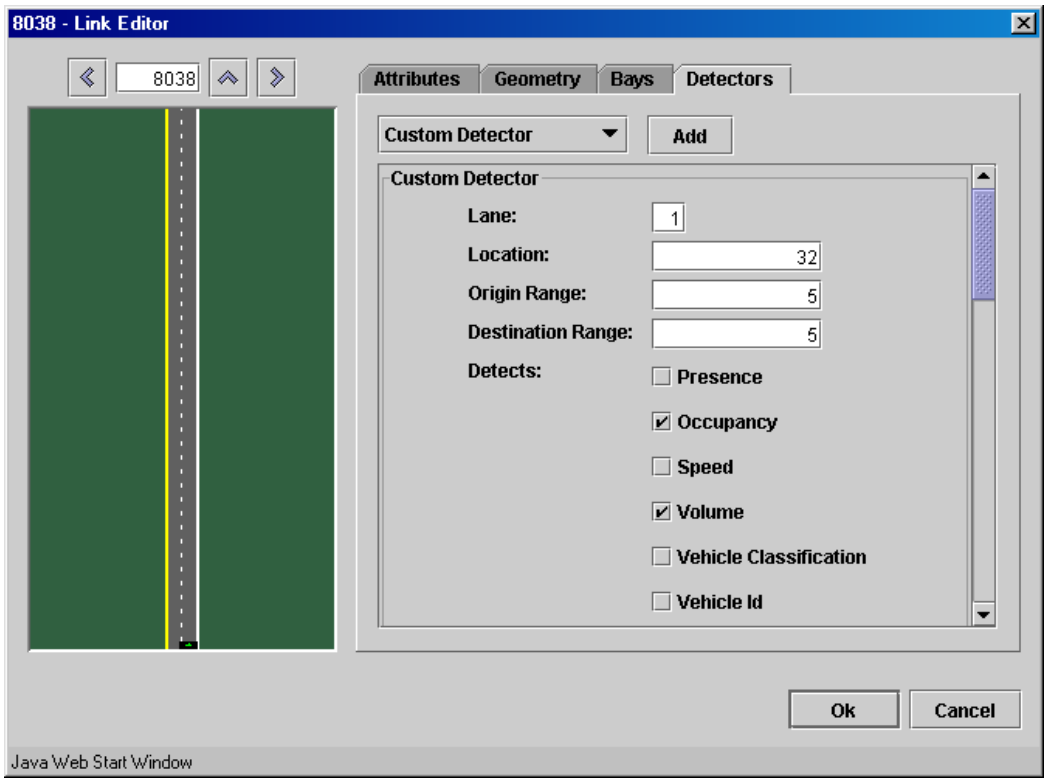


Figure 29: Java GIS Interface Link Detector editor

Find Link - When "Find Link" is selected a "Find Link" window (see Figure 30) will appear, in which the desired link id can be entered. That link will then be highlighted in the network window.

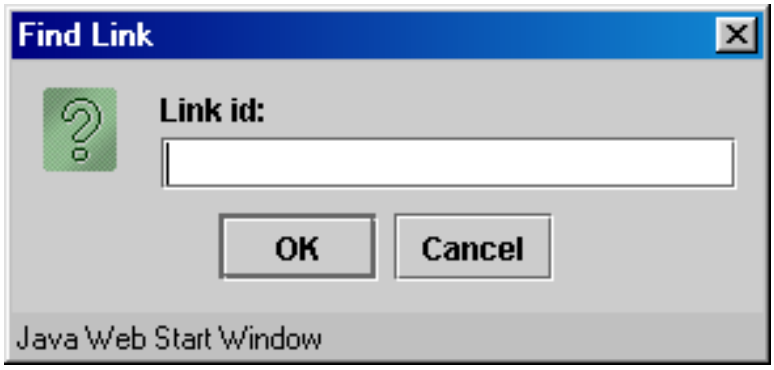


Figure 30: Java GIS Interface Find Link window

Data-Zones - When —Zones‖ is selected from the Data menu, the options of adding, removing, editing and finding a zone appear (see Figure 31). When "Add Zone" is selected, a Create New Zone window will appear in which the nodes to be included in that zone can be specified (see Figure 32). When "Edit Link" or "Remove Link" is selected, an existing zone can be edited of removed by clicking on that zone. When "Find Zone" is selected a "Find Zone" window (see Figure 33) will appear, in which the desired zone id can be entered. That zone will then be highlighted in the network window.

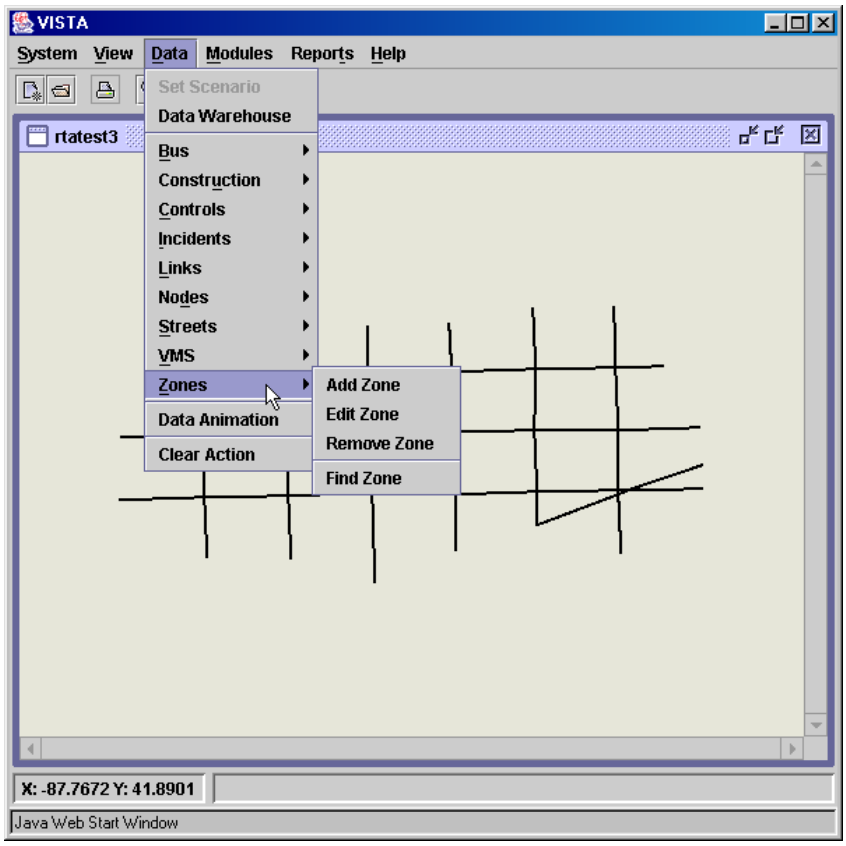


Figure 31: Java GIS Interface Data|Zones menu option

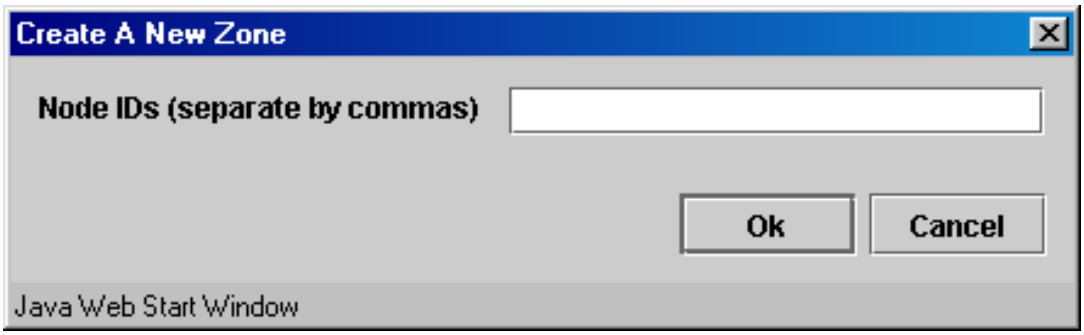


Figure 32: Java GIS Interface Create a New Zone window

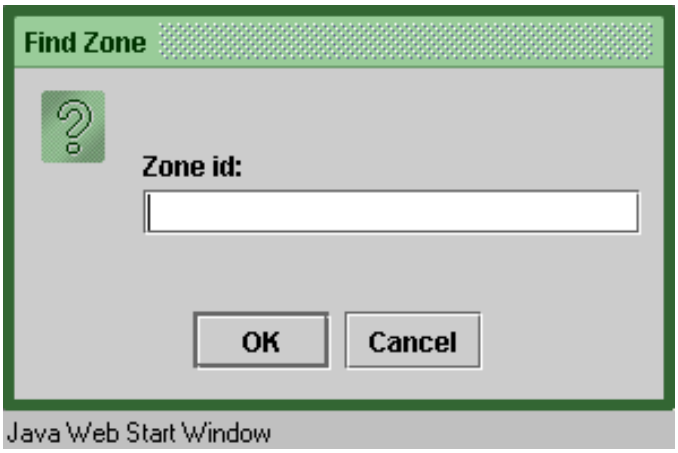


Figure 33: Java GIS Interface Find Zone window

Data-Controls - When "Controls" is selected from the Data menu, the options of adding, editing and removing controls and signal preemption appear (see Figure 34).

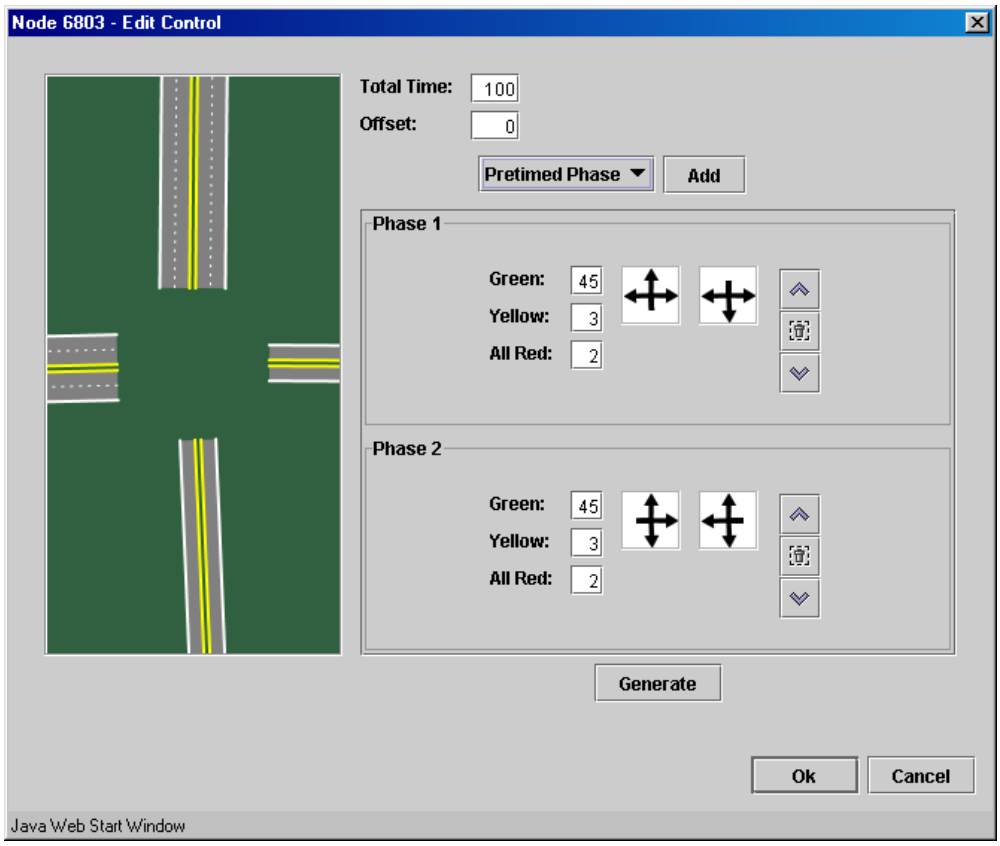


Figure 36: Java GIS Interface Edit Control window

Data-Edit Signal Preemption - If "Edit Signal Preemption" is selected from the Data menu, the "Choose Signal Preemption" window appears (see Figure 37). When the user selects a signal preemption plan from the drop down menu, a signal preemption editing window will appear (see Figure 38), which allows the user to choose the signals to be included in the preemption plan and to adjust the preemption parameters associated with that plan. If "Add Signal Preemption" is selected from the Data menu, the signal preemption editing window appears, so that the user can create a new plan from scratch. If "Remove Signal Preemption" is selected from the Data menu, the Choose Signal Preemption window appears, so that the user can select the preemption plan to be removed from the drop down list.

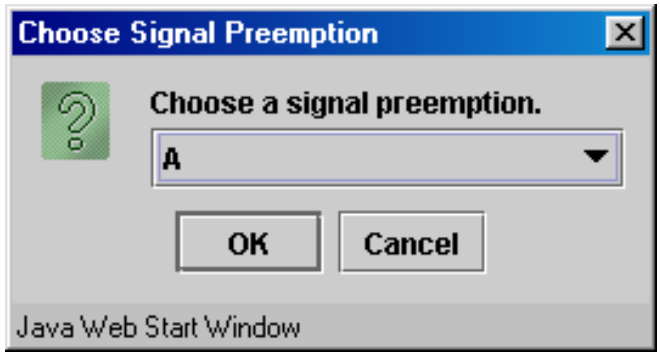


Figure 37: Java GIS Interface Choose Signal Preemption window

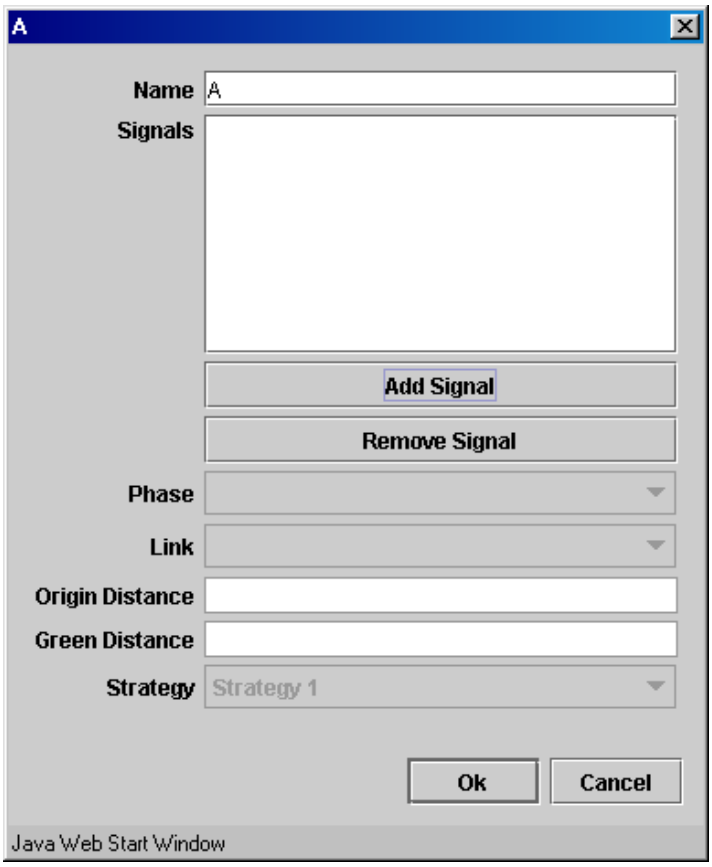


Figure 38: Java GIS Interface Signal Preemption editing window

Data-Bus Option - The Data|Bus option allows the user to add, edit and remove bus stops, bus periods and bus routes (see Figure 39). If the user chooses to add or edit bus stops a bus stop editing window appears (see Figure 40) in which the user can define the link on which the bus stop is to be located, the name of the bus stop, the location along that link (distance in feet from the destination end of the link), and length of the bus bay if one exists. If ―Remove Bus Stop‖ is selected, the user can click on a bus stop to delete it from the network.

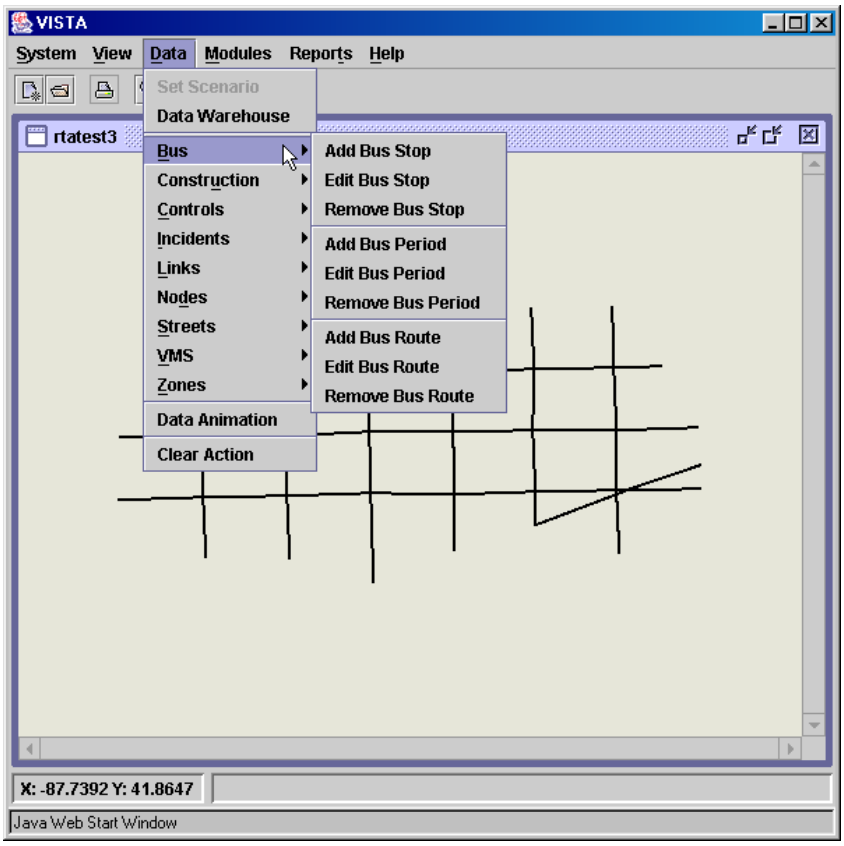


Figure 39: Java GIS Interface Data|Bus menu option

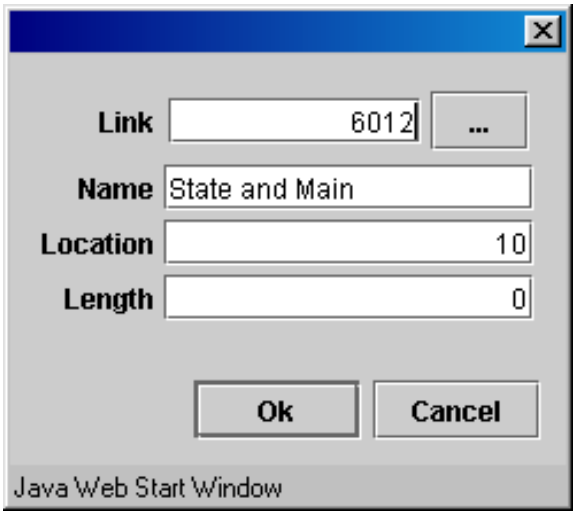


Figure 40: Java GIS Interface Add/Edit bus stop window

Choose a bus period - If the user chooses to edit bus periods a bus period selection window appears (see Figure 41) in which the user can select from the drop down menu the bus period to be edited. A bus period editing window then appears (see Figure 42) in which the user can adjust the start and end times of the selected bus period. If ―Add Bus Period‖ is selected, a window similar t o the bus period editing window (Figure 41) appears in which a new bus period can be defined. If ―Remove

Bus Period‖ is selected, the bus period selection window appears (Figure 41) from which the user can select the bus period to delete it from the network.

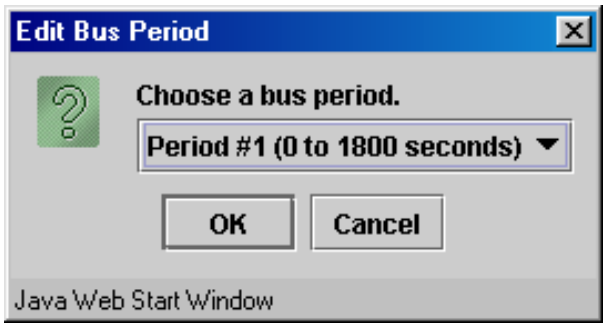


Figure 41: Java GIS Interface Edit Bus Period selection window

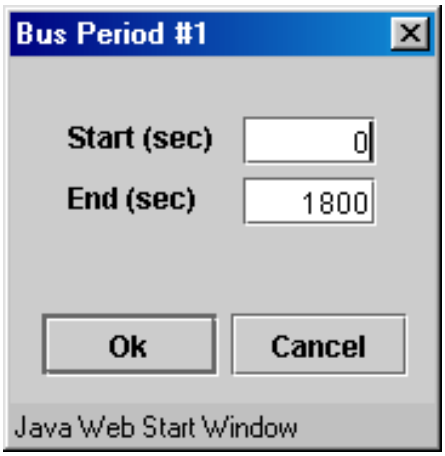


Figure 42: Java GIS Interface Edit Bus Period window

Choose Bus Route - If the user chooses to edit bus route, the Choose Bus Route window appears (see Figure 43) in which select from the drop down menu the bus route to be edited. A bus route editing window then appears in which the user can adjust the route link definition (see Figure 44) and the schedule (see Figure 45) of the selected bus route (there are tabs for each at the top of the window). If "Add Bus Route" is selected, a window similar to the bus route editing window appears in which a new bus route and schedule can be defined. If "Remove Bus Period" is selected, the bus route selection window appears (Figure 46) from which the user can select the bus route to delete it from the network.

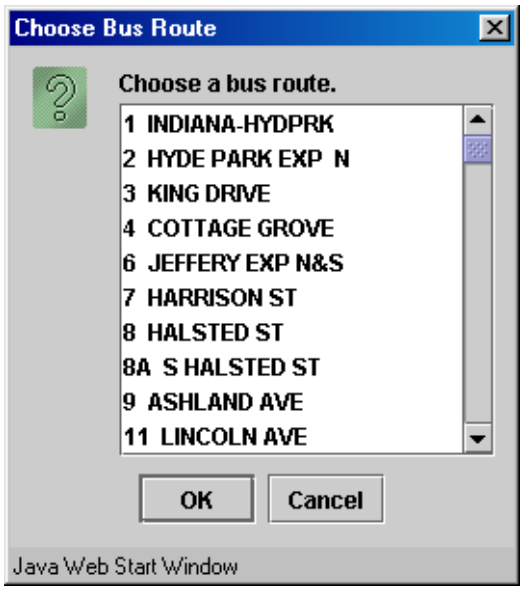


Figure 43: Java GIS Interface Choose Bus Route window

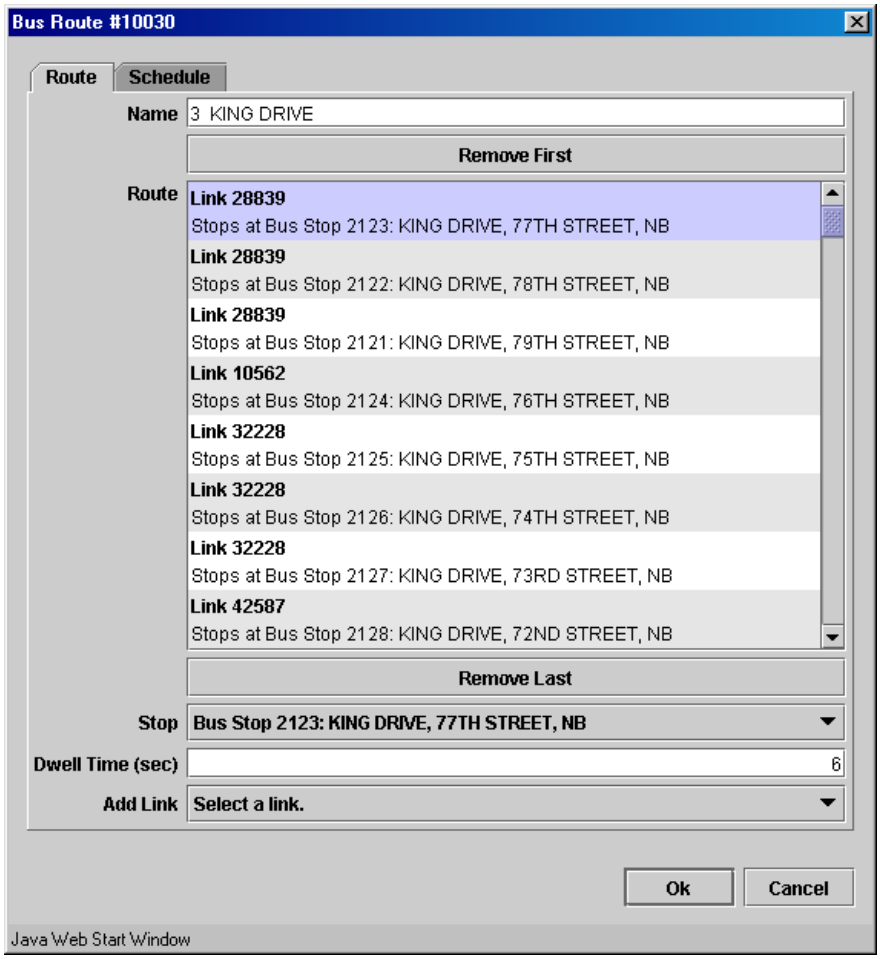


Figure 44: Java GIS Interface Bus Route editing window (route links)

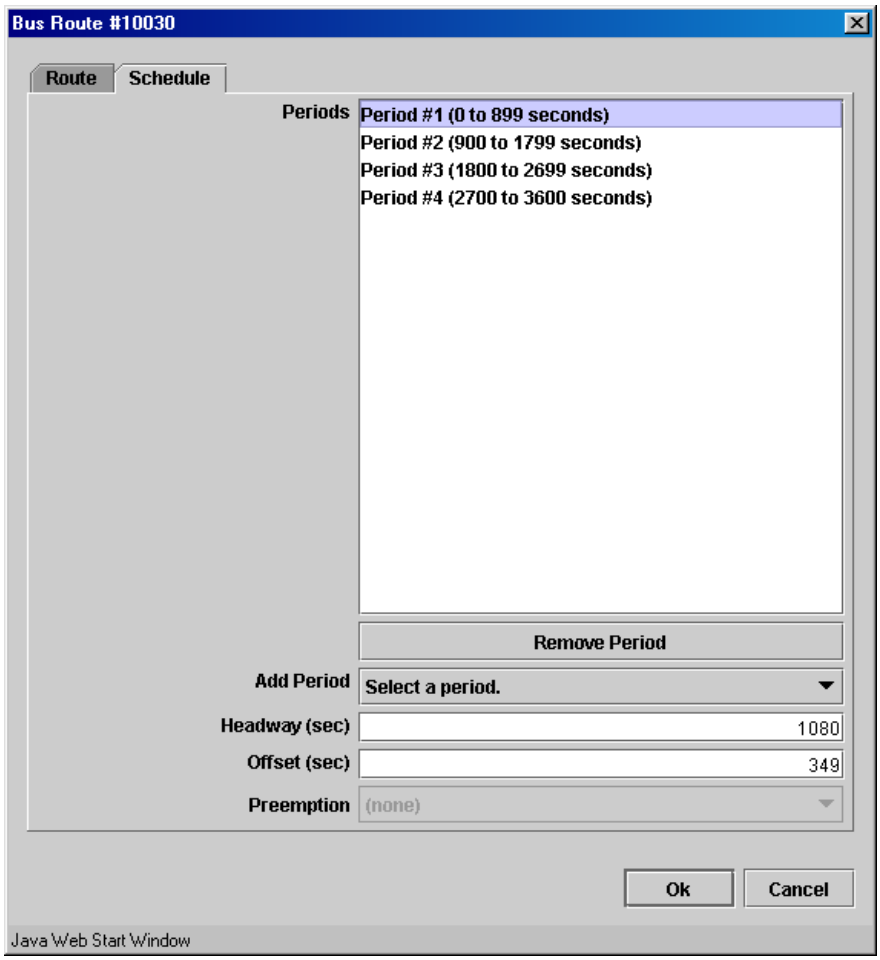


Figure 45: Java GIS Interface Bus Route editing window (schedule)

3.2.3 Viewing and Editing Data in the Data Warehouse

The detailed data tables and queries available in the VISTA web interface can also be accessed through the Java GIS Interface using the Data Warehouse option (available only to authorized users based on their account and password) in the Data menu (see Figure 46).

Data-Data Warehouse - When the Data Warehouse option is selected, the Data Warehouse window appears as shown in Figure 47. In this window, the File|Open option can be selected in order to open a specific table. The Choose Table window will then appear with a list of tables available in the database (see Figure 48). The user can then select one or several tables which will appear in the Data Warehouse window.

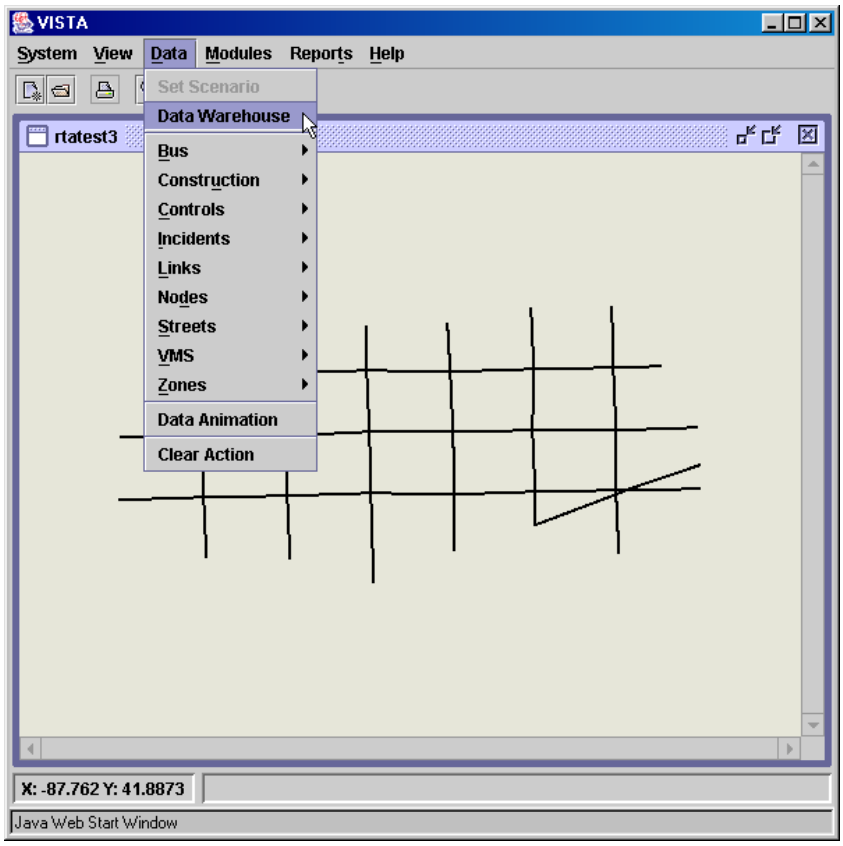


Figure 46: Java GIS Interface Data|Data Warehouse menu option

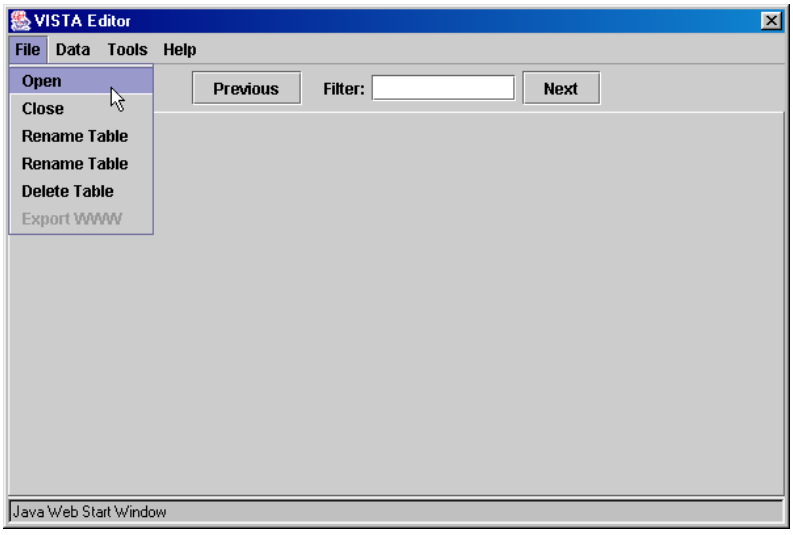


Figure 47: Data warehouse File|Open menu option

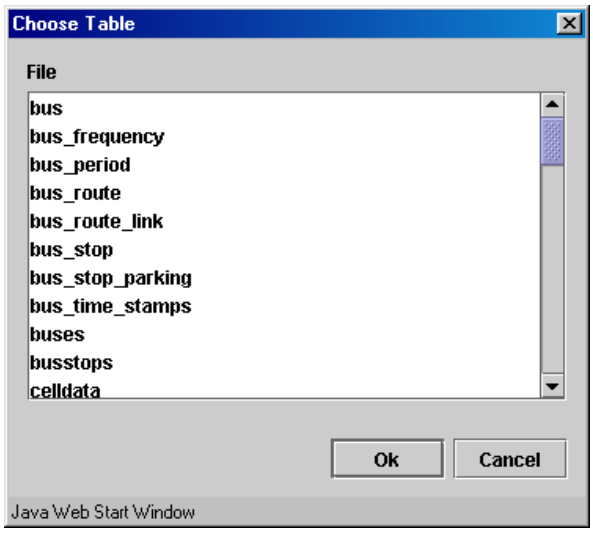
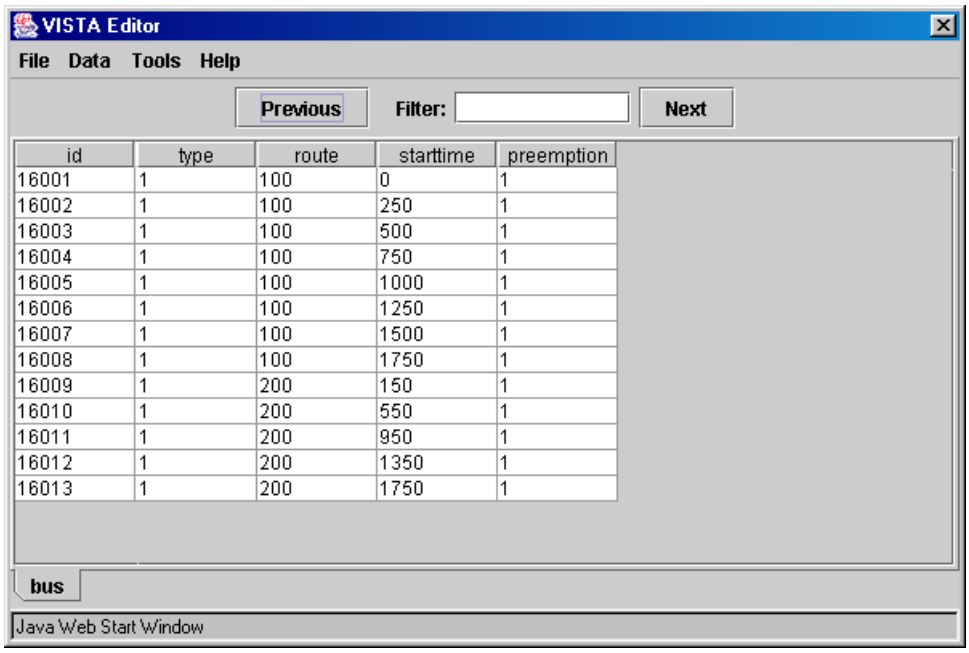


Figure 48: Data warehouse Choose Table window

Bus Table Example - Figure 49 shows the bus table for the example network. The tab at the bottom of the window shows that name of the table (bus), and multiple tabs will appear if several tables are open. If the table has more records than can be shown in one screen, the Previous and Next buttons at the top of the window can be used to see other records. Further, the table can be queried by entering an expression in the Filter box and clicking on Data|Reload Data (see Figure 50).



id	type	route	starttime	preemption
16001	1	100	0	1
16002	1	100	250	1
16003	1	100	500	1
16004	1	100	750	1
16005	1	100	1000	1
16006	1	100	1250	1
16007	1	100	1500	1
16008	1	100	1750	1
16009	1	200	150	1
16010	1	200	550	1
16011	1	200	950	1
16012	1	200	1350	1
16013	1	200	1750	1

Figure 49: Data warehouse example data table (bus table)

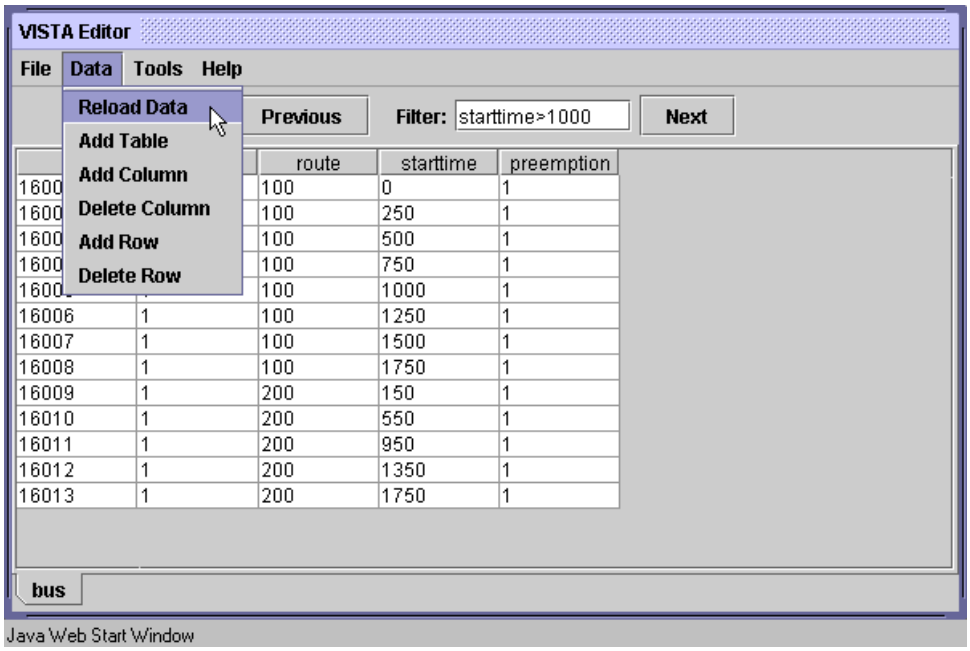


Figure 50: Data warehouse example data table with a query (bus table)

4.0 RUNNING THE DYNAMIC TRAFFIC ASSIGNMENT MODULE

The DTA and DTA-related modules used in the TSP project are listed in Table 1, along with lists of the parameters that must be defined and the functions performed by each module. The Cell Generation, Demand Profiler, Bus Assignment, Intersection Signal Optimization and Intersection Signal Coordination modules are run before DTA to ensure that network, demand, bus and signal data are in the format required by the DTA module. DTA is then run and RouteSim is called from within DTA. When DTA is complete, the vehicle path and travel time results are imported to the database, so that they can be used in reporting modules. Access to the modules through the web and Java GIS Interfaces are also described in this section.

Table 1: DTA and DTA related Modules

Module	Parameters	Module Function
Generate Cell File	Time Step Weather—clear, light rain, moderate rain, heavy rain	Creates a cell network based on the node and link network, with the length of each cell equal to the distance traveled in one time step at free flow speed. If rainy weather is selected, lower free flow speeds will be assumed, resulting in shorter cells.
Demand Profiler	Weightings Simulation Length (seconds) Use Zone IDs Use Dynamic Table Max O-D Pairs	Assigns exact departure times to each vehicle. The weightings entered determine the proportion of vehicles to depart in each interval within the selected simulation length. The "Use Zone IDs" box should be selected if the origins and destinations in the static_od table are zone ids rather than node ids. The "Use Dynamic Table" box can be selected if the demand to be profiled is already in time-dependent rather than static format. A maximum number of OD pairs can be entered to limit the number of vehicle trips created in the demand table.
Bus Assignment	None	Assigns exact departure times to buses based on the data in the bus period and frequency tables.
Intersection Signal Optimization	Node ID Minimum Cycle Length Minimum Phase Green Time Force Generation	Creates and optimizes signal at node selected, subject to the timing constraints entered. If "Force Generation" is selected, a signal will be created even if flows do not warrant it according to the MUTCD rules.
Intersection Signal Coordination	Nodes	Coordinates the signals at the nodes selected.
DTA with TDSP	Iterations Ending Time (seconds) Time Step (seconds) Assignment Length (steps) Warm Up/Cool Down	Performs DTA with calculation of time dependent shortest paths (TDSP) at each iteration. The number of iterations, simulation length ("Ending Time"), time step and number of time steps ("Assignment Length") can be specified. If "Warm Up/Cool Down" is selected, the simulation will begin 15 minutes early to pre-load the network, and end 15 minutes late to allow vehicles to complete their trips.
DTA with Updates Only	Same parameters as DTA with TDSP	Performs DTA with updates of previously calculated paths at each iteration, instead of calculating the time dependent shortest paths (TDSP). This saves significant computational time, but can only be done if DTA has been previously performed, and a library of routes has already been created.
RouteSim	Simulation Length (seconds) Time Step (seconds)	RouteSim is automatically called from within DTA, but can also be run on its own.
Import Simulation Results to Database	None	After DTA has been run, this module is run to create vehicle path and travel time database tables based on the text file output created by the DTA module. The database tables will then be used to run reporting modules.

4.1 Running DTA Modules from the Web interface

The Modules page allows the user to run DTA and other utilities on the selected network. A scroll menu of modules appears on the left side of the page, and the right side lists any parameters that must be entered for the selected module (see Figure 51). The status of a module can be tracked by checking the "Tasks" page (see Figure 52). This page lists all the tasks that are in process and complete and also provides links to log files for each task.

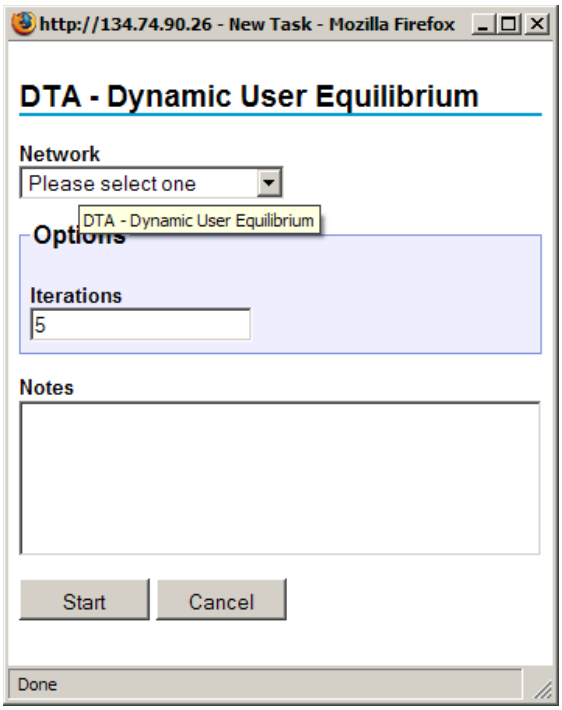


Figure 51: Web interface Modules page

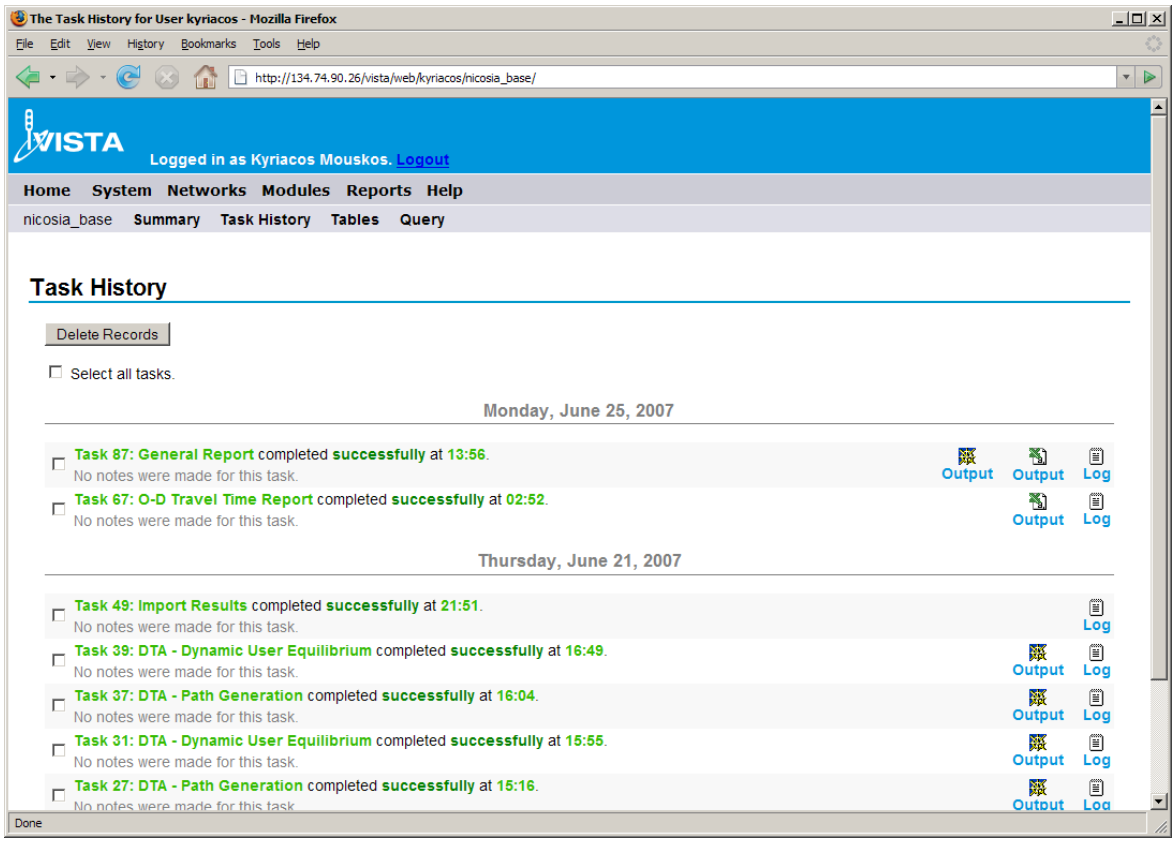


Figure 52: Web interface Tasks page

4.2 Running DTA Modules from the JAVA GIS Interface

The Modules menu allows the user to run DTA and other utilities on the selected network (see Figure 53).

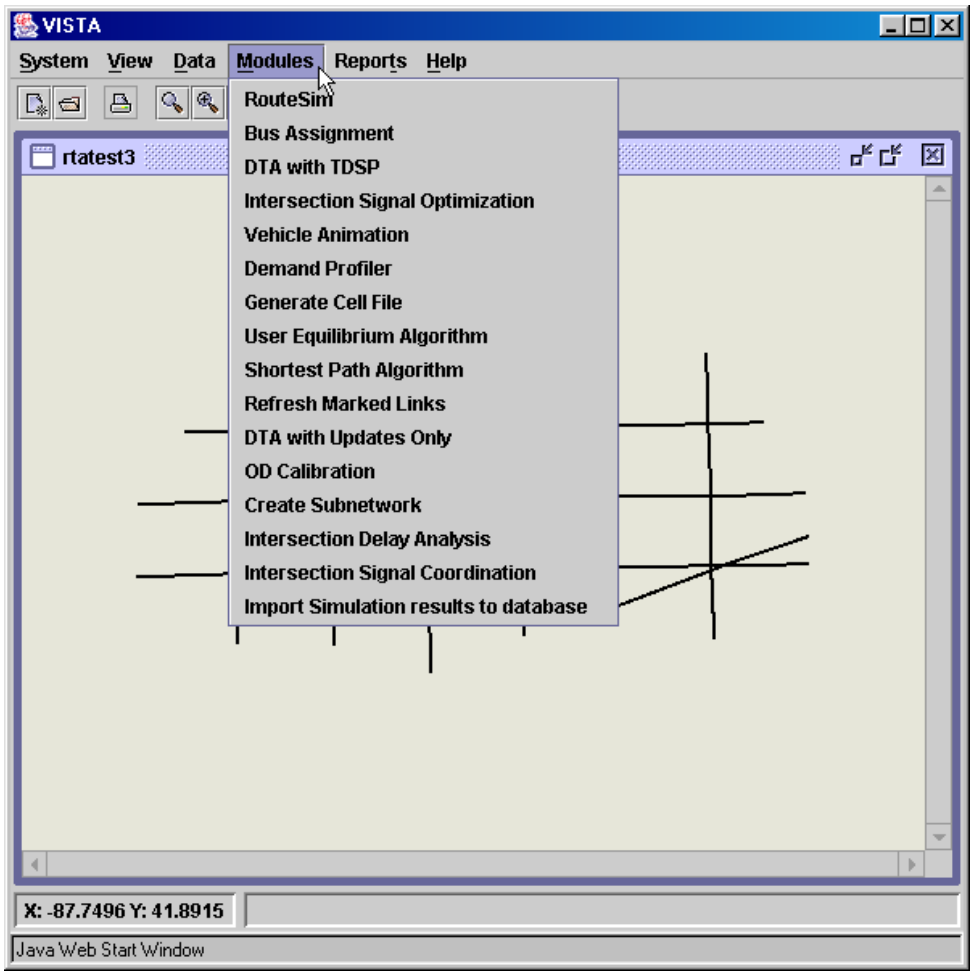


Figure 53: Java GIS Interface Modules menu

5.0 RUNNING REPORTING MODULES

The reporting modules used in the TSP project are listed in Table 2, along with lists of the parameters that must be defined and the functions performed by each module. In each case, “Table Name” indicates the name of the database table to which the report results should be written. Access to the reporting modules through the web and Java GIS Interfaces are also described in this section.

Table 2: Reporting Modules

Module	Parameters	Report Output
General Report	Time Intervals	Aggregate system-wide travel time report
Path Time Space Diagram	Link IDs Table Name	Plot of the average travel time through the corridor.
Origin Destination Travel Time Report	none Table Name	Listing of average travel time, travel time variance and number of vehicles for each OD pair.
Path Information Analysis	Table Name Origin Node Destination Node Use Zone	Table listing all paths used between the origin and destination selected. If —Use Zone‖ is selected, the – Origin Node‖ and —Destination Node‖ values will be taken as zone ids instead of node ids.
Link Traffic Composition Analysis	Link ID Table Name	For the selected link, the origins and destinations of all vehicles that travel on that link will be reported.
Bus Travel Time Report	Bus Route Table Name	For the selected bus route, the travel time for each run completed during the simulation will be reported, along with the travel time average and variance for that route.
Bus Path Time Space Report	Link IDs Table Name	For the selected links, the bus travel time average and variance are reported.
Schedule Adherence Report	Bus Route Table Name	For the selected bus route, the schedule adherence of each run at each time point will be reported.
Signal Report	Node Table Name	For a selected intersection, the total green time and proportion of green time over the whole simulation period will be reported. Also, maximum, minimum, average and variance of green times per cycle will be listed.
Intersection Vehicle Counts	Table Name Node Time Interval	For the selected intersection, the number of vehicles making each movement is listed for each time interval of the specified length.
Cumulative Flows	Link ID	For the selected link, a plot showing cumulative in-flow and out-flow is produced.
VMS Report	Time Interval VMS ID	For the selected VMS, the vehicle counts and travel times on the all route alternatives are shown for each time interval.
Detector Report	Time Interval Detector ID	For the selected detector, the average and standard deviation of the vehicle occupancy, flow and travel time for each time interval are shown in both table and plot format.
TRANSMIT Detector Report	Time Interval TRANSMIT Detector ID	A table listing the number of vehicles detected by the selected detector for each time interval is shown. A second table lists all other TRANSMIT detectors that detected vehicles that had passed through the selected detector, and shows the number of vehicles that passed through those detectors.
DTA Aggregator	none	The DTA Aggregator reports link travel times averaged over each minute of simulation.
Link Plots	Link ID	Travel time, density flow in or flow out curves are reported for the selected link.

5.1 Running Reports from the Web interface

In the web interface, all of the reports can be run from the "Reports" page (see Figure 54), except for the Intersection Movement Counts and the Link Traffic Composition Analysis, which are found on the "Modules" page. A list of previously run reports appears in the "Reports History" section of the "Reports" page. Further, the progress and completion of a report can be tracked through the web interface "Tasks" page (see Figure 52). Examples of the report results are shown below.

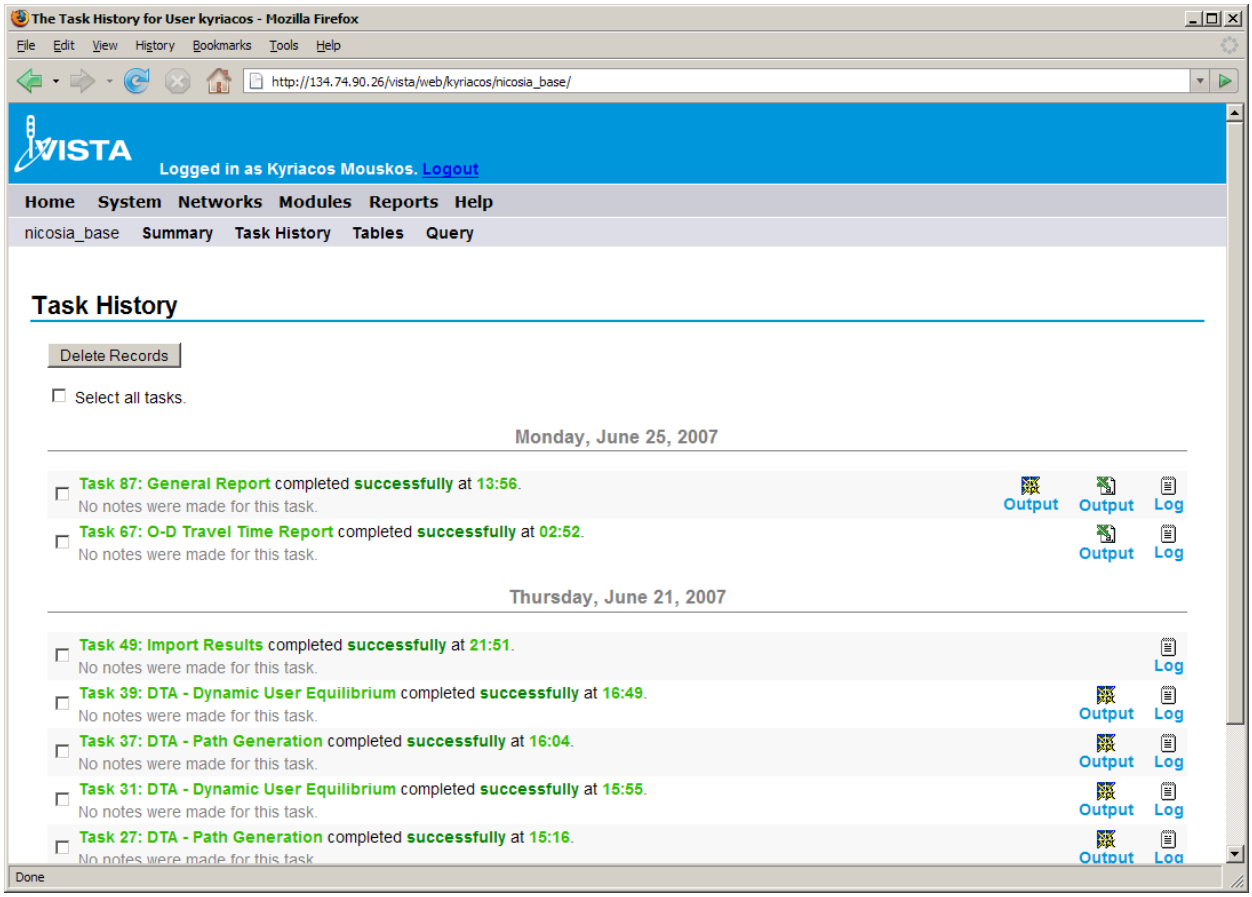
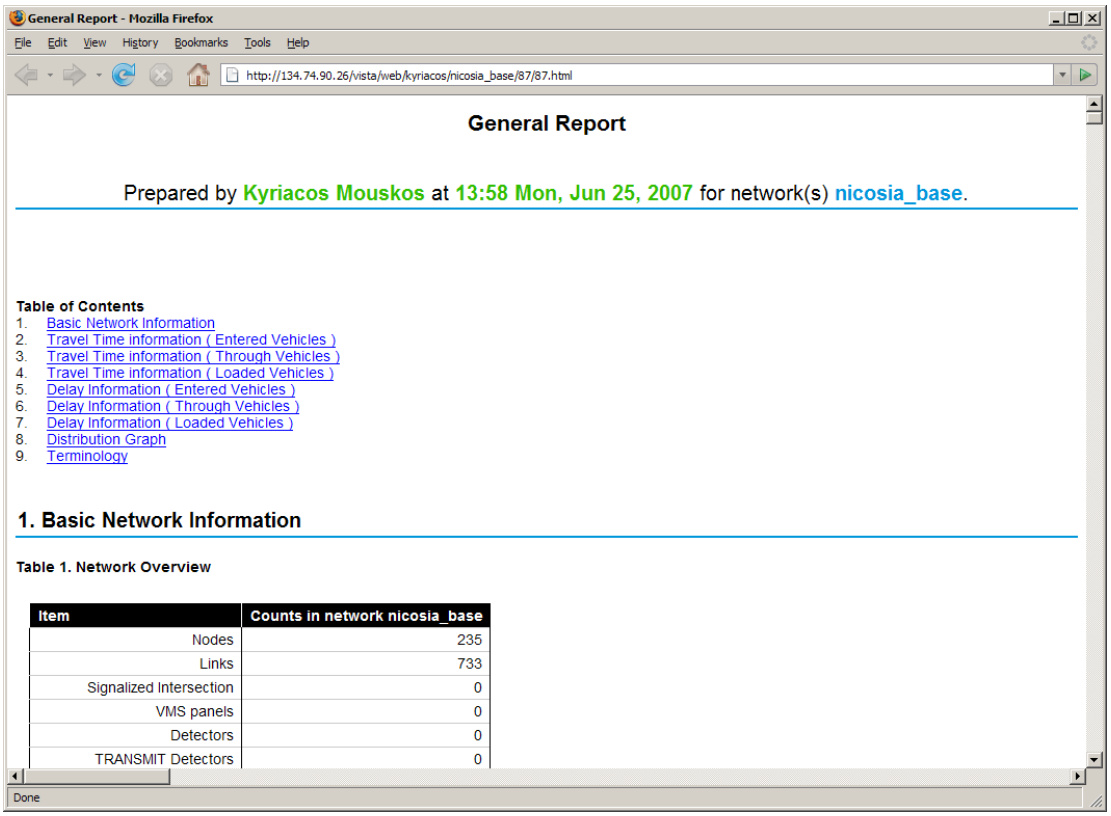


Figure 54: Web interface Tasks page with Reports

5.1.1 General Report

The General Report gives general network statistics, such as number of nodes, links, controls and OD pairs. It also gives aggregate travel statistics; including total system travel time and average, maximum and minimum OD travel times. Further, the distributions of OD travel times and vehicles departure times are shown. The level of detail of the distributions can be increased by setting a smaller "Time Interval" value at the top of the General Report page and clicking on "Update". An example of a General Report is shown in Figure 55.



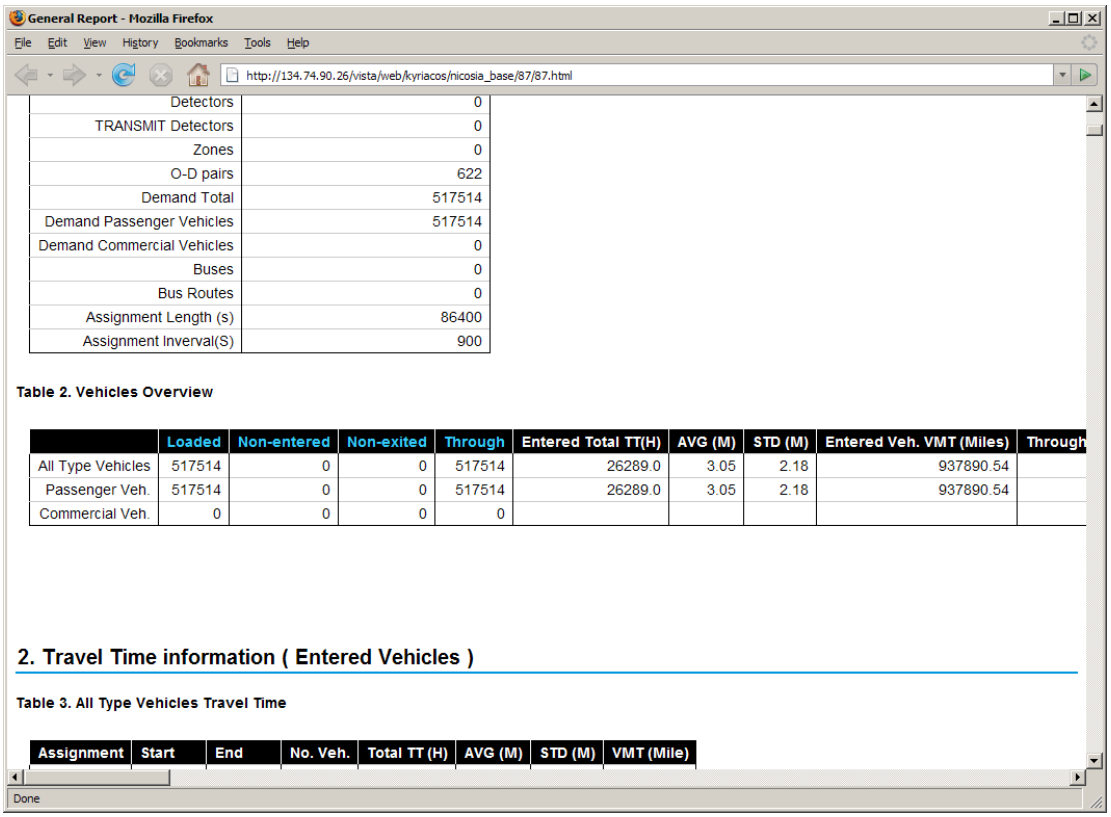


Figure 55: Sample General Report from nicosia_base

5.1.2 Origin Destination Travel Time Report

The Origin Destination Travel Time Report lists the average travel time and travel time variance for each OD pair in the network, as well as the number of vehicles that traveled between each OD pair. An example of an Origin Destination Travel Time Report is shown in Figure 56. (The origins and destinations are listed as centroid node IDs.) This report will allow for convenient comparison of OD travel times for different TSP scenarios.

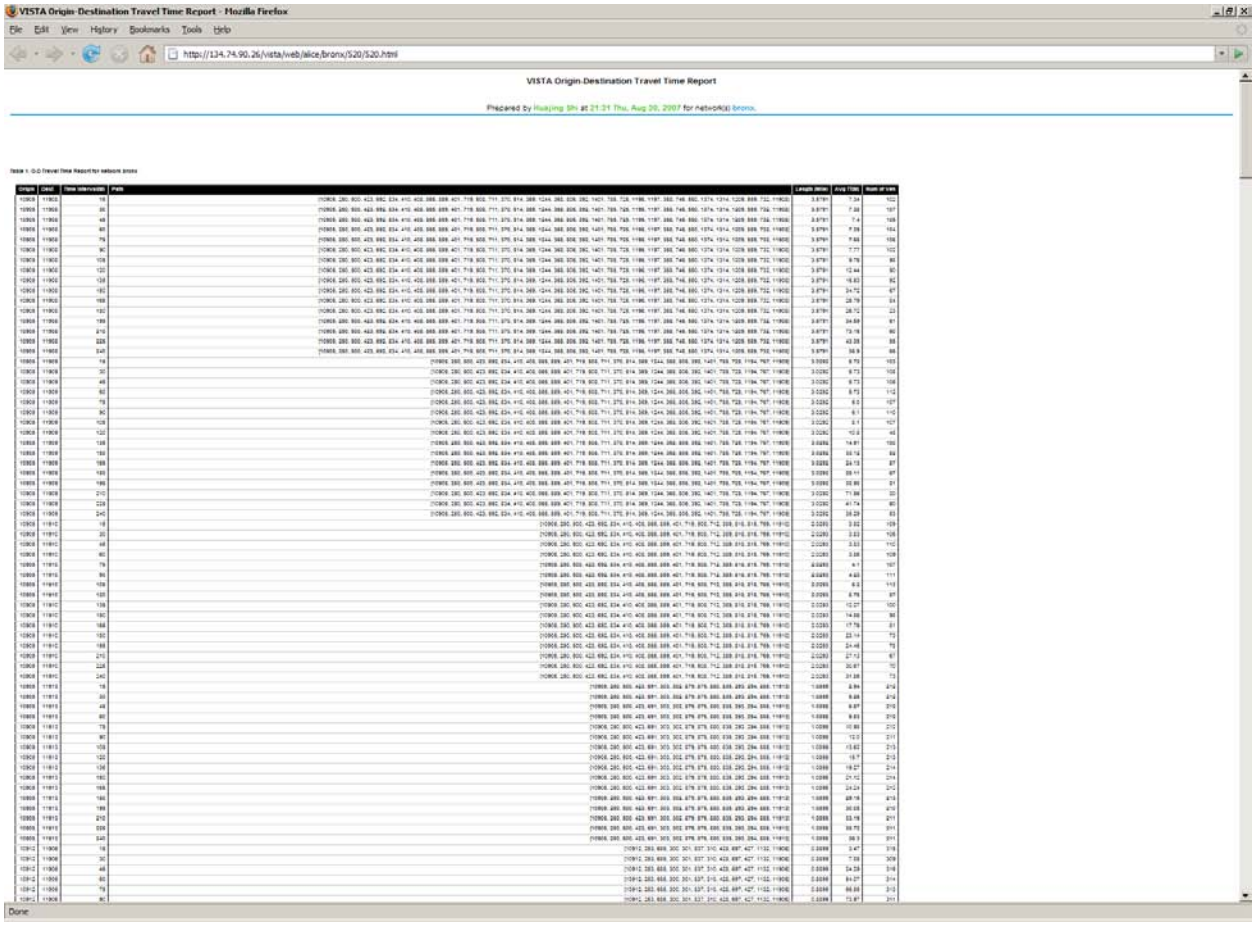


Figure 56: The Origin Destination Travel Time Report

5.1.3 Link Traffic Composition Analysis

For a selected link, the Link Traffic Composition Analysis report lists the OD pairs of the vehicles that traveled along that link. The results are stored in a database table, and can be accessed through the Database web page. An example of a Link Traffic Composition Analysis result table is shown in Figure 57. The first column, “id”, shows the ids of each entry. The “source” column shows the origin zone, and the “destination” column shows the destination zone. The “interval” column indicates a time interval within the simulation period, and the vehno column shows the number of vehicles that traveled on the selected link to travel between the given OD pair during the given time interval. The first row, with id=0, does not correspond to a link traffic composition entry, but instead shows origin node (in the “source” column), destination node (in the “destination” column) and link id (in the “interval” column) of the link.

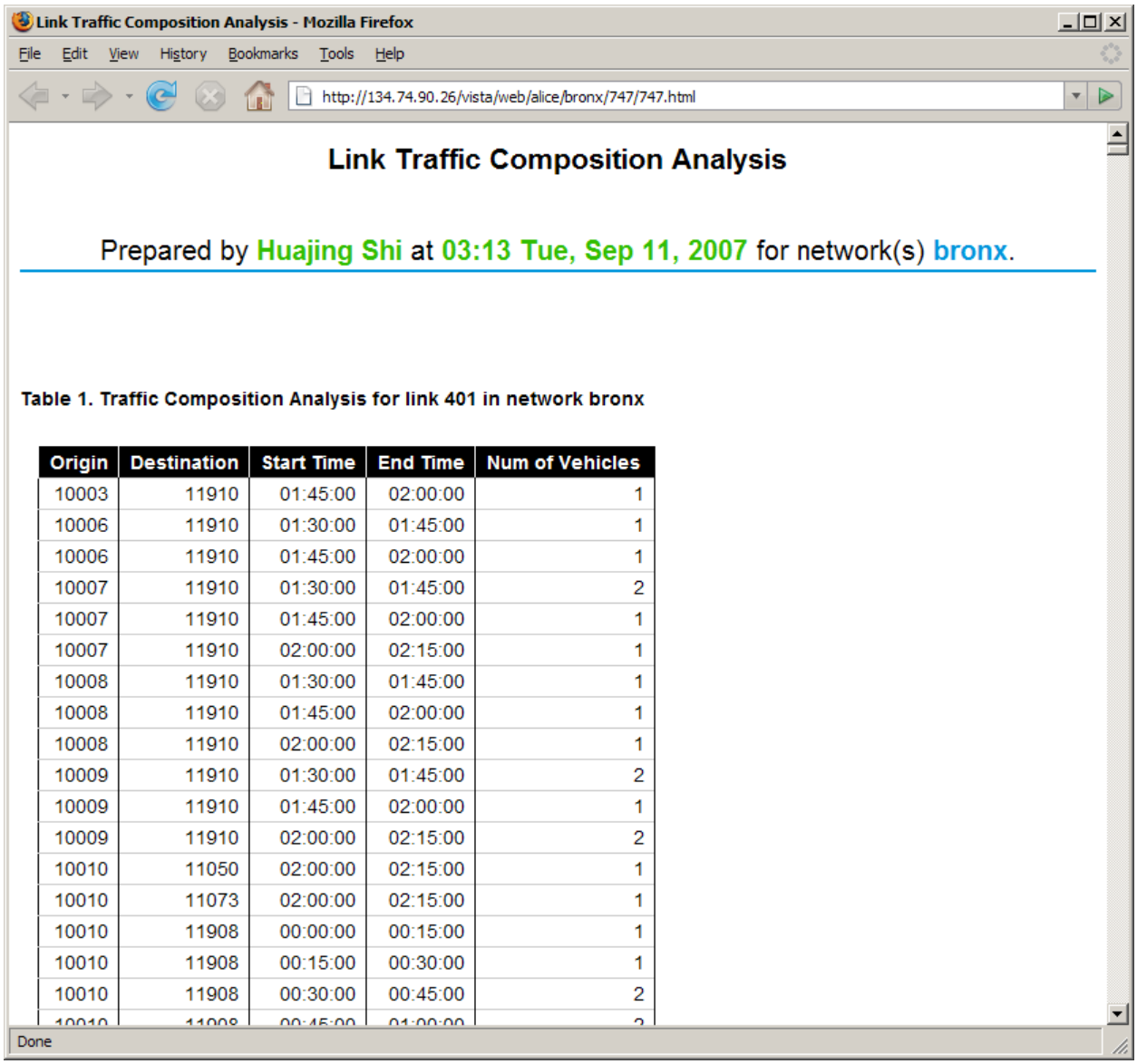


Figure 57: The Link Traffic Composition Analysis Table

5.1.4 Bus Travel Time Report

The Bus Travel Time Report lists the departure time and total travel time of each run made for a selected route (only runs completed before the end of the simulation period are included). The average travel time and standard deviation and variance of the travel time for the bus route are then shown. An example of a Bus Travel Time Report is shown in Figure 58.

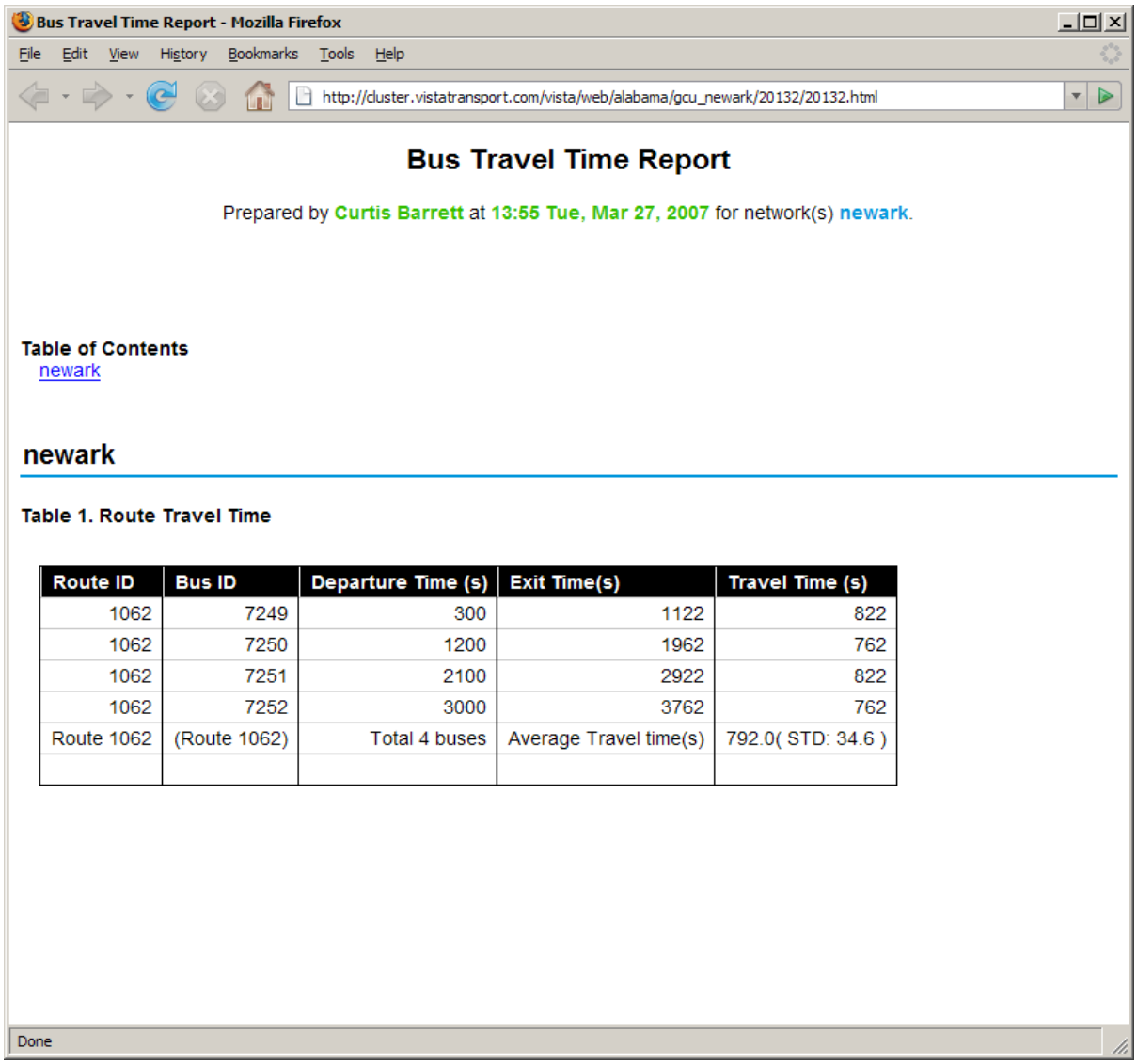


Figure 58: The Bus Travel Time Report

5.1.5 Bus Path Time Space Report

For a selected set of links representing a corridor, the Bus Path Time Space Report shows the average travel time and travel time variance for each link. The number of buses included in the calculations is also listed for each link. An example of a Bus Path Time Space Report is shown in Figure 59.

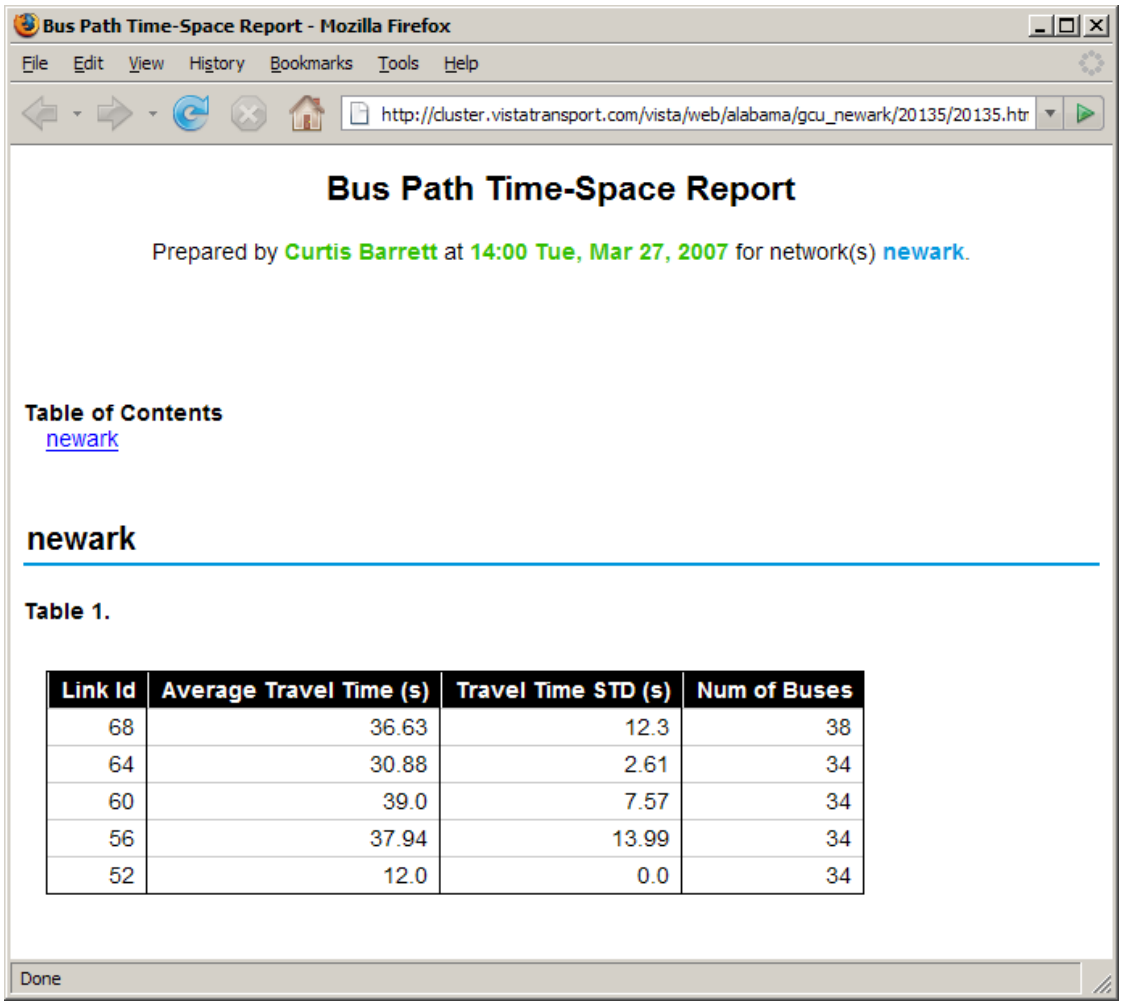


Figure 59: The Bus Path Time Space Report

5.1.6 Schedule Adherence Report

For a selected bus route, the Schedule Adherence Report shows the scheduled arrival time, actual arrival time and the difference between the two for each bus run and time point on that route. The scheduled arrival time is derived from data in the bus_time_stamps table and the actual arrival time is determined from the simulation output. An example of a Schedule Adherence Report is shown in Figure 60.

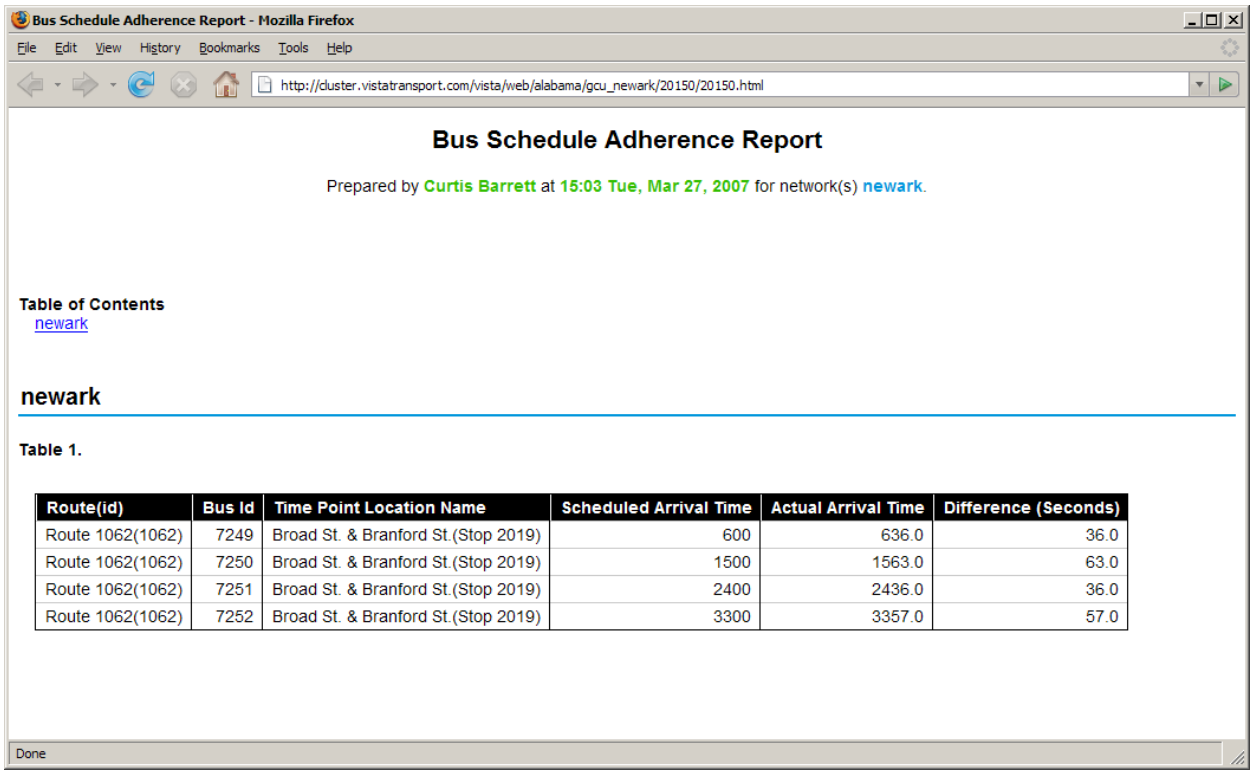


Figure 60: The Schedule Adherence Report

5.1.7 VMS Report

The Variable Message Sign (VMS) report shows the vehicle count and average travel times for each of the route alternatives associated with a VMS. An example of a VMS report is shown in Figure 61. First, the report describes the location of the VMS and then shows the link ids of the links associated with each route alternative. Next, the report shows a table listing the average travel time and number of vehicles for each time interval on the first route alternative is shown along with a plot of the average travel time on the route. (The time interval is selected by the report user). A similar table and plot are then shown for the second route alternative.

VMS Report

Time Interval (minute): 5 | VMS ID 2 | Update

VMS 2 Location: **50** feet downstream on link **9** in lane **0**
Total Number of Vehicles Passed This VMS: 2810
Compliance Rate: 0.5
Strategy: 2

2 Routes attached:
Freeway -- Link id: 3 12 22 23 24 25
Number of vehicles went through this route: 2412
State Route -- Link id: 13 42 10 43 38 34 33
Number of vehicles went through this route: 51

Route 5 Freeway

Start	Average Travel Time (seconds)	Vehicle Count
0	73	200
300	75	284
600	79	281
900	81	278
1200	87	286
1500	88	298
1800	91	284
2100	95	276
2400	93	278
2700	92	274
3000	77	281
3300	101	220

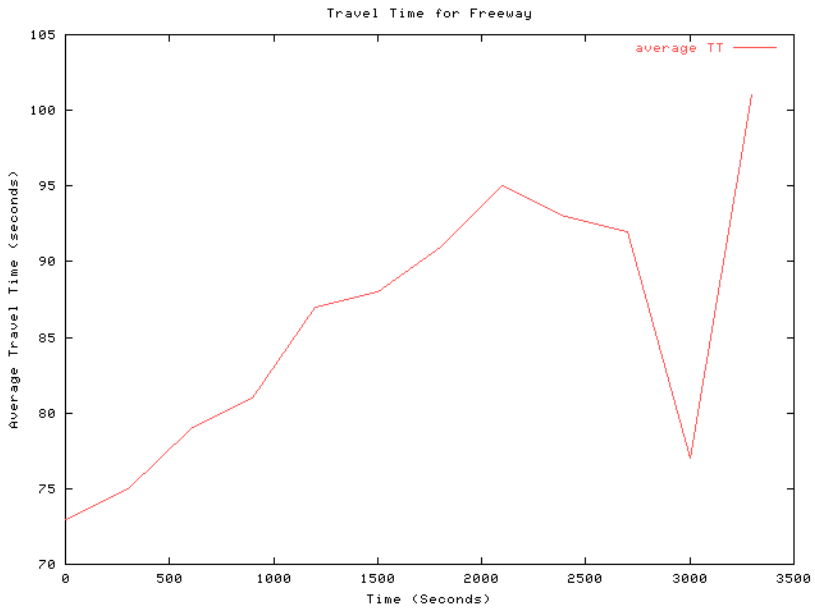


Figure 61: VMS Report

Route 6 State Route

Start	Average Travel Time (seconds)	Vehicle Count
2100	47	11
2400	153	27
2700	162	35
3000	281	26
3300	210	23

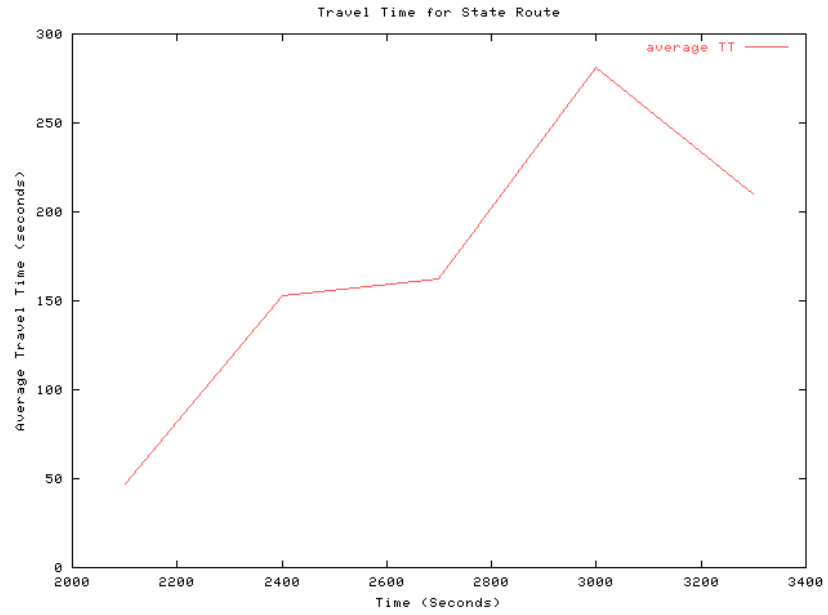


Figure 61 (continued): VMS Report

5.1.8 Detector Report

The detector report shows the flow, occupancy and speed detected by a selected detector in the simulator. An example of a Detector Report is shown in Figure 62. First, report describes the location of the detector. Next, the report shows a table listing the average and standard deviation of vehicle flow detected for each time interval, along with a plot of flow detected throughout the simulation period. (The time interval is selected by the report user.) A similar table and plot are then shown for the speed detected by the detector. The detector used in the example was set to detect only flow and speed, and not occupancy; therefore, the report shows a message stating that no occupancy data was found for the occupancy report.

Detector Report for detector 155

Time Interval (minute): 5 | Detector ID 148 | Update

Detector 155 Location: **1583** feet downstream on link **4465** in lane **3**

No data found for Occupancy Report

Flow Report

Period		Flow (vehicles/hour)	
Start	End	Average	Standard Deviation
0	300	**0.00**	**0**
300	600	**10.62**	**9**
600	900	**24.18**	**3**
900	1200	**57.26**	**14**
1200	1500	**118.60**	**11**
1500	1800	**144.26**	**10**
1800	2100	**164.52**	**3**
2100	2400	**160.90**	**3**
2400	2700	**176.82**	**10**
2700	3000	**202.86**	**5**
3000	3300	**203.32**	**2**
3300	0	**201.41**	**1**

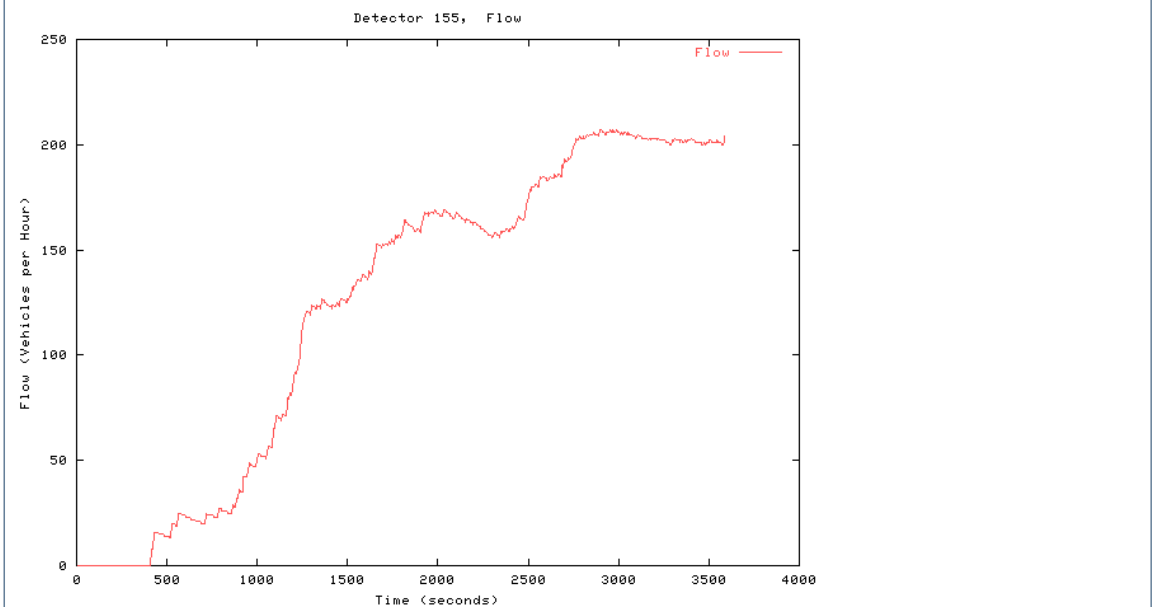


Figure 62: Detector Report

Speed Report

Period		Speed (mph)	
Start	End	Average	Standard Deviation
0	300	**7.00**	**0**
300	600	**7.00**	**0**
600	900	**7.00**	**0**
900	1200	**7.00**	**0**
1200	1500	**7.00**	**0**
1500	1800	**7.00**	**0**
1800	2100	**7.00**	**0**
2100	2400	**7.00**	**0**
2400	2700	**7.00**	**0**
2700	3000	**7.00**	**0**
3000	3300	**7.00**	**0**
3300	0	**7.00**	**0**

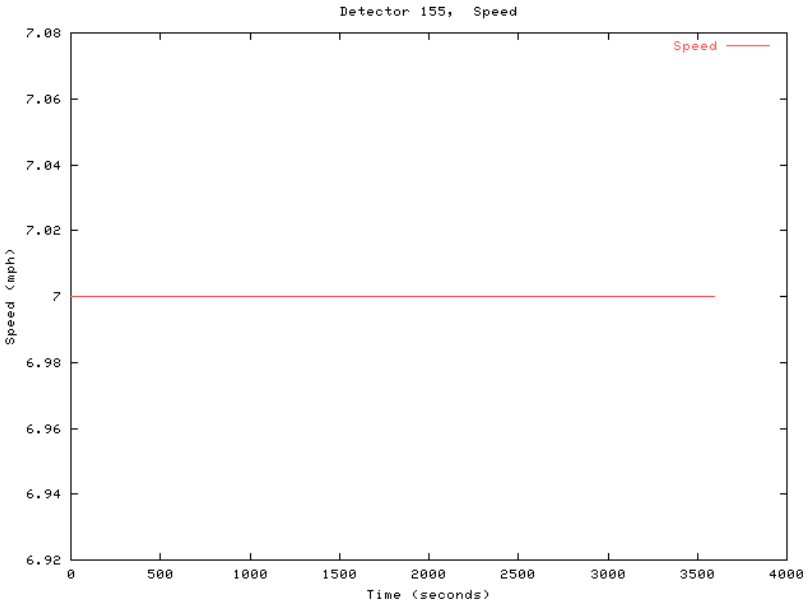
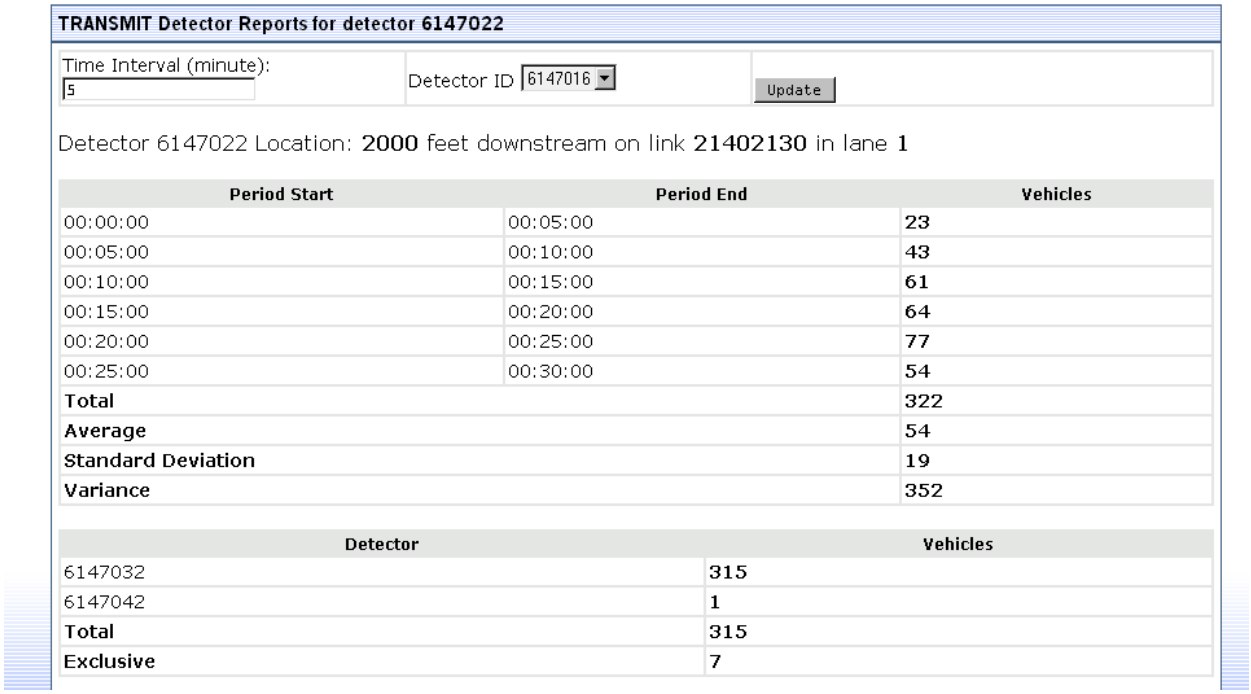


Figure 62 (continued): Detector Report

5.1.9 TRANSMIT Detector Report

The TRANSMIT detector report shows the number of vehicles detected by a selected TRANSMIT detector in the simulator. An example of a TRANSMIT Detector Report is shown in Figure 63, where the detector of interest is number 6147022, as shown in the title bar of the window. First, the report describes the location of the detector. Next, the report shows a table listing the number of vehicles detected for each time interval. (The time interval is selected by the report user.) The total, average, standard deviation and variance of the number of vehicles detected are listed at the end of the table. A second table lists all other TRANSMIT detectors that detected vehicles that had passed through the detector 6147022, and shows the number of vehicles that passed through those detectors.



TRANSMIT Detector Reports for detector 6147022

Time Interval (minute): 5 | Detector ID 6147016 | Update

Detector 6147022 Location: **2000** feet downstream on link **21402130** in lane **1**

Period Start	Period End	Vehicles
00:00:00	00:05:00	**23**
00:05:00	00:10:00	**43**
00:10:00	00:15:00	**61**
00:15:00	00:20:00	**64**
00:20:00	00:25:00	**77**
00:25:00	00:30:00	**54**
Total		**322**
Average		**54**
Standard Deviation		**19**
Variance		**352**

Detector	Vehicles
6147032	**315**
6147042	**1**
Total	**315**
Exclusive	**7**

Figure 63: TRANSMIT Detector Report

5.2 Running Reports from the Java GIS Interface

The Reports menu allows the user to run reports on the selected network (see Figure 64). Most of the reports output their results to tables, which can be viewed in the Data Warehouse or the web interface. Results that are not outputted to tables can be viewed in the web interface. The DTA Aggregator and link plots are described in this section. See Section 5.1 on Running Reports from the Web interface for detailed explanations and examples of the Path Information Analysis, Link Traffic Composition Analysis, Path Time Space Diagram, Cumulative Flows, General Report and Intersection Vehicle Count Reports.

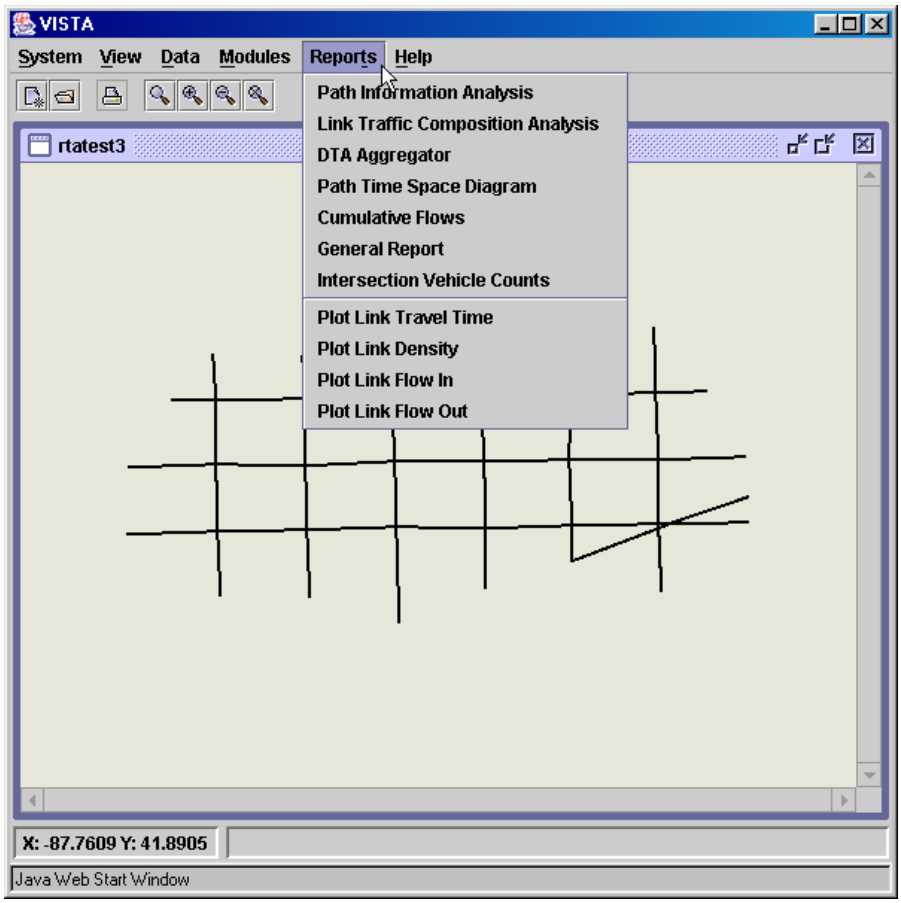


Figure 64: Java GIS Interface Reports menu

5.2.1 Link Plots

Travel time, density flow in and flow out curves can also be reported for user-selected links. The reports show the respective measures plotted over the simulation period. For example, Figure 65 shows the density plot of link 19868. A Data tab is available in the top left of the window, and allows the density data to be viewed in table format, as shown in Figure 66. The Preferences tab provides display options for the plot, as shown in Figure 67.

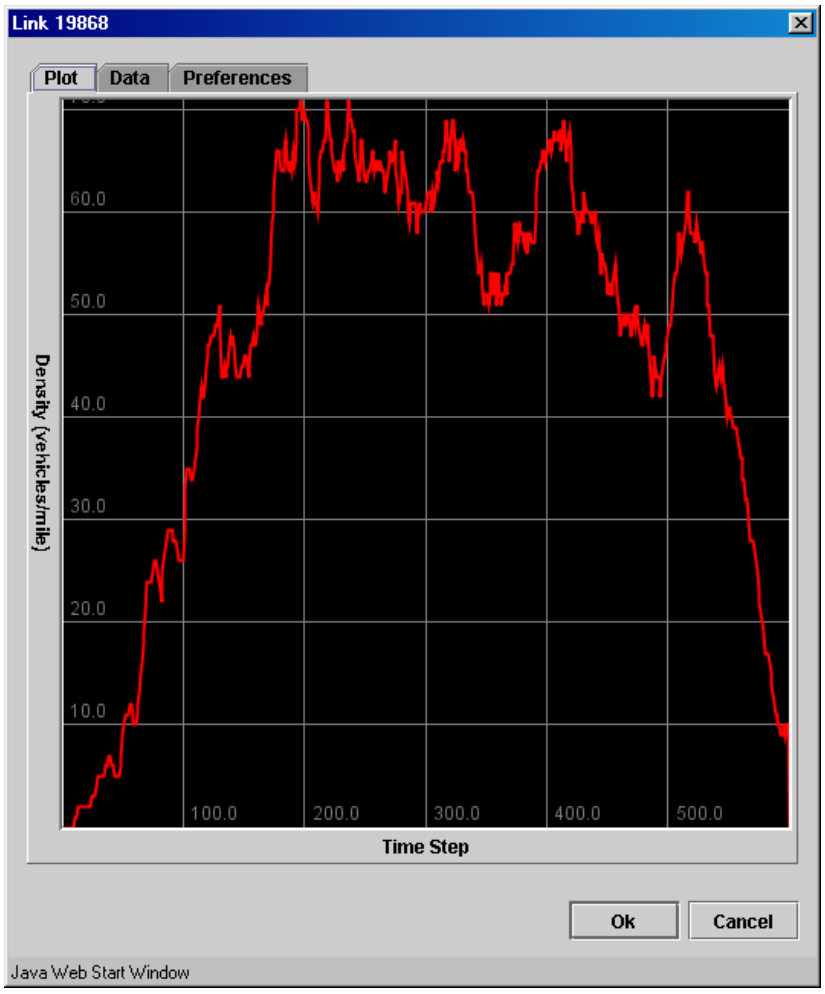


Figure 65: Link Density Plot

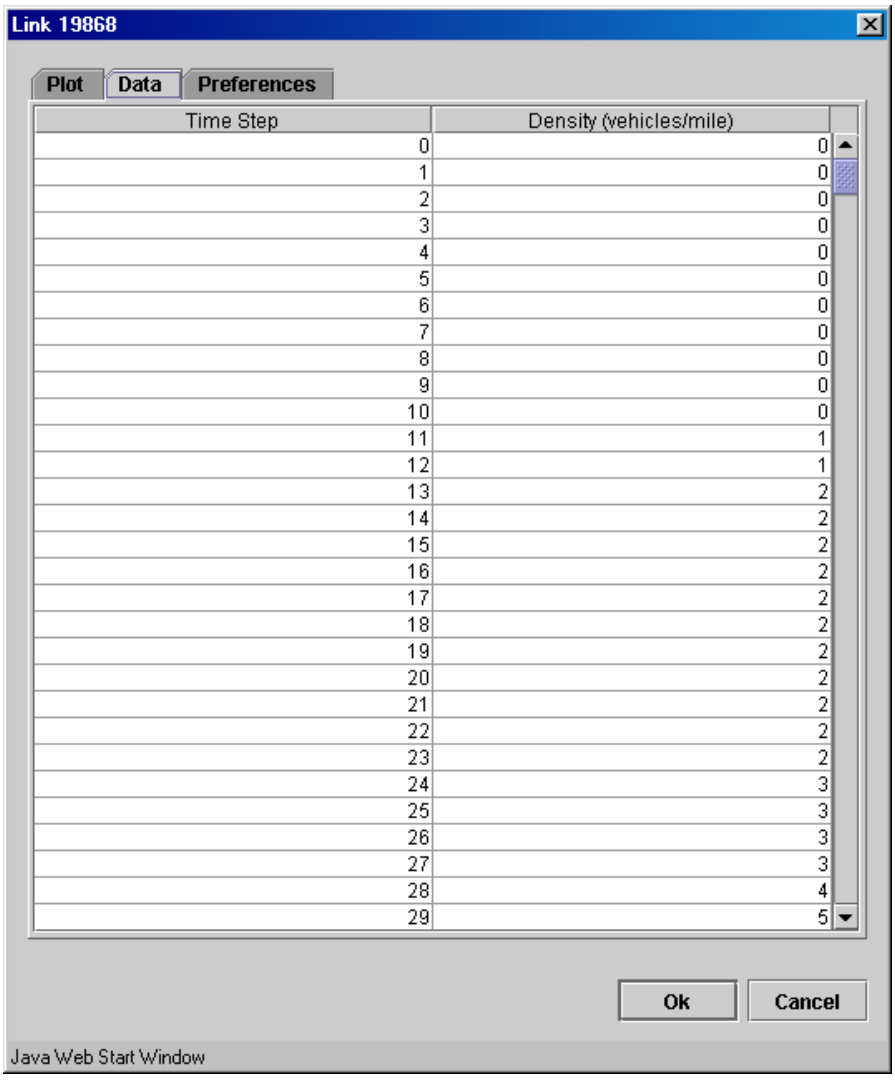


Figure 66: Link Density Plot – Data

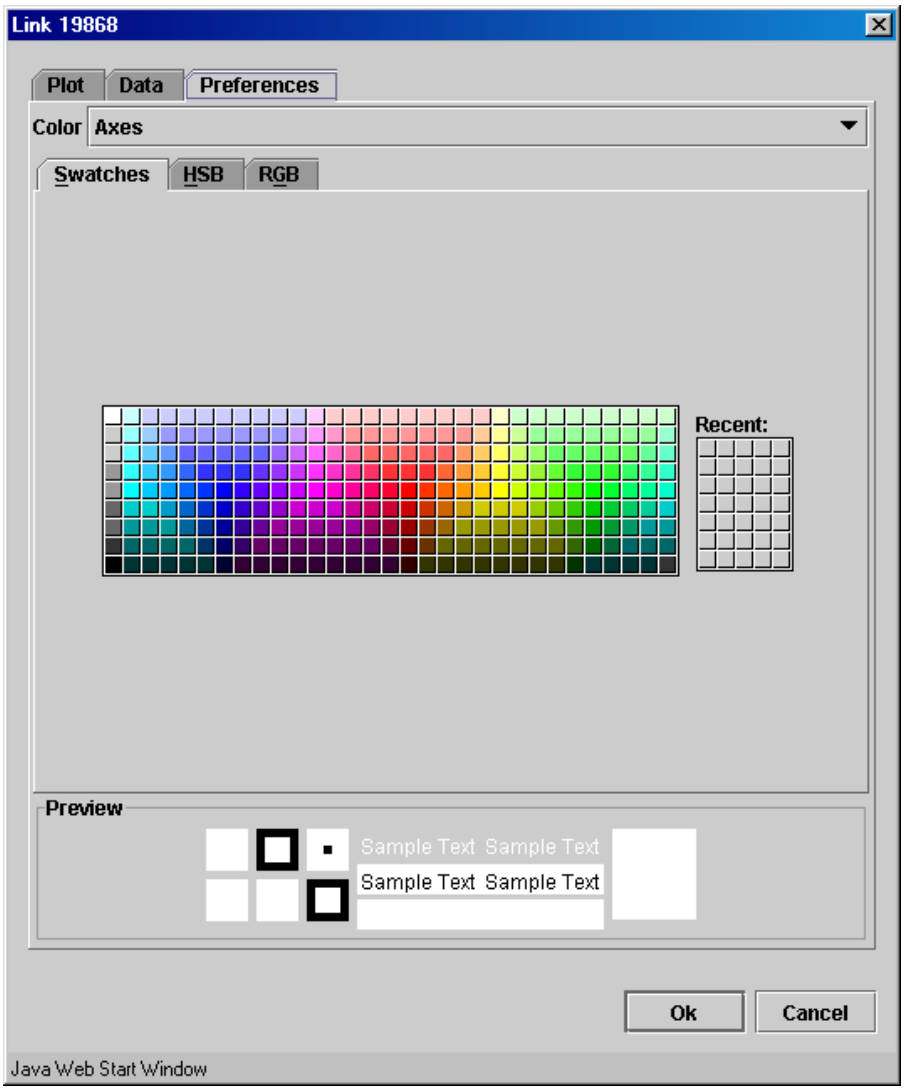


Figure 67: Link Density Plot – Preferences

6.0 RUNNING SIMULATION ANIMATION

Animation is a convenient method of performing an initial verification of whether or not the results of a simulation are reasonable. Since animation is inherently graphic, it cannot be viewed in the web interface, and instead must be viewed in the GIS Java GIS Interface.

After DTA has been run on a network, the simulation animation can be viewed by selecting Data Animation from the Data menu (see Figure 68). The Configure Animation window then appears to prompt the user to select the data that is to be animated (see Figure 69). Specifically, the user can select to have links color-coded by density, travel time, inflow or outflow (see Figure 70). During animation, a color-code legend will appear to show the values associated with each color. If the animation is by density, the colors indicate the proportion of jam density associated on each link (the legend is shown in Figure 71). If the animation is by travel time, the colors indicate the link travel time as a multiple of free flow travel time on each link (the legend is shown in Figure 72). If animation is by inflow or outflow, the colors indicate the number of vehicles entering or leaving the

link during each time step (the legend is shown in Figure 73). Figure 74 shows an example of what a network looks like during animation.

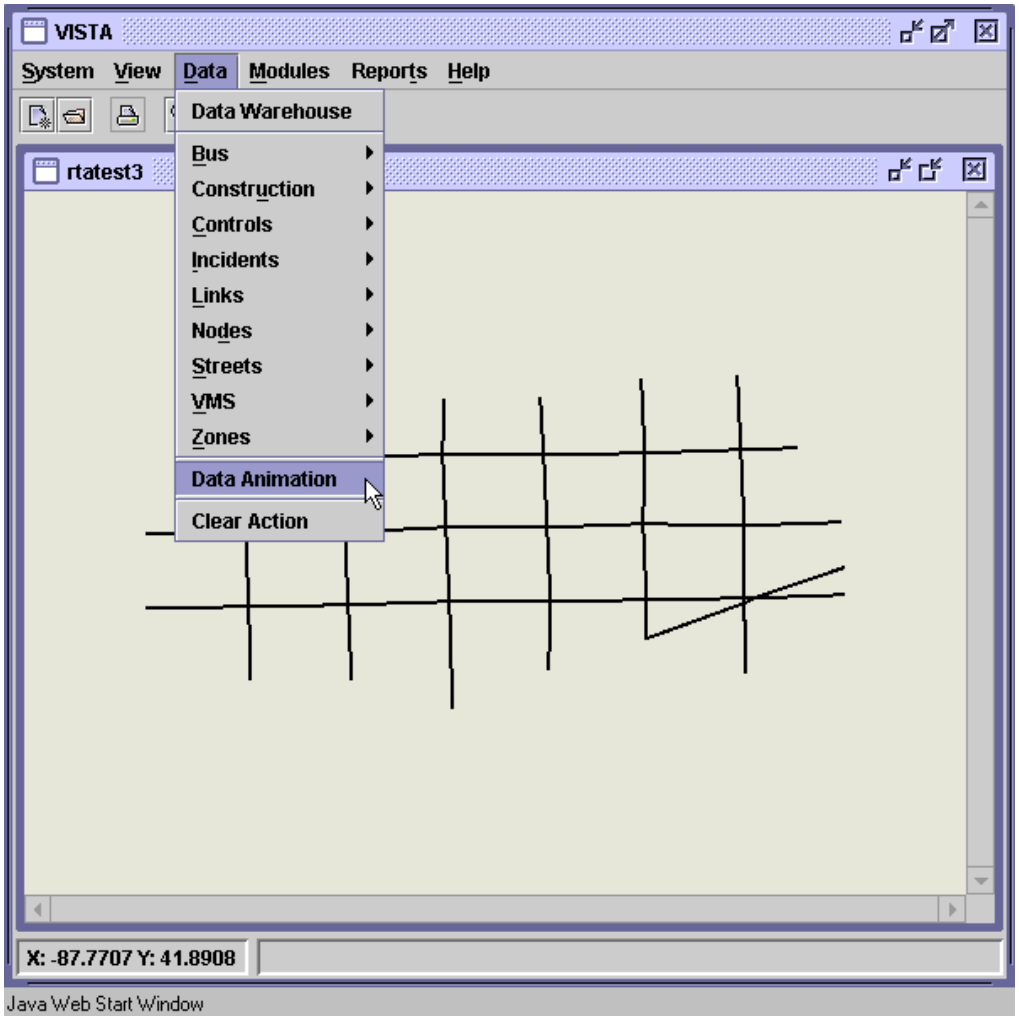


Figure 68: Java GIS Interface Data|Data Animation menu option

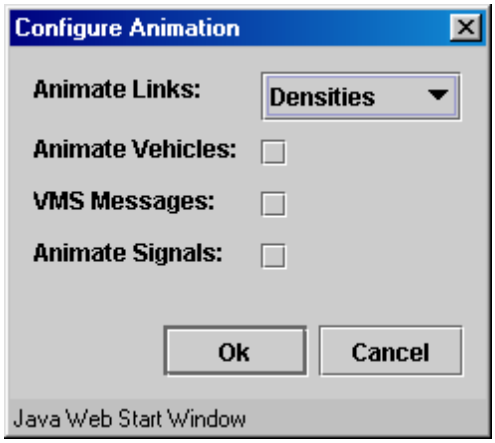


Figure 69: Configure Animation window

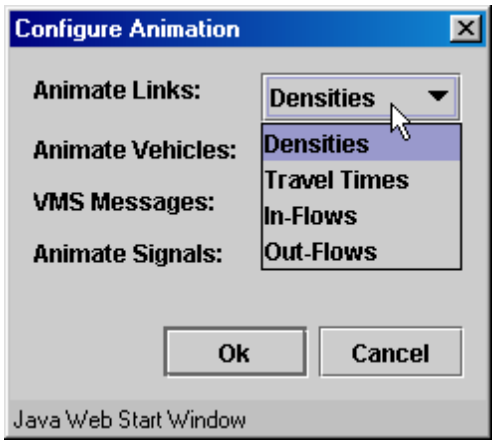


Figure 70: Animation options

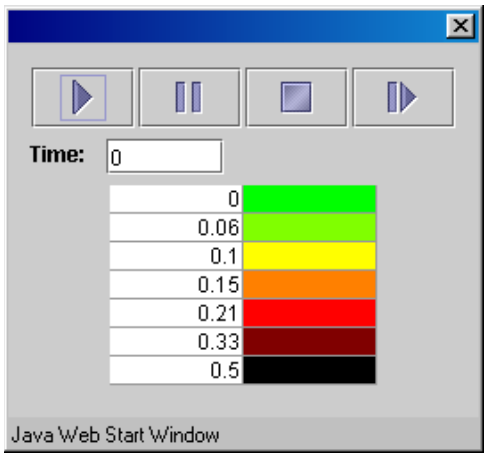


Figure 71: Color codes for animation by density

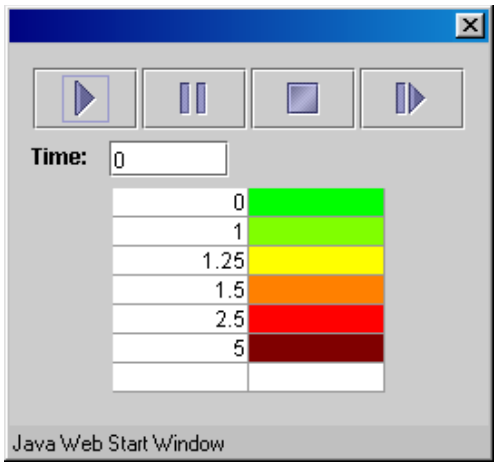


Figure 72: Color codes for animation by travel time

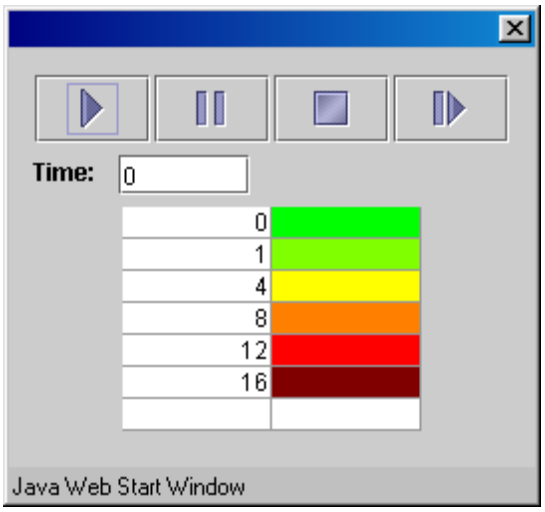


Figure 73: Color codes for animation by inflow or outflow

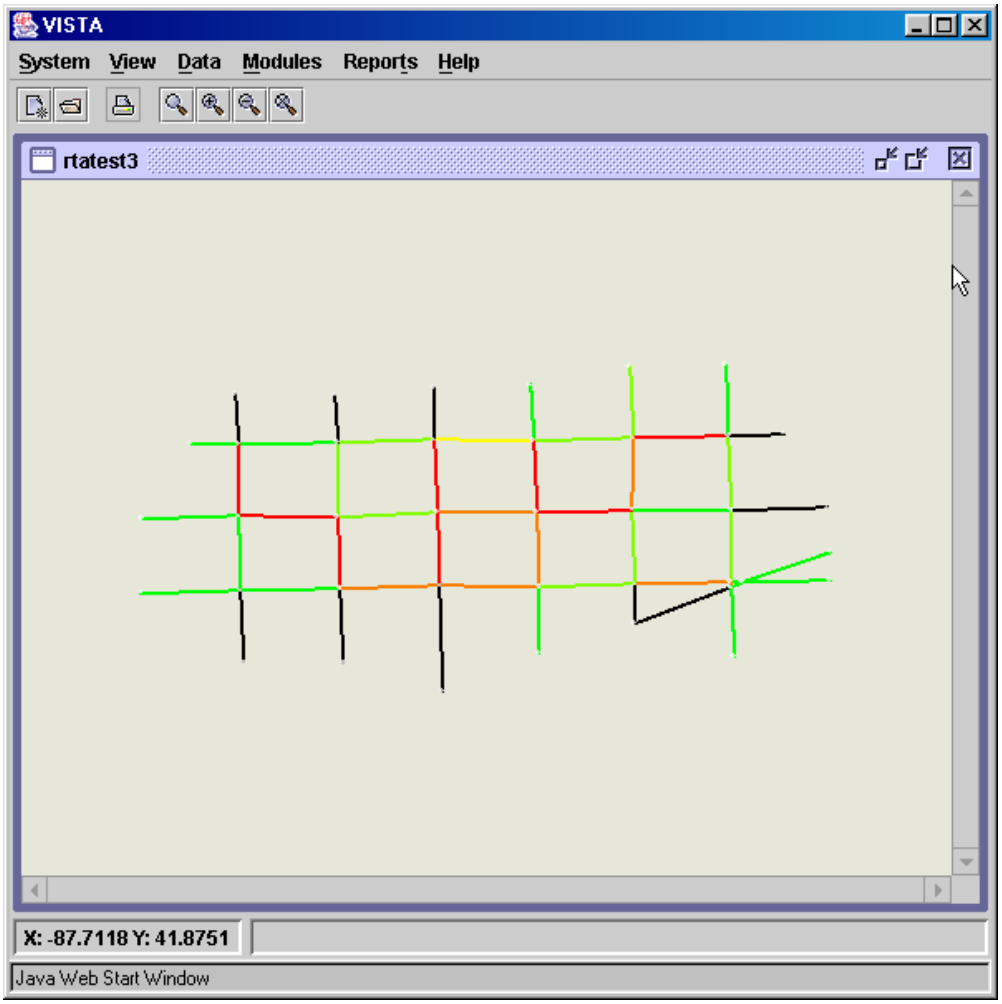


Figure 74: Example of network animation

For more detail, individual vehicles and signals can also be animated. Before running the Data Animation, the Vehicle Animation module must be run from the Modules menu. This module will prompt the user for the percentage of vehicles to animate (see Figure 75). When the Vehicle Animation module has finished, Data Animation can be selected from the Data menu, then in the Configure Data Animation window, Animate Vehicles and Animate Signals can be selected. (There are no VMS's in the Chicago network, so this option is irrelevant.) The data animation will then appear as shown in Figure 76. The small dark circles represent cars, and the large circles represent buses. The small light colored circles represent bus stops.

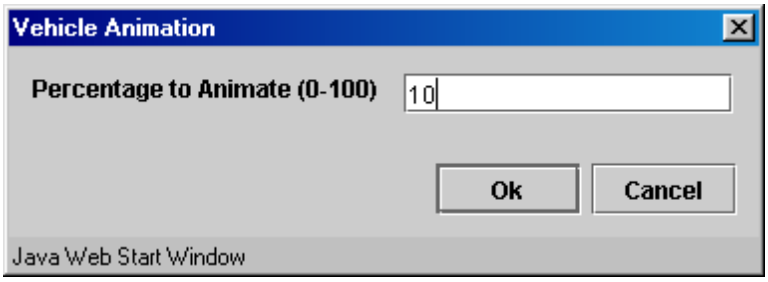


Figure 75: Vehicle Animation window

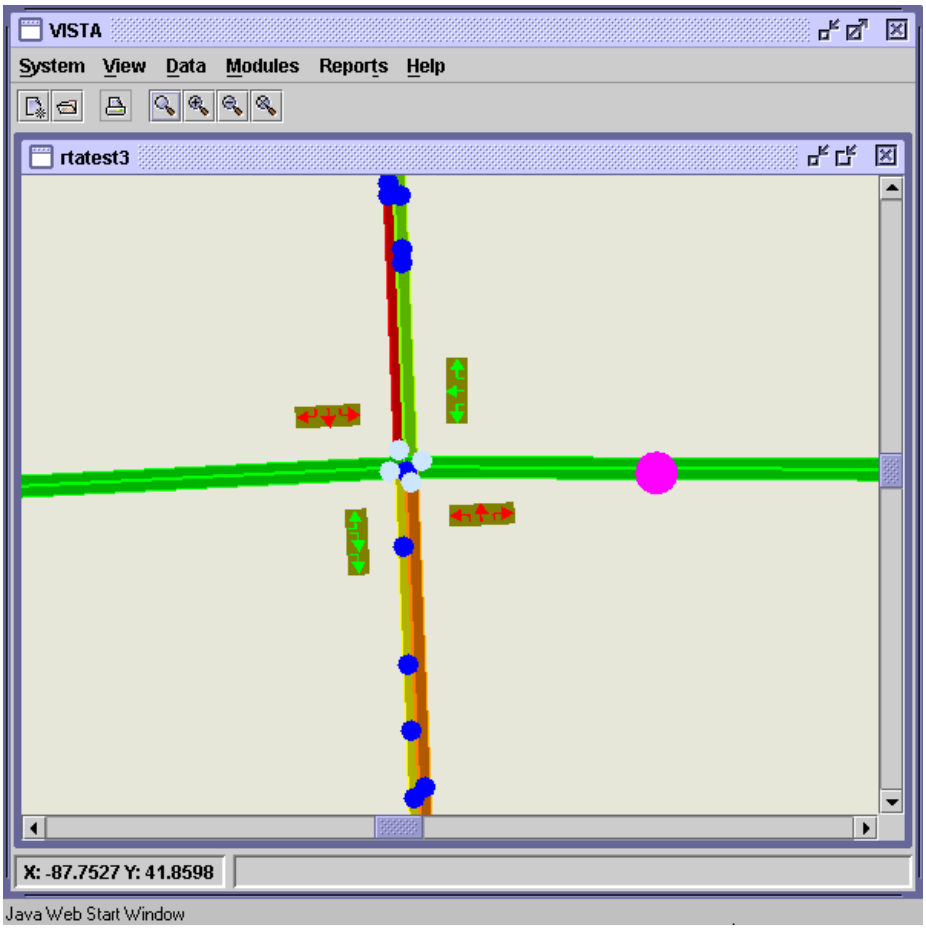


Figure 76: Example of vehicle and signal animation

7.0 SUMMARY

This software walk-through provided detailed instructions and illustrations on how to use the VISTA software from both the GIS Java GIS Interface and the web interface. The following topics were covered for each interface:

- logging into and out of VISTA
- viewing and editing data inputs
- running the dynamic traffic assignment module
- running reporting modules
- running simulation (GIS client only).

General Report

Prepared by Kyriacos Mouskos at 13:58 Mon, Jun 25, 2007 for network(s) nicosia_base.

Table of Contents

1. Basic Network Information

Table 1. Network Overview

Item	Counts in network nicosia_base
Nodes	235
Links	733
Signalized Intersection	0
VMS panels	0
Detectors	0
TRANSMIT Detectors	0
Zones	0
O-D pairs	622
Demand Total	517514
Demand Passenger Vehicles	517514
Demand Commercial Vehicles	0
Buses	0
Bus Routes	0
Assignment Length (s)	86400
Assignment Inverval(S)	900

Table 2. Vehicles Overview

	Loaded	Non-entered	Non-exited	Through	Entered Total TT(H)	AVG (M)	STD (M)	Entered Veh. VMT (Miles)	Through Veh. VMT (Miles)
All Type Vehicles	517514	0	0	517514	26289.0	3.05	2.18	937890.54	937890.54
Passenger Veh.	517514	0	0	517514	26289.0	3.05	2.18	937890.54	937890.54
Commercial Veh.	0	0	0	0					

2. Travel Time information (Entered Vehicles)

Table 3. All Type Vehicles Travel Time

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
0	00:00:00	00:15:00	5391	272.0	3.04	2.18	9732.85
1	00:15:00	00:30:00	5391	275.0	3.07	2.18	9747.14
2	00:30:00	00:45:00	5391	272.0	3.04	2.15	9803.24
3	00:45:00	01:00:00	5391	273.0	3.05	2.19	9760.61
4	01:00:00	01:15:00	5391	276.0	3.07	2.2	9745.39
5	01:15:00	01:30:00	5391	272.0	3.03	2.16	9758.38
6	01:30:00	01:45:00	5391	271.0	3.02	2.16	9783.07
7	01:45:00	02:00:00	5391	272.0	3.04	2.17	9773.65
8	02:00:00	02:15:00	5391	274.0	3.06	2.2	9746.94
9	02:15:00	02:30:00	5391	275.0	3.07	2.18	9782.2
10	02:30:00	02:45:00	5391	274.0	3.05	2.19	9750.63
11	02:45:00	03:00:00	5391	274.0	3.05	2.18	9777.47
12	03:00:00	03:15:00	5391	274.0	3.05	2.19	9758.89
13	03:15:00	03:30:00	5391	275.0	3.06	2.19	9750.04
14	03:30:00	03:45:00	5391	274.0	3.06	2.19	9772.13
15	03:45:00	04:00:00	5391	275.0	3.06	2.22	9763.92
16	04:00:00	04:15:00	5391	273.0	3.04	2.17	9790.88
17	04:15:00	04:30:00	5391	274.0	3.06	2.19	9765.15
18	04:30:00	04:45:00	5391	273.0	3.05	2.17	9783.15
19	04:45:00	05:00:00	5391	275.0	3.06	2.19	9788.66
20	05:00:00	05:15:00	5391	273.0	3.05	2.17	9771.58
21	05:15:00	05:30:00	5391	273.0	3.04	2.16	9787.43
22	05:30:00	05:45:00	5391	274.0	3.06	2.18	9770.24
23	05:45:00	06:00:00	5391	275.0	3.06	2.18	9790.8
24	06:00:00	06:15:00	5391	274.0	3.05	2.18	9774.97
25	06:15:00	06:30:00	5391	274.0	3.05	2.19	9761.05
26	06:30:00	06:45:00	5391	272.0	3.04	2.17	9780.78
27	06:45:00	07:00:00	5391	275.0	3.07	2.2	9769.05
28	07:00:00	07:15:00	5391	273.0	3.04	2.17	9758.03
29	07:15:00	07:30:00	5391	273.0	3.04	2.15	9789.71
30	07:30:00	07:45:00	5391	273.0	3.05	2.18	9774.0
31	07:45:00	08:00:00	5391	273.0	3.05	2.18	9767.51
32	08:00:00	08:15:00	5391	274.0	3.05	2.18	9786.54
33	08:15:00	08:30:00	5391	272.0	3.03	2.16	9768.79
34	08:30:00	08:45:00	5391	272.0	3.03	2.17	9755.18
35	08:45:00	09:00:00	5391	274.0	3.05	2.18	9780.77
36	09:00:00	09:15:00	5391	273.0	3.04	2.18	9759.03
37	09:15:00	09:30:00	5391	274.0	3.06	2.19	9760.09
38	09:30:00	09:45:00	5391	275.0	3.06	2.19	9775.36

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
39	09:45:00	10:00:00	5391	273.0	3.05	2.18	9765.53
40	10:00:00	10:15:00	5391	273.0	3.05	2.19	9762.93
41	10:15:00	10:30:00	5391	272.0	3.04	2.17	9765.0
42	10:30:00	10:45:00	5391	274.0	3.05	2.19	9750.29
43	10:45:00	11:00:00	5391	273.0	3.05	2.18	9780.75
44	11:00:00	11:15:00	5391	273.0	3.04	2.18	9767.24
45	11:15:00	11:30:00	5391	273.0	3.05	2.18	9783.08
46	11:30:00	11:45:00	5391	272.0	3.03	2.16	9776.59
47	11:45:00	12:00:00	5391	273.0	3.04	2.16	9776.46
48	12:00:00	12:15:00	5391	274.0	3.06	2.18	9789.04
49	12:15:00	12:30:00	5391	273.0	3.04	2.16	9776.78
50	12:30:00	12:45:00	5391	273.0	3.05	2.17	9771.23
51	12:45:00	13:00:00	5391	274.0	3.06	2.19	9773.12
52	13:00:00	13:15:00	5391	273.0	3.05	2.18	9783.86
53	13:15:00	13:30:00	5391	274.0	3.05	2.17	9763.98
54	13:30:00	13:45:00	5391	273.0	3.04	2.17	9761.95
55	13:45:00	14:00:00	5391	274.0	3.05	2.19	9757.15
56	14:00:00	14:15:00	5391	274.0	3.06	2.19	9762.01
57	14:15:00	14:30:00	5391	273.0	3.04	2.17	9777.7
58	14:30:00	14:45:00	5391	272.0	3.04	2.17	9766.83
59	14:45:00	15:00:00	5391	273.0	3.04	2.16	9769.37
60	15:00:00	15:15:00	5391	272.0	3.04	2.16	9770.27
61	15:15:00	15:30:00	5391	273.0	3.04	2.17	9746.22
62	15:30:00	15:45:00	5391	275.0	3.07	2.19	9756.9
63	15:45:00	16:00:00	5391	272.0	3.03	2.16	9783.92
64	16:00:00	16:15:00	5391	273.0	3.04	2.17	9765.87
65	16:15:00	16:30:00	5391	274.0	3.05	2.18	9753.97
66	16:30:00	16:45:00	5391	273.0	3.04	2.17	9784.59
67	16:45:00	17:00:00	5391	273.0	3.04	2.17	9759.0
68	17:00:00	17:15:00	5391	275.0	3.06	2.21	9753.15
69	17:15:00	17:30:00	5391	274.0	3.06	2.18	9768.12
70	17:30:00	17:45:00	5391	275.0	3.07	2.2	9753.22
71	17:45:00	18:00:00	5391	274.0	3.05	2.18	9763.82
72	18:00:00	18:15:00	5391	273.0	3.04	2.18	9740.54
73	18:15:00	18:30:00	5391	273.0	3.04	2.18	9762.51
74	18:30:00	18:45:00	5390	272.0	3.03	2.17	9773.69
75	18:45:00	19:00:00	5390	273.0	3.05	2.18	9782.38
76	19:00:00	19:15:00	5390	273.0	3.05	2.17	9789.08
77	19:15:00	19:30:00	5390	271.0	3.02	2.16	9772.8
78	19:30:00	19:45:00	5390	272.0	3.03	2.16	9770.33
79	19:45:00	20:00:00	5390	273.0	3.05	2.18	9793.39
80	20:00:00	20:15:00	5390	273.0	3.05	2.16	9786.0
81	20:15:00	20:30:00	5390	275.0	3.07	2.18	9782.26
82	20:30:00	20:45:00	5390	274.0	3.06	2.18	9774.29
83	20:45:00	21:00:00	5390	274.0	3.06	2.18	9790.51
84	21:00:00	21:15:00	5390	272.0	3.04	2.18	9782.42
85	21:15:00	21:30:00	5390	274.0	3.05	2.17	9776.66
86	21:30:00	21:45:00	5390	273.0	3.05	2.17	9765.33
87	21:45:00	22:00:00	5390	272.0	3.03	2.16	9763.94
88	22:00:00	22:15:00	5390	274.0	3.05	2.18	9759.12
89	22:15:00	22:30:00	5390	272.0	3.03	2.16	9764.24
90	22:30:00	22:45:00	5390	272.0	3.03	2.16	9774.56
91	22:45:00	23:00:00	5390	274.0	3.06	2.19	9735.45
92	23:00:00	23:15:00	5390	273.0	3.05	2.15	9770.97
93	23:15:00	23:30:00	5390	275.0	3.07	2.19	9773.8
94	23:30:00	23:45:00	5390	272.0	3.04	2.16	9776.25
95	23:45:00	24:00:00	5390	273.0	3.04	2.15	9774.77
Total	00:00:00	24:00:00	517514	26289.0	3.05	2.18	937890.54

Table 4. Passenger Vehicle Travel Time

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
0	00:00:00	00:15:00	5391	272.0	3.04	2.18	9732.85
1	00:15:00	00:30:00	5391	275.0	3.07	2.18	9747.14
2	00:30:00	00:45:00	5391	272.0	3.04	2.15	9803.24
3	00:45:00	01:00:00	5391	273.0	3.05	2.19	9760.61
4	01:00:00	01:15:00	5391	276.0	3.07	2.2	9745.39
5	01:15:00	01:30:00	5391	272.0	3.03	2.16	9758.38
6	01:30:00	01:45:00	5391	271.0	3.02	2.16	9783.07
7	01:45:00	02:00:00	5391	272.0	3.04	2.17	9773.65
8	02:00:00	02:15:00	5391	274.0	3.06	2.2	9746.94
9	02:15:00	02:30:00	5391	275.0	3.07	2.18	9782.2
10	02:30:00	02:45:00	5391	274.0	3.05	2.19	9750.63
11	02:45:00	03:00:00	5391	274.0	3.05	2.18	9777.47
12	03:00:00	03:15:00	5391	274.0	3.05	2.19	9758.89
13	03:15:00	03:30:00	5391	275.0	3.06	2.19	9750.04
14	03:30:00	03:45:00	5391	274.0	3.06	2.19	9772.13
15	03:45:00	04:00:00	5391	275.0	3.06	2.22	9763.92
16	04:00:00	04:15:00	5391	273.0	3.04	2.17	9790.88
17	04:15:00	04:30:00	5391	274.0	3.06	2.19	9765.15
18	04:30:00	04:45:00	5391	273.0	3.05	2.17	9783.15
19	04:45:00	05:00:00	5391	275.0	3.06	2.19	9788.66
20	05:00:00	05:15:00	5391	273.0	3.05	2.17	9771.58
21	05:15:00	05:30:00	5391	273.0	3.04	2.16	9787.43
22	05:30:00	05:45:00	5391	274.0	3.06	2.18	9770.24
23	05:45:00	06:00:00	5391	275.0	3.06	2.18	9790.8
24	06:00:00	06:15:00	5391	274.0	3.05	2.18	9774.97
25	06:15:00	06:30:00	5391	274.0	3.05	2.19	9761.05
26	06:30:00	06:45:00	5391	272.0	3.04	2.17	9780.78
27	06:45:00	07:00:00	5391	275.0	3.07	2.2	9769.05
28	07:00:00	07:15:00	5391	273.0	3.04	2.17	9758.03

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
29	07:15:00	07:30:00	5391	273.0	3.04	2.15	9789.71
30	07:30:00	07:45:00	5391	273.0	3.05	2.18	9774.0
31	07:45:00	08:00:00	5391	273.0	3.05	2.18	9767.51
32	08:00:00	08:15:00	5391	274.0	3.05	2.18	9786.54
33	08:15:00	08:30:00	5391	272.0	3.03	2.16	9768.79
34	08:30:00	08:45:00	5391	272.0	3.03	2.17	9755.18
35	08:45:00	09:00:00	5391	274.0	3.05	2.18	9780.77
36	09:00:00	09:15:00	5391	273.0	3.04	2.18	9759.03
37	09:15:00	09:30:00	5391	274.0	3.06	2.19	9760.09
38	09:30:00	09:45:00	5391	275.0	3.06	2.19	9775.36
39	09:45:00	10:00:00	5391	273.0	3.05	2.18	9765.53
40	10:00:00	10:15:00	5391	273.0	3.05	2.19	9762.93
41	10:15:00	10:30:00	5391	272.0	3.04	2.17	9765.0
42	10:30:00	10:45:00	5391	274.0	3.05	2.19	9750.29
43	10:45:00	11:00:00	5391	273.0	3.05	2.18	9780.75
44	11:00:00	11:15:00	5391	273.0	3.04	2.18	9767.24
45	11:15:00	11:30:00	5391	273.0	3.05	2.18	9783.08
46	11:30:00	11:45:00	5391	272.0	3.03	2.16	9776.59
47	11:45:00	12:00:00	5391	273.0	3.04	2.16	9776.46
48	12:00:00	12:15:00	5391	274.0	3.06	2.18	9789.04
49	12:15:00	12:30:00	5391	273.0	3.04	2.16	9776.78
50	12:30:00	12:45:00	5391	273.0	3.05	2.17	9771.23
51	12:45:00	13:00:00	5391	274.0	3.06	2.19	9773.12
52	13:00:00	13:15:00	5391	273.0	3.05	2.18	9783.86
53	13:15:00	13:30:00	5391	274.0	3.05	2.17	9763.98
54	13:30:00	13:45:00	5391	273.0	3.04	2.17	9761.95
55	13:45:00	14:00:00	5391	274.0	3.05	2.19	9757.15
56	14:00:00	14:15:00	5391	274.0	3.06	2.19	9762.01
57	14:15:00	14:30:00	5391	273.0	3.04	2.17	9777.7
58	14:30:00	14:45:00	5391	272.0	3.04	2.17	9766.83
59	14:45:00	15:00:00	5391	273.0	3.04	2.16	9769.37
60	15:00:00	15:15:00	5391	272.0	3.04	2.16	9770.27
61	15:15:00	15:30:00	5391	273.0	3.04	2.17	9746.22
62	15:30:00	15:45:00	5391	275.0	3.07	2.19	9756.9
63	15:45:00	16:00:00	5391	272.0	3.03	2.16	9783.92
64	16:00:00	16:15:00	5391	273.0	3.04	2.17	9765.87
65	16:15:00	16:30:00	5391	274.0	3.05	2.18	9753.97
66	16:30:00	16:45:00	5391	273.0	3.04	2.17	9784.59
67	16:45:00	17:00:00	5391	273.0	3.04	2.17	9759.0
68	17:00:00	17:15:00	5391	275.0	3.06	2.21	9753.15
69	17:15:00	17:30:00	5391	274.0	3.06	2.18	9768.12
70	17:30:00	17:45:00	5391	275.0	3.07	2.2	9753.22
71	17:45:00	18:00:00	5391	274.0	3.05	2.18	9763.82
72	18:00:00	18:15:00	5391	273.0	3.04	2.18	9740.54
73	18:15:00	18:30:00	5391	273.0	3.04	2.18	9762.51
74	18:30:00	18:45:00	5390	272.0	3.03	2.17	9773.69
75	18:45:00	19:00:00	5390	273.0	3.05	2.18	9782.38
76	19:00:00	19:15:00	5390	273.0	3.05	2.17	9789.08
77	19:15:00	19:30:00	5390	271.0	3.02	2.16	9772.8
78	19:30:00	19:45:00	5390	272.0	3.03	2.16	9770.33
79	19:45:00	20:00:00	5390	273.0	3.05	2.18	9793.39
80	20:00:00	20:15:00	5390	273.0	3.05	2.16	9786.0
81	20:15:00	20:30:00	5390	275.0	3.07	2.18	9782.26
82	20:30:00	20:45:00	5390	274.0	3.06	2.18	9774.29
83	20:45:00	21:00:00	5390	274.0	3.06	2.18	9790.51
84	21:00:00	21:15:00	5390	272.0	3.04	2.18	9782.42
85	21:15:00	21:30:00	5390	274.0	3.05	2.17	9776.66
86	21:30:00	21:45:00	5390	273.0	3.05	2.17	9765.33
87	21:45:00	22:00:00	5390	272.0	3.03	2.16	9763.94
88	22:00:00	22:15:00	5390	274.0	3.05	2.18	9759.12
89	22:15:00	22:30:00	5390	272.0	3.03	2.16	9764.24
90	22:30:00	22:45:00	5390	272.0	3.03	2.16	9774.56
91	22:45:00	23:00:00	5390	274.0	3.06	2.19	9735.45
92	23:00:00	23:15:00	5390	273.0	3.05	2.15	9770.97
93	23:15:00	23:30:00	5390	275.0	3.07	2.19	9773.8
94	23:30:00	23:45:00	5390	272.0	3.04	2.16	9776.25
95	23:45:00	24:00:00	5390	273.0	3.04	2.15	9774.77
Total	00:00:00	24:00:00	517514	26289.0	3.05	2.18	937890.54

3. Travel Time information (Through Vehicles)

Table 5. All Type Vehicles Travel Time

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
0	00:00:00	00:15:00	5391	272.0	3.04	2.18	9732.85
1	00:15:00	00:30:00	5391	275.0	3.07	2.18	9747.14
2	00:30:00	00:45:00	5391	272.0	3.04	2.15	9803.24
3	00:45:00	01:00:00	5391	273.0	3.05	2.19	9760.61
4	01:00:00	01:15:00	5391	276.0	3.07	2.2	9745.39
5	01:15:00	01:30:00	5391	272.0	3.03	2.16	9758.38
6	01:30:00	01:45:00	5391	271.0	3.02	2.16	9783.07
7	01:45:00	02:00:00	5391	272.0	3.04	2.17	9773.65
8	02:00:00	02:15:00	5391	274.0	3.06	2.2	9746.94
9	02:15:00	02:30:00	5391	275.0	3.07	2.18	9782.2
10	02:30:00	02:45:00	5391	274.0	3.05	2.19	9750.63
11	02:45:00	03:00:00	5391	274.0	3.05	2.18	9777.47
12	03:00:00	03:15:00	5391	274.0	3.05	2.19	9758.89
13	03:15:00	03:30:00	5391	275.0	3.06	2.19	9750.04

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
14	03:30:00	03:45:00	5391	274.0	3.06	2.19	9772.13
15	03:45:00	04:00:00	5391	275.0	3.06	2.22	9763.92
16	04:00:00	04:15:00	5391	273.0	3.04	2.17	9790.88
17	04:15:00	04:30:00	5391	274.0	3.06	2.19	9765.15
18	04:30:00	04:45:00	5391	273.0	3.05	2.17	9783.15
19	04:45:00	05:00:00	5391	275.0	3.06	2.19	9788.66
20	05:00:00	05:15:00	5391	273.0	3.05	2.17	9771.58
21	05:15:00	05:30:00	5391	273.0	3.04	2.16	9787.43
22	05:30:00	05:45:00	5391	274.0	3.06	2.18	9770.24
23	05:45:00	06:00:00	5391	275.0	3.06	2.18	9790.8
24	06:00:00	06:15:00	5391	274.0	3.05	2.18	9774.97
25	06:15:00	06:30:00	5391	274.0	3.05	2.19	9761.05
26	06:30:00	06:45:00	5391	272.0	3.04	2.17	9780.78
27	06:45:00	07:00:00	5391	275.0	3.07	2.2	9769.05
28	07:00:00	07:15:00	5391	273.0	3.04	2.17	9758.03
29	07:15:00	07:30:00	5391	273.0	3.04	2.15	9789.71
30	07:30:00	07:45:00	5391	273.0	3.05	2.18	9774.0
31	07:45:00	08:00:00	5391	273.0	3.05	2.18	9767.51
32	08:00:00	08:15:00	5391	274.0	3.05	2.18	9786.54
33	08:15:00	08:30:00	5391	272.0	3.03	2.16	9768.79
34	08:30:00	08:45:00	5391	272.0	3.03	2.17	9755.18
35	08:45:00	09:00:00	5391	274.0	3.05	2.18	9780.77
36	09:00:00	09:15:00	5391	273.0	3.04	2.18	9759.03
37	09:15:00	09:30:00	5391	274.0	3.06	2.19	9760.09
38	09:30:00	09:45:00	5391	275.0	3.06	2.19	9775.36
39	09:45:00	10:00:00	5391	273.0	3.05	2.18	9765.53
40	10:00:00	10:15:00	5391	273.0	3.05	2.19	9762.93
41	10:15:00	10:30:00	5391	272.0	3.04	2.17	9765.0
42	10:30:00	10:45:00	5391	274.0	3.05	2.19	9750.29
43	10:45:00	11:00:00	5391	273.0	3.05	2.18	9780.75
44	11:00:00	11:15:00	5391	273.0	3.04	2.18	9767.24
45	11:15:00	11:30:00	5391	273.0	3.05	2.18	9783.08
46	11:30:00	11:45:00	5391	272.0	3.03	2.16	9776.59
47	11:45:00	12:00:00	5391	273.0	3.04	2.16	9776.46
48	12:00:00	12:15:00	5391	274.0	3.06	2.18	9789.04
49	12:15:00	12:30:00	5391	273.0	3.04	2.16	9776.78
50	12:30:00	12:45:00	5391	273.0	3.05	2.17	9771.23
51	12:45:00	13:00:00	5391	274.0	3.06	2.19	9773.12
52	13:00:00	13:15:00	5391	273.0	3.05	2.18	9783.86
53	13:15:00	13:30:00	5391	274.0	3.05	2.17	9763.98
54	13:30:00	13:45:00	5391	273.0	3.04	2.17	9761.95
55	13:45:00	14:00:00	5391	274.0	3.05	2.19	9757.15
56	14:00:00	14:15:00	5391	274.0	3.06	2.19	9762.01
57	14:15:00	14:30:00	5391	273.0	3.04	2.17	9777.7
58	14:30:00	14:45:00	5391	272.0	3.04	2.17	9766.83
59	14:45:00	15:00:00	5391	273.0	3.04	2.16	9769.37
60	15:00:00	15:15:00	5391	272.0	3.04	2.16	9770.27
61	15:15:00	15:30:00	5391	273.0	3.04	2.17	9746.22
62	15:30:00	15:45:00	5391	275.0	3.07	2.19	9756.9
63	15:45:00	16:00:00	5391	272.0	3.03	2.16	9783.92
64	16:00:00	16:15:00	5391	273.0	3.04	2.17	9765.87
65	16:15:00	16:30:00	5391	274.0	3.05	2.18	9753.97
66	16:30:00	16:45:00	5391	273.0	3.04	2.17	9784.59
67	16:45:00	17:00:00	5391	273.0	3.04	2.17	9759.0
68	17:00:00	17:15:00	5391	275.0	3.06	2.21	9753.15
69	17:15:00	17:30:00	5391	274.0	3.06	2.18	9768.12
70	17:30:00	17:45:00	5391	275.0	3.07	2.2	9753.22
71	17:45:00	18:00:00	5391	274.0	3.05	2.18	9763.82
72	18:00:00	18:15:00	5391	273.0	3.04	2.18	9740.54
73	18:15:00	18:30:00	5391	273.0	3.04	2.18	9762.51
74	18:30:00	18:45:00	5390	272.0	3.03	2.17	9773.69
75	18:45:00	19:00:00	5390	273.0	3.05	2.18	9782.38
76	19:00:00	19:15:00	5390	273.0	3.05	2.17	9789.08
77	19:15:00	19:30:00	5390	271.0	3.02	2.16	9772.8
78	19:30:00	19:45:00	5390	272.0	3.03	2.16	9770.33
79	19:45:00	20:00:00	5390	273.0	3.05	2.18	9793.39
80	20:00:00	20:15:00	5390	273.0	3.05	2.16	9786.0
81	20:15:00	20:30:00	5390	275.0	3.07	2.18	9782.26
82	20:30:00	20:45:00	5390	274.0	3.06	2.18	9774.29
83	20:45:00	21:00:00	5390	274.0	3.06	2.18	9790.51
84	21:00:00	21:15:00	5390	272.0	3.04	2.18	9782.42
85	21:15:00	21:30:00	5390	274.0	3.05	2.17	9776.66
86	21:30:00	21:45:00	5390	273.0	3.05	2.17	9765.33
87	21:45:00	22:00:00	5390	272.0	3.03	2.16	9763.94
88	22:00:00	22:15:00	5390	274.0	3.05	2.18	9759.12
89	22:15:00	22:30:00	5390	272.0	3.03	2.16	9764.24
90	22:30:00	22:45:00	5390	272.0	3.03	2.16	9774.56
91	22:45:00	23:00:00	5390	274.0	3.06	2.19	9735.45
92	23:00:00	23:15:00	5390	273.0	3.05	2.15	9770.97
93	23:15:00	23:30:00	5390	275.0	3.07	2.19	9773.8
94	23:30:00	23:45:00	5390	272.0	3.04	2.16	9776.25
95	23:45:00	24:00:00	5390	273.0	3.04	2.15	9774.77
Total	00:00:00	24:00:00	517514	26289.0	3.05	2.18	937890.54

Table 6. Passenger Vehicle Travel Time

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
0	00:00:00	00:15:00	5391	272.0	3.04	2.18	9732.85
1	00:15:00	00:30:00	5391	275.0	3.07	2.18	9747.14
2	00:30:00	00:45:00	5391	272.0	3.04	2.15	9803.24
3	00:45:00	01:00:00	5391	273.0	3.05	2.19	9760.61

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
4	01:00:00	01:15:00	5391	276.0	3.07	2.2	9745.39
5	01:15:00	01:30:00	5391	272.0	3.03	2.16	9758.38
6	01:30:00	01:45:00	5391	271.0	3.02	2.16	9783.07
7	01:45:00	02:00:00	5391	272.0	3.04	2.17	9773.65
8	02:00:00	02:15:00	5391	274.0	3.06	2.2	9746.94
9	02:15:00	02:30:00	5391	275.0	3.07	2.18	9782.2
10	02:30:00	02:45:00	5391	274.0	3.05	2.19	9750.63
11	02:45:00	03:00:00	5391	274.0	3.05	2.18	9777.47
12	03:00:00	03:15:00	5391	274.0	3.05	2.19	9758.89
13	03:15:00	03:30:00	5391	275.0	3.06	2.19	9750.04
14	03:30:00	03:45:00	5391	274.0	3.06	2.19	9772.13
15	03:45:00	04:00:00	5391	275.0	3.06	2.22	9763.92
16	04:00:00	04:15:00	5391	273.0	3.04	2.17	9790.88
17	04:15:00	04:30:00	5391	274.0	3.06	2.19	9765.15
18	04:30:00	04:45:00	5391	273.0	3.05	2.17	9783.15
19	04:45:00	05:00:00	5391	275.0	3.06	2.19	9788.66
20	05:00:00	05:15:00	5391	273.0	3.05	2.17	9771.58
21	05:15:00	05:30:00	5391	273.0	3.04	2.16	9787.43
22	05:30:00	05:45:00	5391	274.0	3.06	2.18	9770.24
23	05:45:00	06:00:00	5391	275.0	3.06	2.18	9790.8
24	06:00:00	06:15:00	5391	274.0	3.05	2.18	9774.97
25	06:15:00	06:30:00	5391	274.0	3.05	2.19	9761.05
26	06:30:00	06:45:00	5391	272.0	3.04	2.17	9780.78
27	06:45:00	07:00:00	5391	275.0	3.07	2.2	9769.05
28	07:00:00	07:15:00	5391	273.0	3.04	2.17	9758.03
29	07:15:00	07:30:00	5391	273.0	3.04	2.15	9789.71
30	07:30:00	07:45:00	5391	273.0	3.05	2.18	9774.0
31	07:45:00	08:00:00	5391	273.0	3.05	2.18	9767.51
32	08:00:00	08:15:00	5391	274.0	3.05	2.18	9786.54
33	08:15:00	08:30:00	5391	272.0	3.03	2.16	9768.79
34	08:30:00	08:45:00	5391	272.0	3.03	2.17	9755.18
35	08:45:00	09:00:00	5391	274.0	3.05	2.18	9780.77
36	09:00:00	09:15:00	5391	273.0	3.04	2.18	9759.03
37	09:15:00	09:30:00	5391	274.0	3.06	2.19	9760.09
38	09:30:00	09:45:00	5391	275.0	3.06	2.19	9775.36
39	09:45:00	10:00:00	5391	273.0	3.05	2.18	9765.53
40	10:00:00	10:15:00	5391	273.0	3.05	2.19	9762.93
41	10:15:00	10:30:00	5391	272.0	3.04	2.17	9765.0
42	10:30:00	10:45:00	5391	274.0	3.05	2.19	9750.29
43	10:45:00	11:00:00	5391	273.0	3.05	2.18	9780.75
44	11:00:00	11:15:00	5391	273.0	3.04	2.18	9767.24
45	11:15:00	11:30:00	5391	273.0	3.05	2.18	9783.08
46	11:30:00	11:45:00	5391	272.0	3.03	2.16	9776.59
47	11:45:00	12:00:00	5391	273.0	3.04	2.16	9776.46
48	12:00:00	12:15:00	5391	274.0	3.06	2.18	9789.04
49	12:15:00	12:30:00	5391	273.0	3.04	2.16	9776.78
50	12:30:00	12:45:00	5391	273.0	3.05	2.17	9771.23
51	12:45:00	13:00:00	5391	274.0	3.06	2.19	9773.12
52	13:00:00	13:15:00	5391	273.0	3.05	2.18	9783.86
53	13:15:00	13:30:00	5391	274.0	3.05	2.17	9763.98
54	13:30:00	13:45:00	5391	273.0	3.04	2.17	9761.95
55	13:45:00	14:00:00	5391	274.0	3.05	2.19	9757.15
56	14:00:00	14:15:00	5391	274.0	3.06	2.19	9762.01
57	14:15:00	14:30:00	5391	273.0	3.04	2.17	9777.7
58	14:30:00	14:45:00	5391	272.0	3.04	2.17	9766.83
59	14:45:00	15:00:00	5391	273.0	3.04	2.16	9769.37
60	15:00:00	15:15:00	5391	272.0	3.04	2.16	9770.27
61	15:15:00	15:30:00	5391	273.0	3.04	2.17	9746.22
62	15:30:00	15:45:00	5391	275.0	3.07	2.19	9756.9
63	15:45:00	16:00:00	5391	272.0	3.03	2.16	9783.92
64	16:00:00	16:15:00	5391	273.0	3.04	2.17	9765.87
65	16:15:00	16:30:00	5391	274.0	3.05	2.18	9753.97
66	16:30:00	16:45:00	5391	273.0	3.04	2.17	9784.59
67	16:45:00	17:00:00	5391	273.0	3.04	2.17	9759.0
68	17:00:00	17:15:00	5391	275.0	3.06	2.21	9753.15
69	17:15:00	17:30:00	5391	274.0	3.06	2.18	9768.12
70	17:30:00	17:45:00	5391	275.0	3.07	2.2	9753.22
71	17:45:00	18:00:00	5391	274.0	3.05	2.18	9763.82
72	18:00:00	18:15:00	5391	273.0	3.04	2.18	9740.54
73	18:15:00	18:30:00	5391	273.0	3.04	2.18	9762.51
74	18:30:00	18:45:00	5390	272.0	3.03	2.17	9773.69
75	18:45:00	19:00:00	5390	273.0	3.05	2.18	9782.38
76	19:00:00	19:15:00	5390	273.0	3.05	2.17	9789.08
77	19:15:00	19:30:00	5390	271.0	3.02	2.16	9772.8
78	19:30:00	19:45:00	5390	272.0	3.03	2.16	9770.33
79	19:45:00	20:00:00	5390	273.0	3.05	2.18	9793.39
80	20:00:00	20:15:00	5390	273.0	3.05	2.16	9786.0
81	20:15:00	20:30:00	5390	275.0	3.07	2.18	9782.26
82	20:30:00	20:45:00	5390	274.0	3.06	2.18	9774.29
83	20:45:00	21:00:00	5390	274.0	3.06	2.18	9790.51
84	21:00:00	21:15:00	5390	272.0	3.04	2.18	9782.42
85	21:15:00	21:30:00	5390	274.0	3.05	2.17	9776.66
86	21:30:00	21:45:00	5390	273.0	3.05	2.17	9765.33
87	21:45:00	22:00:00	5390	272.0	3.03	2.16	9763.94
88	22:00:00	22:15:00	5390	274.0	3.05	2.18	9759.12
89	22:15:00	22:30:00	5390	272.0	3.03	2.16	9764.24
90	22:30:00	22:45:00	5390	272.0	3.03	2.16	9774.56
91	22:45:00	23:00:00	5390	274.0	3.06	2.19	9735.45
92	23:00:00	23:15:00	5390	273.0	3.05	2.15	9770.97
93	23:15:00	23:30:00	5390	275.0	3.07	2.19	9773.8
94	23:30:00	23:45:00	5390	272.0	3.04	2.16	9776.25

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)	VMT (Mile)
95	23:45:00	24:00:00	5390	273.0	3.04	2.15	9774.77
Total	00:00:00	24:00:00	517514	26289.0	3.05	2.18	937890.54

4. Travel Time information (Loaded Vehicles)

Table 7. All Type Vehicles Travel Time

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)
0	00:00:00	00:15:00	5391	272.0	3.04	2.18
1	00:15:00	00:30:00	5391	275.0	3.07	2.18
2	00:30:00	00:45:00	5391	272.0	3.04	2.15
3	00:45:00	01:00:00	5391	273.0	3.05	2.19
4	01:00:00	01:15:00	5391	276.0	3.07	2.2
5	01:15:00	01:30:00	5391	272.0	3.03	2.16
6	01:30:00	01:45:00	5391	271.0	3.02	2.16
7	01:45:00	02:00:00	5391	272.0	3.04	2.17
8	02:00:00	02:15:00	5391	274.0	3.06	2.2
9	02:15:00	02:30:00	5391	275.0	3.07	2.18
10	02:30:00	02:45:00	5391	274.0	3.05	2.19
11	02:45:00	03:00:00	5391	274.0	3.05	2.18
12	03:00:00	03:15:00	5391	274.0	3.05	2.19
13	03:15:00	03:30:00	5391	275.0	3.06	2.19
14	03:30:00	03:45:00	5391	274.0	3.06	2.19
15	03:45:00	04:00:00	5391	275.0	3.06	2.22
16	04:00:00	04:15:00	5391	273.0	3.04	2.17
17	04:15:00	04:30:00	5391	274.0	3.06	2.19
18	04:30:00	04:45:00	5391	273.0	3.05	2.17
19	04:45:00	05:00:00	5391	275.0	3.06	2.19
20	05:00:00	05:15:00	5391	273.0	3.05	2.17
21	05:15:00	05:30:00	5391	273.0	3.04	2.16
22	05:30:00	05:45:00	5391	274.0	3.06	2.18
23	05:45:00	06:00:00	5391	275.0	3.06	2.18
24	06:00:00	06:15:00	5391	274.0	3.05	2.18
25	06:15:00	06:30:00	5391	274.0	3.05	2.19
26	06:30:00	06:45:00	5391	272.0	3.04	2.17
27	06:45:00	07:00:00	5391	275.0	3.07	2.2
28	07:00:00	07:15:00	5391	273.0	3.04	2.17
29	07:15:00	07:30:00	5391	273.0	3.04	2.15
30	07:30:00	07:45:00	5391	273.0	3.05	2.18
31	07:45:00	08:00:00	5391	273.0	3.05	2.18
32	08:00:00	08:15:00	5391	274.0	3.05	2.18
33	08:15:00	08:30:00	5391	272.0	3.03	2.16
34	08:30:00	08:45:00	5391	272.0	3.03	2.17
35	08:45:00	09:00:00	5391	274.0	3.05	2.18
36	09:00:00	09:15:00	5391	273.0	3.04	2.18
37	09:15:00	09:30:00	5391	274.0	3.06	2.19
38	09:30:00	09:45:00	5391	275.0	3.06	2.19
39	09:45:00	10:00:00	5391	273.0	3.05	2.18
40	10:00:00	10:15:00	5391	273.0	3.05	2.19
41	10:15:00	10:30:00	5391	272.0	3.04	2.17
42	10:30:00	10:45:00	5391	274.0	3.05	2.19
43	10:45:00	11:00:00	5391	273.0	3.05	2.18
44	11:00:00	11:15:00	5391	273.0	3.04	2.18
45	11:15:00	11:30:00	5391	273.0	3.05	2.18
46	11:30:00	11:45:00	5391	272.0	3.03	2.16
47	11:45:00	12:00:00	5391	273.0	3.04	2.16
48	12:00:00	12:15:00	5391	274.0	3.06	2.18
49	12:15:00	12:30:00	5391	273.0	3.04	2.16
50	12:30:00	12:45:00	5391	273.0	3.05	2.17
51	12:45:00	13:00:00	5391	274.0	3.06	2.19
52	13:00:00	13:15:00	5391	273.0	3.05	2.18
53	13:15:00	13:30:00	5391	274.0	3.05	2.17
54	13:30:00	13:45:00	5391	273.0	3.04	2.17
55	13:45:00	14:00:00	5391	274.0	3.05	2.19
56	14:00:00	14:15:00	5391	274.0	3.06	2.19
57	14:15:00	14:30:00	5391	273.0	3.04	2.17
58	14:30:00	14:45:00	5391	272.0	3.04	2.17
59	14:45:00	15:00:00	5391	273.0	3.04	2.16
60	15:00:00	15:15:00	5391	272.0	3.04	2.16
61	15:15:00	15:30:00	5391	273.0	3.04	2.17
62	15:30:00	15:45:00	5391	275.0	3.07	2.19
63	15:45:00	16:00:00	5391	272.0	3.03	2.16
64	16:00:00	16:15:00	5391	273.0	3.04	2.17
65	16:15:00	16:30:00	5391	274.0	3.05	2.18
66	16:30:00	16:45:00	5391	273.0	3.04	2.17
67	16:45:00	17:00:00	5391	273.0	3.04	2.17
68	17:00:00	17:15:00	5391	275.0	3.06	2.21
69	17:15:00	17:30:00	5391	274.0	3.06	2.18
70	17:30:00	17:45:00	5391	275.0	3.07	2.2
71	17:45:00	18:00:00	5391	274.0	3.05	2.18
72	18:00:00	18:15:00	5391	273.0	3.04	2.18
73	18:15:00	18:30:00	5391	273.0	3.04	2.18
74	18:30:00	18:45:00	5390	272.0	3.03	2.17
75	18:45:00	19:00:00	5390	273.0	3.05	2.18
76	19:00:00	19:15:00	5390	273.0	3.05	2.17
77	19:15:00	19:30:00	5390	271.0	3.02	2.16
78	19:30:00	19:45:00	5390	272.0	3.03	2.16
79	19:45:00	20:00:00	5390	273.0	3.05	2.18

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)
80	20:00:00	20:15:00	5390	273.0	3.05	2.16
81	20:15:00	20:30:00	5390	275.0	3.07	2.18
82	20:30:00	20:45:00	5390	274.0	3.06	2.18
83	20:45:00	21:00:00	5390	274.0	3.06	2.18
84	21:00:00	21:15:00	5390	272.0	3.04	2.18
85	21:15:00	21:30:00	5390	274.0	3.05	2.17
86	21:30:00	21:45:00	5390	273.0	3.05	2.17
87	21:45:00	22:00:00	5390	272.0	3.03	2.16
88	22:00:00	22:15:00	5390	274.0	3.05	2.18
89	22:15:00	22:30:00	5390	272.0	3.03	2.16
90	22:30:00	22:45:00	5390	272.0	3.03	2.16
91	22:45:00	23:00:00	5390	274.0	3.06	2.19
92	23:00:00	23:15:00	5390	273.0	3.05	2.15
93	23:15:00	23:30:00	5390	275.0	3.07	2.19
94	23:30:00	23:45:00	5390	272.0	3.04	2.16
95	23:45:00	24:00:00	5390	273.0	3.04	2.15
Total	00:00:00	24:00:00	517514	26289.0	3.05	2.18

Table 8. Passenger Vehicle Travel Time

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)
0	00:00:00	00:15:00	5391	272.0	3.04	2.18
1	00:15:00	00:30:00	5391	275.0	3.07	2.18
2	00:30:00	00:45:00	5391	272.0	3.04	2.15
3	00:45:00	01:00:00	5391	273.0	3.05	2.19
4	01:00:00	01:15:00	5391	276.0	3.07	2.2
5	01:15:00	01:30:00	5391	272.0	3.03	2.16
6	01:30:00	01:45:00	5391	271.0	3.02	2.16
7	01:45:00	02:00:00	5391	272.0	3.04	2.17
8	02:00:00	02:15:00	5391	274.0	3.06	2.2
9	02:15:00	02:30:00	5391	275.0	3.07	2.18
10	02:30:00	02:45:00	5391	274.0	3.05	2.19
11	02:45:00	03:00:00	5391	274.0	3.05	2.18
12	03:00:00	03:15:00	5391	274.0	3.05	2.19
13	03:15:00	03:30:00	5391	275.0	3.06	2.19
14	03:30:00	03:45:00	5391	274.0	3.06	2.19
15	03:45:00	04:00:00	5391	275.0	3.06	2.22
16	04:00:00	04:15:00	5391	273.0	3.04	2.17
17	04:15:00	04:30:00	5391	274.0	3.06	2.19
18	04:30:00	04:45:00	5391	273.0	3.05	2.17
19	04:45:00	05:00:00	5391	275.0	3.06	2.19
20	05:00:00	05:15:00	5391	273.0	3.05	2.17
21	05:15:00	05:30:00	5391	273.0	3.04	2.16
22	05:30:00	05:45:00	5391	274.0	3.06	2.18
23	05:45:00	06:00:00	5391	275.0	3.06	2.18
24	06:00:00	06:15:00	5391	274.0	3.05	2.18
25	06:15:00	06:30:00	5391	274.0	3.05	2.19
26	06:30:00	06:45:00	5391	272.0	3.04	2.17
27	06:45:00	07:00:00	5391	275.0	3.07	2.2
28	07:00:00	07:15:00	5391	273.0	3.04	2.17
29	07:15:00	07:30:00	5391	273.0	3.04	2.15
30	07:30:00	07:45:00	5391	273.0	3.05	2.18
31	07:45:00	08:00:00	5391	273.0	3.05	2.18
32	08:00:00	08:15:00	5391	274.0	3.05	2.18
33	08:15:00	08:30:00	5391	272.0	3.03	2.16
34	08:30:00	08:45:00	5391	272.0	3.03	2.17
35	08:45:00	09:00:00	5391	274.0	3.05	2.18
36	09:00:00	09:15:00	5391	273.0	3.04	2.18
37	09:15:00	09:30:00	5391	274.0	3.06	2.19
38	09:30:00	09:45:00	5391	275.0	3.06	2.19
39	09:45:00	10:00:00	5391	273.0	3.05	2.18
40	10:00:00	10:15:00	5391	273.0	3.05	2.19
41	10:15:00	10:30:00	5391	272.0	3.04	2.17
42	10:30:00	10:45:00	5391	274.0	3.05	2.19
43	10:45:00	11:00:00	5391	273.0	3.05	2.18
44	11:00:00	11:15:00	5391	273.0	3.04	2.18
45	11:15:00	11:30:00	5391	273.0	3.05	2.18
46	11:30:00	11:45:00	5391	272.0	3.03	2.16
47	11:45:00	12:00:00	5391	273.0	3.04	2.16
48	12:00:00	12:15:00	5391	274.0	3.06	2.18
49	12:15:00	12:30:00	5391	273.0	3.04	2.16
50	12:30:00	12:45:00	5391	273.0	3.05	2.17
51	12:45:00	13:00:00	5391	274.0	3.06	2.19
52	13:00:00	13:15:00	5391	273.0	3.05	2.18
53	13:15:00	13:30:00	5391	274.0	3.05	2.17
54	13:30:00	13:45:00	5391	273.0	3.04	2.17
55	13:45:00	14:00:00	5391	274.0	3.05	2.19
56	14:00:00	14:15:00	5391	274.0	3.06	2.19
57	14:15:00	14:30:00	5391	273.0	3.04	2.17
58	14:30:00	14:45:00	5391	272.0	3.04	2.17
59	14:45:00	15:00:00	5391	273.0	3.04	2.16
60	15:00:00	15:15:00	5391	272.0	3.04	2.16
61	15:15:00	15:30:00	5391	273.0	3.04	2.17
62	15:30:00	15:45:00	5391	275.0	3.07	2.19
63	15:45:00	16:00:00	5391	272.0	3.03	2.16
64	16:00:00	16:15:00	5391	273.0	3.04	2.17
65	16:15:00	16:30:00	5391	274.0	3.05	2.18
66	16:30:00	16:45:00	5391	273.0	3.04	2.17
67	16:45:00	17:00:00	5391	273.0	3.04	2.17
68	17:00:00	17:15:00	5391	275.0	3.06	2.21
69	17:15:00	17:30:00	5391	274.0	3.06	2.18

Assignment	Start	End	No. Veh.	Total TT (H)	AVG (M)	STD (M)
70	17:30:00	17:45:00	5391	275.0	3.07	2.2
71	17:45:00	18:00:00	5391	274.0	3.05	2.18
72	18:00:00	18:15:00	5391	273.0	3.04	2.18
73	18:15:00	18:30:00	5391	273.0	3.04	2.18
74	18:30:00	18:45:00	5390	272.0	3.03	2.17
75	18:45:00	19:00:00	5390	273.0	3.05	2.18
76	19:00:00	19:15:00	5390	273.0	3.05	2.17
77	19:15:00	19:30:00	5390	271.0	3.02	2.16
78	19:30:00	19:45:00	5390	272.0	3.03	2.16
79	19:45:00	20:00:00	5390	273.0	3.05	2.18
80	20:00:00	20:15:00	5390	273.0	3.05	2.16
81	20:15:00	20:30:00	5390	275.0	3.07	2.18
82	20:30:00	20:45:00	5390	274.0	3.06	2.18
83	20:45:00	21:00:00	5390	274.0	3.06	2.18
84	21:00:00	21:15:00	5390	272.0	3.04	2.18
85	21:15:00	21:30:00	5390	274.0	3.05	2.17
86	21:30:00	21:45:00	5390	273.0	3.05	2.17
87	21:45:00	22:00:00	5390	272.0	3.03	2.16
88	22:00:00	22:15:00	5390	274.0	3.05	2.18
89	22:15:00	22:30:00	5390	272.0	3.03	2.16
90	22:30:00	22:45:00	5390	272.0	3.03	2.16
91	22:45:00	23:00:00	5390	274.0	3.06	2.19
92	23:00:00	23:15:00	5390	273.0	3.05	2.15
93	23:15:00	23:30:00	5390	275.0	3.07	2.19
94	23:30:00	23:45:00	5390	272.0	3.04	2.16
95	23:45:00	24:00:00	5390	273.0	3.04	2.15
Total	00:00:00	24:00:00	517514	26289.0	3.05	2.18

5. Delay Information (Entered Vehicles)

Table 9. All Type Vehicles Delay

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
0	00:00:00	00:15:00	5391	0.11	0.18
1	00:15:00	00:30:00	5391	0.14	0.25
2	00:30:00	00:45:00	5391	0.09	0.14
3	00:45:00	01:00:00	5391	0.12	0.2
4	01:00:00	01:15:00	5391	0.15	0.26
5	01:15:00	01:30:00	5391	0.11	0.15
6	01:30:00	01:45:00	5391	0.09	0.12
7	01:45:00	02:00:00	5391	0.1	0.14
8	02:00:00	02:15:00	5391	0.13	0.23
9	02:15:00	02:30:00	5391	0.13	0.22
10	02:30:00	02:45:00	5391	0.13	0.21
11	02:45:00	03:00:00	5391	0.11	0.18
12	03:00:00	03:15:00	5391	0.12	0.2
13	03:15:00	03:30:00	5391	0.13	0.21
14	03:30:00	03:45:00	5391	0.13	0.2
15	03:45:00	04:00:00	5391	0.13	0.27
16	04:00:00	04:15:00	5391	0.11	0.17
17	04:15:00	04:30:00	5391	0.13	0.23
18	04:30:00	04:45:00	5391	0.11	0.19
19	04:45:00	05:00:00	5391	0.13	0.2
20	05:00:00	05:15:00	5391	0.12	0.17
21	05:15:00	05:30:00	5391	0.1	0.15
22	05:30:00	05:45:00	5391	0.13	0.23
23	05:45:00	06:00:00	5391	0.13	0.21
24	06:00:00	06:15:00	5391	0.12	0.17
25	06:15:00	06:30:00	5391	0.13	0.21
26	06:30:00	06:45:00	5391	0.1	0.15
27	06:45:00	07:00:00	5391	0.14	0.26
28	07:00:00	07:15:00	5391	0.11	0.16
29	07:15:00	07:30:00	5391	0.1	0.17
30	07:30:00	07:45:00	5391	0.11	0.17
31	07:45:00	08:00:00	5391	0.12	0.18
32	08:00:00	08:15:00	5391	0.12	0.2
33	08:15:00	08:30:00	5391	0.1	0.16
34	08:30:00	08:45:00	5391	0.11	0.16
35	08:45:00	09:00:00	5391	0.12	0.2
36	09:00:00	09:15:00	5391	0.11	0.17
37	09:15:00	09:30:00	5391	0.13	0.2
38	09:30:00	09:45:00	5391	0.13	0.2
39	09:45:00	10:00:00	5391	0.12	0.18
40	10:00:00	10:15:00	5391	0.12	0.2
41	10:15:00	10:30:00	5391	0.11	0.16
42	10:30:00	10:45:00	5391	0.12	0.2
43	10:45:00	11:00:00	5391	0.12	0.18
44	11:00:00	11:15:00	5391	0.11	0.17
45	11:15:00	11:30:00	5391	0.11	0.17
46	11:30:00	11:45:00	5391	0.1	0.13
47	11:45:00	12:00:00	5391	0.11	0.16
48	12:00:00	12:15:00	5391	0.12	0.19
49	12:15:00	12:30:00	5391	0.11	0.16
50	12:30:00	12:45:00	5391	0.11	0.17
51	12:45:00	13:00:00	5391	0.13	0.2
52	13:00:00	13:15:00	5391	0.11	0.17
53	13:15:00	13:30:00	5391	0.12	0.19
54	13:30:00	13:45:00	5391	0.11	0.15

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
55	13:45:00	14:00:00	5391	0.12	0.2
56	14:00:00	14:15:00	5391	0.13	0.2
57	14:15:00	14:30:00	5391	0.11	0.16
58	14:30:00	14:45:00	5391	0.11	0.15
59	14:45:00	15:00:00	5391	0.11	0.17
60	15:00:00	15:15:00	5391	0.1	0.15
61	15:15:00	15:30:00	5391	0.12	0.18
62	15:30:00	15:45:00	5391	0.14	0.23
63	15:45:00	16:00:00	5391	0.1	0.14
64	16:00:00	16:15:00	5391	0.11	0.16
65	16:15:00	16:30:00	5391	0.13	0.2
66	16:30:00	16:45:00	5391	0.1	0.15
67	16:45:00	17:00:00	5391	0.12	0.17
68	17:00:00	17:15:00	5391	0.14	0.25
69	17:15:00	17:30:00	5391	0.13	0.21
70	17:30:00	17:45:00	5391	0.15	0.24
71	17:45:00	18:00:00	5391	0.12	0.19
72	18:00:00	18:15:00	5391	0.12	0.18
73	18:15:00	18:30:00	5391	0.12	0.19
74	18:30:00	18:45:00	5390	0.1	0.16
75	18:45:00	19:00:00	5390	0.12	0.18
76	19:00:00	19:15:00	5390	0.11	0.16
77	19:15:00	19:30:00	5390	0.09	0.11
78	19:30:00	19:45:00	5390	0.1	0.13
79	19:45:00	20:00:00	5390	0.11	0.18
80	20:00:00	20:15:00	5390	0.11	0.18
81	20:15:00	20:30:00	5390	0.13	0.22
82	20:30:00	20:45:00	5390	0.13	0.2
83	20:45:00	21:00:00	5390	0.12	0.19
84	21:00:00	21:15:00	5390	0.11	0.16
85	21:15:00	21:30:00	5390	0.12	0.17
86	21:30:00	21:45:00	5390	0.12	0.18
87	21:45:00	22:00:00	5390	0.1	0.13
88	22:00:00	22:15:00	5390	0.12	0.19
89	22:15:00	22:30:00	5390	0.1	0.15
90	22:30:00	22:45:00	5390	0.1	0.14
91	22:45:00	23:00:00	5390	0.13	0.23
92	23:00:00	23:15:00	5390	0.12	0.19
93	23:15:00	23:30:00	5390	0.13	0.22
94	23:30:00	23:45:00	5390	0.1	0.15
95	23:45:00	24:00:00	5390	0.11	0.17
Total	00:00:00	24:00:00	517514	0.12	0.19

Table 10. Passenger Vehicle Delay

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
0	00:00:00	00:15:00	5391	0.11	0.18
1	00:15:00	00:30:00	5391	0.14	0.25
2	00:30:00	00:45:00	5391	0.09	0.14
3	00:45:00	01:00:00	5391	0.12	0.2
4	01:00:00	01:15:00	5391	0.15	0.26
5	01:15:00	01:30:00	5391	0.11	0.15
6	01:30:00	01:45:00	5391	0.09	0.12
7	01:45:00	02:00:00	5391	0.1	0.14
8	02:00:00	02:15:00	5391	0.13	0.23
9	02:15:00	02:30:00	5391	0.13	0.22
10	02:30:00	02:45:00	5391	0.13	0.21
11	02:45:00	03:00:00	5391	0.11	0.18
12	03:00:00	03:15:00	5391	0.12	0.2
13	03:15:00	03:30:00	5391	0.13	0.21
14	03:30:00	03:45:00	5391	0.13	0.2
15	03:45:00	04:00:00	5391	0.13	0.27
16	04:00:00	04:15:00	5391	0.11	0.17
17	04:15:00	04:30:00	5391	0.13	0.23
18	04:30:00	04:45:00	5391	0.11	0.19
19	04:45:00	05:00:00	5391	0.13	0.2
20	05:00:00	05:15:00	5391	0.12	0.17
21	05:15:00	05:30:00	5391	0.1	0.15
22	05:30:00	05:45:00	5391	0.13	0.23
23	05:45:00	06:00:00	5391	0.13	0.21
24	06:00:00	06:15:00	5391	0.12	0.17
25	06:15:00	06:30:00	5391	0.13	0.21
26	06:30:00	06:45:00	5391	0.1	0.15
27	06:45:00	07:00:00	5391	0.14	0.26
28	07:00:00	07:15:00	5391	0.11	0.16
29	07:15:00	07:30:00	5391	0.1	0.17
30	07:30:00	07:45:00	5391	0.11	0.17
31	07:45:00	08:00:00	5391	0.12	0.18
32	08:00:00	08:15:00	5391	0.12	0.2
33	08:15:00	08:30:00	5391	0.1	0.16
34	08:30:00	08:45:00	5391	0.11	0.16
35	08:45:00	09:00:00	5391	0.12	0.2
36	09:00:00	09:15:00	5391	0.11	0.17
37	09:15:00	09:30:00	5391	0.13	0.2
38	09:30:00	09:45:00	5391	0.13	0.2
39	09:45:00	10:00:00	5391	0.12	0.18
40	10:00:00	10:15:00	5391	0.12	0.2
41	10:15:00	10:30:00	5391	0.11	0.16
42	10:30:00	10:45:00	5391	0.12	0.2
43	10:45:00	11:00:00	5391	0.12	0.18
44	11:00:00	11:15:00	5391	0.11	0.17

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
45	11:15:00	11:30:00	5391	0.11	0.17
46	11:30:00	11:45:00	5391	0.1	0.13
47	11:45:00	12:00:00	5391	0.11	0.16
48	12:00:00	12:15:00	5391	0.12	0.19
49	12:15:00	12:30:00	5391	0.11	0.16
50	12:30:00	12:45:00	5391	0.11	0.17
51	12:45:00	13:00:00	5391	0.13	0.2
52	13:00:00	13:15:00	5391	0.11	0.17
53	13:15:00	13:30:00	5391	0.12	0.19
54	13:30:00	13:45:00	5391	0.11	0.15
55	13:45:00	14:00:00	5391	0.12	0.2
56	14:00:00	14:15:00	5391	0.13	0.2
57	14:15:00	14:30:00	5391	0.11	0.16
58	14:30:00	14:45:00	5391	0.11	0.15
59	14:45:00	15:00:00	5391	0.11	0.17
60	15:00:00	15:15:00	5391	0.1	0.15
61	15:15:00	15:30:00	5391	0.12	0.18
62	15:30:00	15:45:00	5391	0.14	0.23
63	15:45:00	16:00:00	5391	0.1	0.14
64	16:00:00	16:15:00	5391	0.11	0.16
65	16:15:00	16:30:00	5391	0.13	0.2
66	16:30:00	16:45:00	5391	0.1	0.15
67	16:45:00	17:00:00	5391	0.12	0.17
68	17:00:00	17:15:00	5391	0.14	0.25
69	17:15:00	17:30:00	5391	0.13	0.21
70	17:30:00	17:45:00	5391	0.15	0.24
71	17:45:00	18:00:00	5391	0.12	0.19
72	18:00:00	18:15:00	5391	0.12	0.18
73	18:15:00	18:30:00	5391	0.12	0.19
74	18:30:00	18:45:00	5390	0.1	0.16
75	18:45:00	19:00:00	5390	0.12	0.18
76	19:00:00	19:15:00	5390	0.11	0.16
77	19:15:00	19:30:00	5390	0.09	0.11
78	19:30:00	19:45:00	5390	0.1	0.13
79	19:45:00	20:00:00	5390	0.11	0.18
80	20:00:00	20:15:00	5390	0.11	0.18
81	20:15:00	20:30:00	5390	0.13	0.22
82	20:30:00	20:45:00	5390	0.13	0.2
83	20:45:00	21:00:00	5390	0.12	0.19
84	21:00:00	21:15:00	5390	0.11	0.16
85	21:15:00	21:30:00	5390	0.12	0.17
86	21:30:00	21:45:00	5390	0.12	0.18
87	21:45:00	22:00:00	5390	0.1	0.13
88	22:00:00	22:15:00	5390	0.12	0.19
89	22:15:00	22:30:00	5390	0.1	0.15
90	22:30:00	22:45:00	5390	0.1	0.14
91	22:45:00	23:00:00	5390	0.13	0.23
92	23:00:00	23:15:00	5390	0.12	0.19
93	23:15:00	23:30:00	5390	0.13	0.22
94	23:30:00	23:45:00	5390	0.1	0.15
95	23:45:00	24:00:00	5390	0.11	0.17
Total	00:00:00	24:00:00	517514	0.12	0.19

6. Delay Information (Through Vehicles)

Table 11. All Type Vehicles Delay

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
0	00:00:00	00:15:00	5391	0.11	0.18
1	00:15:00	00:30:00	5391	0.14	0.25
2	00:30:00	00:45:00	5391	0.09	0.14
3	00:45:00	01:00:00	5391	0.12	0.2
4	01:00:00	01:15:00	5391	0.15	0.26
5	01:15:00	01:30:00	5391	0.11	0.15
6	01:30:00	01:45:00	5391	0.09	0.12
7	01:45:00	02:00:00	5391	0.1	0.14
8	02:00:00	02:15:00	5391	0.13	0.23
9	02:15:00	02:30:00	5391	0.13	0.22
10	02:30:00	02:45:00	5391	0.13	0.21
11	02:45:00	03:00:00	5391	0.11	0.18
12	03:00:00	03:15:00	5391	0.12	0.2
13	03:15:00	03:30:00	5391	0.13	0.21
14	03:30:00	03:45:00	5391	0.13	0.2
15	03:45:00	04:00:00	5391	0.13	0.27
16	04:00:00	04:15:00	5391	0.11	0.17
17	04:15:00	04:30:00	5391	0.13	0.23
18	04:30:00	04:45:00	5391	0.11	0.19
19	04:45:00	05:00:00	5391	0.13	0.2
20	05:00:00	05:15:00	5391	0.12	0.17
21	05:15:00	05:30:00	5391	0.1	0.15
22	05:30:00	05:45:00	5391	0.13	0.23
23	05:45:00	06:00:00	5391	0.13	0.21
24	06:00:00	06:15:00	5391	0.12	0.17
25	06:15:00	06:30:00	5391	0.13	0.21
26	06:30:00	06:45:00	5391	0.1	0.15
27	06:45:00	07:00:00	5391	0.14	0.26
28	07:00:00	07:15:00	5391	0.11	0.16
29	07:15:00	07:30:00	5391	0.1	0.17

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
30	07:30:00	07:45:00	5391	0.11	0.17
31	07:45:00	08:00:00	5391	0.12	0.18
32	08:00:00	08:15:00	5391	0.12	0.2
33	08:15:00	08:30:00	5391	0.1	0.16
34	08:30:00	08:45:00	5391	0.11	0.16
35	08:45:00	09:00:00	5391	0.12	0.2
36	09:00:00	09:15:00	5391	0.11	0.17
37	09:15:00	09:30:00	5391	0.13	0.2
38	09:30:00	09:45:00	5391	0.13	0.2
39	09:45:00	10:00:00	5391	0.12	0.18
40	10:00:00	10:15:00	5391	0.12	0.2
41	10:15:00	10:30:00	5391	0.11	0.16
42	10:30:00	10:45:00	5391	0.12	0.2
43	10:45:00	11:00:00	5391	0.12	0.18
44	11:00:00	11:15:00	5391	0.11	0.17
45	11:15:00	11:30:00	5391	0.11	0.17
46	11:30:00	11:45:00	5391	0.1	0.13
47	11:45:00	12:00:00	5391	0.11	0.16
48	12:00:00	12:15:00	5391	0.12	0.19
49	12:15:00	12:30:00	5391	0.11	0.16
50	12:30:00	12:45:00	5391	0.11	0.17
51	12:45:00	13:00:00	5391	0.13	0.2
52	13:00:00	13:15:00	5391	0.11	0.17
53	13:15:00	13:30:00	5391	0.12	0.19
54	13:30:00	13:45:00	5391	0.11	0.15
55	13:45:00	14:00:00	5391	0.12	0.2
56	14:00:00	14:15:00	5391	0.13	0.2
57	14:15:00	14:30:00	5391	0.11	0.16
58	14:30:00	14:45:00	5391	0.11	0.15
59	14:45:00	15:00:00	5391	0.11	0.17
60	15:00:00	15:15:00	5391	0.1	0.15
61	15:15:00	15:30:00	5391	0.12	0.18
62	15:30:00	15:45:00	5391	0.14	0.23
63	15:45:00	16:00:00	5391	0.1	0.14
64	16:00:00	16:15:00	5391	0.11	0.16
65	16:15:00	16:30:00	5391	0.13	0.2
66	16:30:00	16:45:00	5391	0.1	0.15
67	16:45:00	17:00:00	5391	0.12	0.17
68	17:00:00	17:15:00	5391	0.14	0.25
69	17:15:00	17:30:00	5391	0.13	0.21
70	17:30:00	17:45:00	5391	0.15	0.24
71	17:45:00	18:00:00	5391	0.12	0.19
72	18:00:00	18:15:00	5391	0.12	0.18
73	18:15:00	18:30:00	5391	0.12	0.19
74	18:30:00	18:45:00	5390	0.1	0.16
75	18:45:00	19:00:00	5390	0.12	0.18
76	19:00:00	19:15:00	5390	0.11	0.16
77	19:15:00	19:30:00	5390	0.09	0.11
78	19:30:00	19:45:00	5390	0.1	0.13
79	19:45:00	20:00:00	5390	0.11	0.18
80	20:00:00	20:15:00	5390	0.11	0.18
81	20:15:00	20:30:00	5390	0.13	0.22
82	20:30:00	20:45:00	5390	0.13	0.2
83	20:45:00	21:00:00	5390	0.12	0.19
84	21:00:00	21:15:00	5390	0.11	0.16
85	21:15:00	21:30:00	5390	0.12	0.17
86	21:30:00	21:45:00	5390	0.12	0.18
87	21:45:00	22:00:00	5390	0.1	0.13
88	22:00:00	22:15:00	5390	0.12	0.19
89	22:15:00	22:30:00	5390	0.1	0.15
90	22:30:00	22:45:00	5390	0.1	0.14
91	22:45:00	23:00:00	5390	0.13	0.23
92	23:00:00	23:15:00	5390	0.12	0.19
93	23:15:00	23:30:00	5390	0.13	0.22
94	23:30:00	23:45:00	5390	0.1	0.15
95	23:45:00	24:00:00	5390	0.11	0.17
Total	00:00:00	24:00:00	517514	0.12	0.19

Table 12. Passenger Vehicle Delay

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
0	00:00:00	00:15:00	5391	0.11	0.18
1	00:15:00	00:30:00	5391	0.14	0.25
2	00:30:00	00:45:00	5391	0.09	0.14
3	00:45:00	01:00:00	5391	0.12	0.2
4	01:00:00	01:15:00	5391	0.15	0.26
5	01:15:00	01:30:00	5391	0.11	0.15
6	01:30:00	01:45:00	5391	0.09	0.12
7	01:45:00	02:00:00	5391	0.1	0.14
8	02:00:00	02:15:00	5391	0.13	0.23
9	02:15:00	02:30:00	5391	0.13	0.22
10	02:30:00	02:45:00	5391	0.13	0.21
11	02:45:00	03:00:00	5391	0.11	0.18
12	03:00:00	03:15:00	5391	0.12	0.2
13	03:15:00	03:30:00	5391	0.13	0.21
14	03:30:00	03:45:00	5391	0.13	0.2
15	03:45:00	04:00:00	5391	0.13	0.27
16	04:00:00	04:15:00	5391	0.11	0.17
17	04:15:00	04:30:00	5391	0.13	0.23
18	04:30:00	04:45:00	5391	0.11	0.19
19	04:45:00	05:00:00	5391	0.13	0.2

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
20	05:00:00	05:15:00	5391	0.12	0.17
21	05:15:00	05:30:00	5391	0.1	0.15
22	05:30:00	05:45:00	5391	0.13	0.23
23	05:45:00	06:00:00	5391	0.13	0.21
24	06:00:00	06:15:00	5391	0.12	0.17
25	06:15:00	06:30:00	5391	0.13	0.21
26	06:30:00	06:45:00	5391	0.1	0.15
27	06:45:00	07:00:00	5391	0.14	0.26
28	07:00:00	07:15:00	5391	0.11	0.16
29	07:15:00	07:30:00	5391	0.1	0.17
30	07:30:00	07:45:00	5391	0.11	0.17
31	07:45:00	08:00:00	5391	0.12	0.18
32	08:00:00	08:15:00	5391	0.12	0.2
33	08:15:00	08:30:00	5391	0.1	0.16
34	08:30:00	08:45:00	5391	0.11	0.16
35	08:45:00	09:00:00	5391	0.12	0.2
36	09:00:00	09:15:00	5391	0.11	0.17
37	09:15:00	09:30:00	5391	0.13	0.2
38	09:30:00	09:45:00	5391	0.13	0.2
39	09:45:00	10:00:00	5391	0.12	0.18
40	10:00:00	10:15:00	5391	0.12	0.2
41	10:15:00	10:30:00	5391	0.11	0.16
42	10:30:00	10:45:00	5391	0.12	0.2
43	10:45:00	11:00:00	5391	0.12	0.18
44	11:00:00	11:15:00	5391	0.11	0.17
45	11:15:00	11:30:00	5391	0.11	0.17
46	11:30:00	11:45:00	5391	0.1	0.13
47	11:45:00	12:00:00	5391	0.11	0.16
48	12:00:00	12:15:00	5391	0.12	0.19
49	12:15:00	12:30:00	5391	0.11	0.16
50	12:30:00	12:45:00	5391	0.11	0.17
51	12:45:00	13:00:00	5391	0.13	0.2
52	13:00:00	13:15:00	5391	0.11	0.17
53	13:15:00	13:30:00	5391	0.12	0.19
54	13:30:00	13:45:00	5391	0.11	0.15
55	13:45:00	14:00:00	5391	0.12	0.2
56	14:00:00	14:15:00	5391	0.13	0.2
57	14:15:00	14:30:00	5391	0.11	0.16
58	14:30:00	14:45:00	5391	0.11	0.15
59	14:45:00	15:00:00	5391	0.11	0.17
60	15:00:00	15:15:00	5391	0.1	0.15
61	15:15:00	15:30:00	5391	0.12	0.18
62	15:30:00	15:45:00	5391	0.14	0.23
63	15:45:00	16:00:00	5391	0.1	0.14
64	16:00:00	16:15:00	5391	0.11	0.16
65	16:15:00	16:30:00	5391	0.13	0.2
66	16:30:00	16:45:00	5391	0.1	0.15
67	16:45:00	17:00:00	5391	0.12	0.17
68	17:00:00	17:15:00	5391	0.14	0.25
69	17:15:00	17:30:00	5391	0.13	0.21
70	17:30:00	17:45:00	5391	0.15	0.24
71	17:45:00	18:00:00	5391	0.12	0.19
72	18:00:00	18:15:00	5391	0.12	0.18
73	18:15:00	18:30:00	5391	0.12	0.19
74	18:30:00	18:45:00	5390	0.1	0.16
75	18:45:00	19:00:00	5390	0.12	0.18
76	19:00:00	19:15:00	5390	0.11	0.16
77	19:15:00	19:30:00	5390	0.09	0.11
78	19:30:00	19:45:00	5390	0.1	0.13
79	19:45:00	20:00:00	5390	0.11	0.18
80	20:00:00	20:15:00	5390	0.11	0.18
81	20:15:00	20:30:00	5390	0.13	0.22
82	20:30:00	20:45:00	5390	0.13	0.2
83	20:45:00	21:00:00	5390	0.12	0.19
84	21:00:00	21:15:00	5390	0.11	0.16
85	21:15:00	21:30:00	5390	0.12	0.17
86	21:30:00	21:45:00	5390	0.12	0.18
87	21:45:00	22:00:00	5390	0.1	0.13
88	22:00:00	22:15:00	5390	0.12	0.19
89	22:15:00	22:30:00	5390	0.1	0.15
90	22:30:00	22:45:00	5390	0.1	0.14
91	22:45:00	23:00:00	5390	0.13	0.23
92	23:00:00	23:15:00	5390	0.12	0.19
93	23:15:00	23:30:00	5390	0.13	0.22
94	23:30:00	23:45:00	5390	0.1	0.15
95	23:45:00	24:00:00	5390	0.11	0.17
Total	00:00:00	24:00:00	517514	0.12	0.19

7. Delay Information (Loaded Vehicles)

Table 13. All Type Vehicles Delay

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
0	00:00:00	00:15:00	5391	0.11	0.18
1	00:15:00	00:30:00	5391	0.14	0.25
2	00:30:00	00:45:00	5391	0.09	0.14
3	00:45:00	01:00:00	5391	0.12	0.2
4	01:00:00	01:15:00	5391	0.15	0.26

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
5	01:15:00	01:30:00	5391	0.11	0.15
6	01:30:00	01:45:00	5391	0.09	0.12
7	01:45:00	02:00:00	5391	0.1	0.14
8	02:00:00	02:15:00	5391	0.13	0.23
9	02:15:00	02:30:00	5391	0.13	0.22
10	02:30:00	02:45:00	5391	0.13	0.21
11	02:45:00	03:00:00	5391	0.11	0.18
12	03:00:00	03:15:00	5391	0.12	0.2
13	03:15:00	03:30:00	5391	0.13	0.21
14	03:30:00	03:45:00	5391	0.13	0.2
15	03:45:00	04:00:00	5391	0.13	0.27
16	04:00:00	04:15:00	5391	0.11	0.17
17	04:15:00	04:30:00	5391	0.13	0.23
18	04:30:00	04:45:00	5391	0.11	0.19
19	04:45:00	05:00:00	5391	0.13	0.2
20	05:00:00	05:15:00	5391	0.12	0.17
21	05:15:00	05:30:00	5391	0.1	0.15
22	05:30:00	05:45:00	5391	0.13	0.23
23	05:45:00	06:00:00	5391	0.13	0.21
24	06:00:00	06:15:00	5391	0.12	0.17
25	06:15:00	06:30:00	5391	0.13	0.21
26	06:30:00	06:45:00	5391	0.1	0.15
27	06:45:00	07:00:00	5391	0.14	0.26
28	07:00:00	07:15:00	5391	0.11	0.16
29	07:15:00	07:30:00	5391	0.1	0.17
30	07:30:00	07:45:00	5391	0.11	0.17
31	07:45:00	08:00:00	5391	0.12	0.18
32	08:00:00	08:15:00	5391	0.12	0.2
33	08:15:00	08:30:00	5391	0.1	0.16
34	08:30:00	08:45:00	5391	0.11	0.16
35	08:45:00	09:00:00	5391	0.12	0.2
36	09:00:00	09:15:00	5391	0.11	0.17
37	09:15:00	09:30:00	5391	0.13	0.2
38	09:30:00	09:45:00	5391	0.13	0.2
39	09:45:00	10:00:00	5391	0.12	0.18
40	10:00:00	10:15:00	5391	0.12	0.2
41	10:15:00	10:30:00	5391	0.11	0.16
42	10:30:00	10:45:00	5391	0.12	0.2
43	10:45:00	11:00:00	5391	0.12	0.18
44	11:00:00	11:15:00	5391	0.11	0.17
45	11:15:00	11:30:00	5391	0.11	0.17
46	11:30:00	11:45:00	5391	0.1	0.13
47	11:45:00	12:00:00	5391	0.11	0.16
48	12:00:00	12:15:00	5391	0.12	0.19
49	12:15:00	12:30:00	5391	0.11	0.16
50	12:30:00	12:45:00	5391	0.11	0.17
51	12:45:00	13:00:00	5391	0.13	0.2
52	13:00:00	13:15:00	5391	0.11	0.17
53	13:15:00	13:30:00	5391	0.12	0.19
54	13:30:00	13:45:00	5391	0.11	0.15
55	13:45:00	14:00:00	5391	0.12	0.2
56	14:00:00	14:15:00	5391	0.13	0.2
57	14:15:00	14:30:00	5391	0.11	0.16
58	14:30:00	14:45:00	5391	0.11	0.15
59	14:45:00	15:00:00	5391	0.11	0.17
60	15:00:00	15:15:00	5391	0.1	0.15
61	15:15:00	15:30:00	5391	0.12	0.18
62	15:30:00	15:45:00	5391	0.14	0.23
63	15:45:00	16:00:00	5391	0.1	0.14
64	16:00:00	16:15:00	5391	0.11	0.16
65	16:15:00	16:30:00	5391	0.13	0.2
66	16:30:00	16:45:00	5391	0.1	0.15
67	16:45:00	17:00:00	5391	0.12	0.17
68	17:00:00	17:15:00	5391	0.14	0.25
69	17:15:00	17:30:00	5391	0.13	0.21
70	17:30:00	17:45:00	5391	0.15	0.24
71	17:45:00	18:00:00	5391	0.12	0.19
72	18:00:00	18:15:00	5391	0.12	0.18
73	18:15:00	18:30:00	5391	0.12	0.19
74	18:30:00	18:45:00	5390	0.1	0.16
75	18:45:00	19:00:00	5390	0.12	0.18
76	19:00:00	19:15:00	5390	0.11	0.16
77	19:15:00	19:30:00	5390	0.09	0.11
78	19:30:00	19:45:00	5390	0.1	0.13
79	19:45:00	20:00:00	5390	0.11	0.18
80	20:00:00	20:15:00	5390	0.11	0.18
81	20:15:00	20:30:00	5390	0.13	0.22
82	20:30:00	20:45:00	5390	0.13	0.2
83	20:45:00	21:00:00	5390	0.12	0.19
84	21:00:00	21:15:00	5390	0.11	0.16
85	21:15:00	21:30:00	5390	0.12	0.17
86	21:30:00	21:45:00	5390	0.12	0.18
87	21:45:00	22:00:00	5390	0.1	0.13
88	22:00:00	22:15:00	5390	0.12	0.19
89	22:15:00	22:30:00	5390	0.1	0.15
90	22:30:00	22:45:00	5390	0.1	0.14
91	22:45:00	23:00:00	5390	0.13	0.23
92	23:00:00	23:15:00	5390	0.12	0.19
93	23:15:00	23:30:00	5390	0.13	0.22
94	23:30:00	23:45:00	5390	0.1	0.15
95	23:45:00	24:00:00	5390	0.11	0.17

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
Total	00:00:00	24:00:00	517514	0.12	0.19

Table 14. Passenger Vehicle Delay

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
0	00:00:00	00:15:00	5391	0.11	0.18
1	00:15:00	00:30:00	5391	0.14	0.25
2	00:30:00	00:45:00	5391	0.09	0.14
3	00:45:00	01:00:00	5391	0.12	0.2
4	01:00:00	01:15:00	5391	0.15	0.26
5	01:15:00	01:30:00	5391	0.11	0.15
6	01:30:00	01:45:00	5391	0.09	0.12
7	01:45:00	02:00:00	5391	0.1	0.14
8	02:00:00	02:15:00	5391	0.13	0.23
9	02:15:00	02:30:00	5391	0.13	0.22
10	02:30:00	02:45:00	5391	0.13	0.21
11	02:45:00	03:00:00	5391	0.11	0.18
12	03:00:00	03:15:00	5391	0.12	0.2
13	03:15:00	03:30:00	5391	0.13	0.21
14	03:30:00	03:45:00	5391	0.13	0.2
15	03:45:00	04:00:00	5391	0.13	0.27
16	04:00:00	04:15:00	5391	0.11	0.17
17	04:15:00	04:30:00	5391	0.13	0.23
18	04:30:00	04:45:00	5391	0.11	0.19
19	04:45:00	05:00:00	5391	0.13	0.2
20	05:00:00	05:15:00	5391	0.12	0.17
21	05:15:00	05:30:00	5391	0.1	0.15
22	05:30:00	05:45:00	5391	0.13	0.23
23	05:45:00	06:00:00	5391	0.13	0.21
24	06:00:00	06:15:00	5391	0.12	0.17
25	06:15:00	06:30:00	5391	0.13	0.21
26	06:30:00	06:45:00	5391	0.1	0.15
27	06:45:00	07:00:00	5391	0.14	0.26
28	07:00:00	07:15:00	5391	0.11	0.16
29	07:15:00	07:30:00	5391	0.1	0.17
30	07:30:00	07:45:00	5391	0.11	0.17
31	07:45:00	08:00:00	5391	0.12	0.18
32	08:00:00	08:15:00	5391	0.12	0.2
33	08:15:00	08:30:00	5391	0.1	0.16
34	08:30:00	08:45:00	5391	0.11	0.16
35	08:45:00	09:00:00	5391	0.12	0.2
36	09:00:00	09:15:00	5391	0.11	0.17
37	09:15:00	09:30:00	5391	0.13	0.2
38	09:30:00	09:45:00	5391	0.13	0.2
39	09:45:00	10:00:00	5391	0.12	0.18
40	10:00:00	10:15:00	5391	0.12	0.2
41	10:15:00	10:30:00	5391	0.11	0.16
42	10:30:00	10:45:00	5391	0.12	0.2
43	10:45:00	11:00:00	5391	0.12	0.18
44	11:00:00	11:15:00	5391	0.11	0.17
45	11:15:00	11:30:00	5391	0.11	0.17
46	11:30:00	11:45:00	5391	0.1	0.13
47	11:45:00	12:00:00	5391	0.11	0.16
48	12:00:00	12:15:00	5391	0.12	0.19
49	12:15:00	12:30:00	5391	0.11	0.16
50	12:30:00	12:45:00	5391	0.11	0.17
51	12:45:00	13:00:00	5391	0.13	0.2
52	13:00:00	13:15:00	5391	0.11	0.17
53	13:15:00	13:30:00	5391	0.12	0.19
54	13:30:00	13:45:00	5391	0.11	0.15
55	13:45:00	14:00:00	5391	0.12	0.2
56	14:00:00	14:15:00	5391	0.13	0.2
57	14:15:00	14:30:00	5391	0.11	0.16
58	14:30:00	14:45:00	5391	0.11	0.15
59	14:45:00	15:00:00	5391	0.11	0.17
60	15:00:00	15:15:00	5391	0.1	0.15
61	15:15:00	15:30:00	5391	0.12	0.18
62	15:30:00	15:45:00	5391	0.14	0.23
63	15:45:00	16:00:00	5391	0.1	0.14
64	16:00:00	16:15:00	5391	0.11	0.16
65	16:15:00	16:30:00	5391	0.13	0.2
66	16:30:00	16:45:00	5391	0.1	0.15
67	16:45:00	17:00:00	5391	0.12	0.17
68	17:00:00	17:15:00	5391	0.14	0.25
69	17:15:00	17:30:00	5391	0.13	0.21
70	17:30:00	17:45:00	5391	0.15	0.24
71	17:45:00	18:00:00	5391	0.12	0.19
72	18:00:00	18:15:00	5391	0.12	0.18
73	18:15:00	18:30:00	5391	0.12	0.19
74	18:30:00	18:45:00	5390	0.1	0.16
75	18:45:00	19:00:00	5390	0.12	0.18
76	19:00:00	19:15:00	5390	0.11	0.16
77	19:15:00	19:30:00	5390	0.09	0.11
78	19:30:00	19:45:00	5390	0.1	0.13
79	19:45:00	20:00:00	5390	0.11	0.18
80	20:00:00	20:15:00	5390	0.11	0.18
81	20:15:00	20:30:00	5390	0.13	0.22
82	20:30:00	20:45:00	5390	0.13	0.2
83	20:45:00	21:00:00	5390	0.12	0.19
84	21:00:00	21:15:00	5390	0.11	0.16
85	21:15:00	21:30:00	5390	0.12	0.17

Assignment	Starting Time	Ending Time	Vehicle Count	AVG Delay (M/Veh)	Delay STD (M)
86	21:30:00	21:45:00	5390	0.12	0.18
87	21:45:00	22:00:00	5390	0.1	0.13
88	22:00:00	22:15:00	5390	0.12	0.19
89	22:15:00	22:30:00	5390	0.1	0.15
90	22:30:00	22:45:00	5390	0.1	0.14
91	22:45:00	23:00:00	5390	0.13	0.23
92	23:00:00	23:15:00	5390	0.12	0.19
93	23:15:00	23:30:00	5390	0.13	0.22
94	23:30:00	23:45:00	5390	0.1	0.15
95	23:45:00	24:00:00	5390	0.11	0.17
Total	00:00:00	24:00:00	517514	0.12	0.19

8. Distribution Graph

Figure 1. Passenger Vehicle Travel Time Categories in network nicosia_base

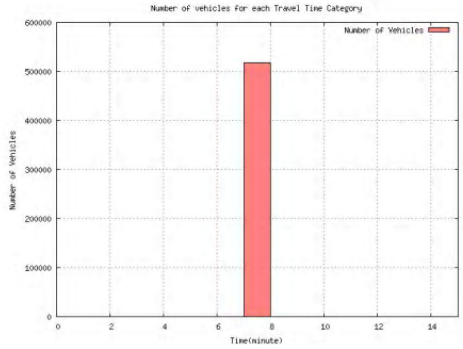


Table 15.

Time (Minute)	0 ~ 15
No. Vehicles	517514

Figure 2. Passenger Vehicle Departure Time Distribution in network nicosia_base

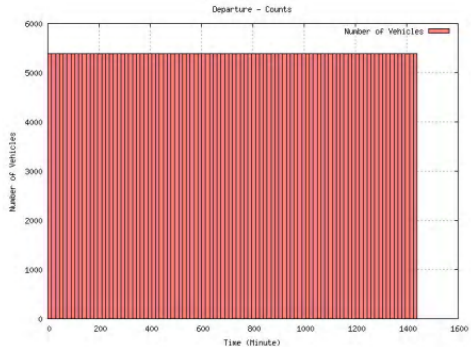


Table 16.

Start (M)	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390	405	420	435
End (M)	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345	360	375	390	405	420	435	450
No. Vehicles	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391	5391

Figure 3. Passenger Vehicle Departure Time Cumulative Distribution in network nicosia_base

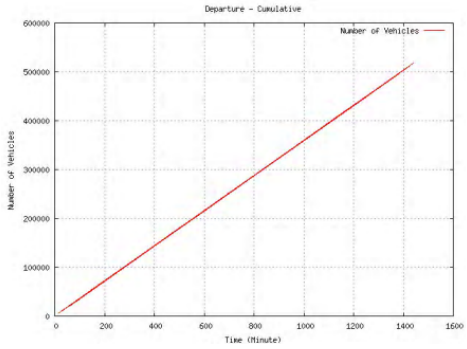


Table 17. Passenger Vehicle Departure Time Cumulative Distribution in network nicosia_base

Time (Minute)	255	510	765	1020	1275	240	495	750	1005	1260	225	480	735	990	1245	210	465	720	975	1230	195	450	705
No. Vehicles	91647	183294	274941	366588	458224	86256	177903	269550	361197	452834	80865	172512	264159	355806	447444	75474	167121	258768	350415	442054	70083	161730	253377

9. Terminology

Loaded Vehicles

The total number of arranged vehicles..

Entered Vehicles

Vehicles that entered (but not necessarily exited) the network..

Non-entered Vehicles

Vehicles that are loaded but never left their origin zone..

Through Vehicles

Vehicles exited the network.

Non-exited Vehicles

Vehicles that entered but not exited.

Loaded = Entered + Non-entered.

Entered = Through + Non-exited.

Delay

Delay = Travel Time - Free Flow Travel Time.

APPENDIX B. VISTA OD Report

The VISTA OD Report is designed to produce specific statistics for each OD pair that the analyst desires. The main tables that are produced by the OD report are provided below as an example from the preliminary VISTA prototype of Nicosia.

Table B1 is generated automatically by specifying the Origin, the Destination, the time interval of analysis. It produces the OD pair, the DUE paths for each OD pair, the length of the path, the average travel time for the OD pair and the number of vehicles that were assigned to each OD path. For example, the OD pair (10003-200004) produces three DUE paths for the time interval from zero to 15 minutes and the same one for the time interval from 15 to 30 minutes. It is noted that different paths may be generated for various time intervals of the day due to the variations in demand.

Table B1. This report provides the summary statistics for a specific OD pair (10003-200004)

Origin	Destination	Time Interval (M)	Path	Length (Mile)	Avg TT(M)	Number of Vehs
100003	200004	15.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	6.53	15
100003	200004	15.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.82	26
100003	200004	15.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,243,265,676}	37.338	6.45	218
100003	200004	30.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	6.75	44
100003	200004	30.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.84	26
100003	200004	30.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,243,265,676}	37.338	6.68	189
100003	200004	45.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	6.58	61
100003	200004	45.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.83	26
100003	200004	45.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,243,265,676}	37.338	6.5	144
100003	200004	45.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,251,276,20,269,677}	39.842	6.86	28
100003	200004	60.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	6.61	35
100003	200004	60.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.83	18
100003	200004	60.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,243,265,676}	37.338	6.54	206
100003	200004	75.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	7.12	28
100003	200004	75.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.83	29
100003	200004	75.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,243,265,676}	37.338	7.05	202
100003	200004	90.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	6.71	48
100003	200004	90.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.83	32
100003	200004	90.0	{549,440,74,467,112,114,116,154,157,160,529, 528,256,250,246,243,265,676}	37.338	6.63	179
100003	200004	105.0	{549,440,74,467,112,114,116,154,155,278,250, 246,243,265,676}	36.965	6.45	43
100003	200004	105.0	{549,440,74,467,112,114,116,154,155,285,284, 263,262,20,269,677}	40.029	6.85	14

100003	200004	105.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.38	162
100003	200004	105.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.88	40
100003	200004	120.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.46	26
100003	200004	120.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	41
100003	200004	120.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.4	192
100003	200004	135.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.78	27
100003	200004	135.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	12
100003	200004	135.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.71	220
100003	200004	150.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	7.06	51
100003	200004	150.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	15
100003	200004	150.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	7.0	178
100003	200004	150.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.91	15
100003	200004	165.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.58	26
100003	200004	165.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	6
100003	200004	165.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.51	227
100003	200004	180.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	180.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	7.01	86
100003	200004	180.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	17
100003	200004	180.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.92	123
100003	200004	180.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.97	23
100003	200004	195.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	195.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.57	32
100003	200004	195.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	11
100003	200004	195.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.5	210
100003	200004	210.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	8
100003	200004	210.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.97	60
100003	200004	210.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	15
100003	200004	210.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.89	176
100003	200004	225.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	225.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.84	36

100003	200004	225.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	28
100003	200004	225.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.78	177
100003	200004	225.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.9	9
100003	200004	240.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	5
100003	200004	240.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.57	49
100003	200004	240.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.52	205
100003	200004	255.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	18
100003	200004	255.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	7.01	63
100003	200004	255.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	33
100003	200004	255.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.93	145
100003	200004	270.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	5
100003	200004	270.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.47	36
100003	200004	270.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.4	218
100003	200004	285.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	285.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.91	53
100003	200004	285.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	14
100003	200004	285.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.83	182
100003	200004	300.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	300.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.6	34
100003	200004	300.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	32
100003	200004	300.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.52	185
100003	200004	315.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	315.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.66	36
100003	200004	315.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.58	217
100003	200004	330.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	9
100003	200004	330.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.65	38
100003	200004	330.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	19
100003	200004	330.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.58	193
100003	200004	345.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	8
100003	200004	345.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.54	32

100003	200004	345.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	30
100003	200004	345.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.47	189
100003	200004	360.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	360.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.85	77
100003	200004	360.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	15
100003	200004	360.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.77	159
100003	200004	375.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	375.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.79	49
100003	200004	375.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	25
100003	200004	375.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.72	176
100003	200004	390.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	7
100003	200004	390.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.7	34
100003	200004	390.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.63	218
100003	200004	405.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	16
100003	200004	405.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.83	64
100003	200004	405.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	28
100003	200004	405.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.75	136
100003	200004	405.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.88	15
100003	200004	420.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	10
100003	200004	420.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.58	43
100003	200004	420.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	19
100003	200004	420.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.51	187
100003	200004	435.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	435.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.86	32
100003	200004	435.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	39
100003	200004	435.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.78	179
100003	200004	450.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	450.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.37	81
100003	200004	450.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	14
100003	200004	450.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.29	155

100003	200004	465.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	465.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.55	57
100003	200004	465.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	19
100003	200004	465.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.47	173
100003	200004	480.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	480.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.83	48
100003	200004	480.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.77	192
100003	200004	480.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.86	12
100003	200004	495.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	11
100003	200004	495.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.73	60
100003	200004	495.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	19
100003	200004	495.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.65	149
100003	200004	495.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.91	19
100003	200004	510.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	510.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.41	45
100003	200004	510.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	40
100003	200004	510.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.34	165
100003	200004	525.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	525.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.37	46
100003	200004	525.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.29	206
100003	200004	540.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	540.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.91	79
100003	200004	540.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	16
100003	200004	540.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.83	153
100003	200004	555.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	555.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.46	53
100003	200004	555.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	20
100003	200004	555.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.38	177
100003	200004	570.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	570.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.95	57

100003	200004	570.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	20
100003	200004	570.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.87	173
100003	200004	585.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	585.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.78	55
100003	200004	585.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	18
100003	200004	585.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.71	175
100003	200004	600.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	13
100003	200004	600.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.84	72
100003	200004	600.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	24
100003	200004	600.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.75	149
100003	200004	615.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	5
100003	200004	615.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.56	45
100003	200004	615.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.5	208
100003	200004	630.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	630.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.9	80
100003	200004	630.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	16
100003	200004	630.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.82	152
100003	200004	645.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	7
100003	200004	645.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.67	36
100003	200004	645.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.59	215
100003	200004	660.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	660.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.84	48
100003	200004	660.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	26
100003	200004	660.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.76	174
100003	200004	675.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	7
100003	200004	675.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.61	43
100003	200004	675.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	14
100003	200004	675.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.54	194
100003	200004	690.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	690.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.84	76

100003	200004	690.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	15
100003	200004	690.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.77	141
100003	200004	690.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.88	16
100003	200004	705.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	705.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.56	72
100003	200004	705.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	15
100003	200004	705.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.47	161
100003	200004	720.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	720.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.52	70
100003	200004	720.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	15
100003	200004	720.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.45	164
100003	200004	735.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	11
100003	200004	735.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.67	57
100003	200004	735.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	20
100003	200004	735.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.6	170
100003	200004	750.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	750.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.61	79
100003	200004	750.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	19
100003	200004	750.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.53	127
100003	200004	750.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.85	23
100003	200004	765.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	11
100003	200004	765.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.5	59
100003	200004	765.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	21
100003	200004	765.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.42	167
100003	200004	780.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	7
100003	200004	780.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.68	33
100003	200004	780.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.61	218
100003	200004	795.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	12
100003	200004	795.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.77	46
100003	200004	795.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	20

100003	200004	795.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.69	180
100003	200004	810.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	810.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.67	42
100003	200004	810.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	19
100003	200004	810.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.6	187
100003	200004	825.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	10
100003	200004	825.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.63	81
100003	200004	825.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	14
100003	200004	825.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.56	153
100003	200004	840.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	9
100003	200004	840.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.77	46
100003	200004	840.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	29
100003	200004	840.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.7	174
100003	200004	855.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	13
100003	200004	855.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.51	62
100003	200004	855.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	32
100003	200004	855.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.44	151
100003	200004	870.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	870.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.66	77
100003	200004	870.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	14
100003	200004	870.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.58	158
100003	200004	885.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	6
100003	200004	885.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.71	45
100003	200004	885.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	37
100003	200004	885.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.64	170
100003	200004	900.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	900.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.43	40
100003	200004	900.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	31
100003	200004	900.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.35	177
100003	200004	915.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	13

100003	200004	915.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.36	81
100003	200004	915.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	32
100003	200004	915.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.28	132
100003	200004	930.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	10
100003	200004	930.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.49	41
100003	200004	930.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	26
100003	200004	930.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.41	181
100003	200004	945.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	945.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.62	37
100003	200004	945.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.54	215
100003	200004	960.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	10
100003	200004	960.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.79	77
100003	200004	960.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	14
100003	200004	960.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.71	157
100003	200004	975.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	975.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.54	63
100003	200004	975.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.85	19
100003	200004	975.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.46	166
100003	200004	990.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	5
100003	200004	990.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.62	47
100003	200004	990.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.55	206
100003	200004	1005.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	1005.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.82	77
100003	200004	1005.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	17
100003	200004	1005.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.74	138
100003	200004	1005.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.88	16
100003	200004	1020.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	8
100003	200004	1020.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.64	39
100003	200004	1020.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.86	33
100003	200004	1020.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.57	169

100003	200004	1020.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.92	9
100003	200004	1035.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	5
100003	200004	1035.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.57	47
100003	200004	1035.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.51	206
100003	200004	1050.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	1050.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	7.03	60
100003	200004	1050.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	14
100003	200004	1050.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.96	174
100003	200004	1065.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	5
100003	200004	1065.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.75	45
100003	200004	1065.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.69	208
100003	200004	1080.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	11
100003	200004	1080.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.92	80
100003	200004	1080.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	15
100003	200004	1080.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.85	132
100003	200004	1080.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.88	20
100003	200004	1095.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	1095.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.46	46
100003	200004	1095.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.4	206
100003	200004	1110.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	9
100003	200004	1110.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.88	57
100003	200004	1110.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	17
100003	200004	1110.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.81	175
100003	200004	1125.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	10
100003	200004	1125.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.56	82
100003	200004	1125.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	17
100003	200004	1125.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.48	150
100003	200004	1140.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	14
100003	200004	1140.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.61	45
100003	200004	1140.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	33

100003	200004	1140.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.53	167
100003	200004	1155.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	13
100003	200004	1155.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.57	49
100003	200004	1155.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	54
100003	200004	1155.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.5	143
100003	200004	1170.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	13
100003	200004	1170.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.4	35
100003	200004	1170.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	33
100003	200004	1170.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.32	178
100003	200004	1185.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	1185.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.39	44
100003	200004	1185.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.33	209
100003	200004	1200.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	1200.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.8	38
100003	200004	1200.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.74	215
100003	200004	1215.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	13
100003	200004	1215.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.45	63
100003	200004	1215.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	19
100003	200004	1215.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.37	145
100003	200004	1215.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,251,276,20,269,677}	39.842	6.85	19
100003	200004	1230.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	7
100003	200004	1230.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.55	46
100003	200004	1230.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	14
100003	200004	1230.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.48	192
100003	200004	1245.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	11
100003	200004	1245.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.86	57
100003	200004	1245.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	17
100003	200004	1245.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.8	174
100003	200004	1260.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	11
100003	200004	1260.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.7	57

100003	200004	1260.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	16
100003	200004	1260.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.62	175
100003	200004	1275.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.11	11
100003	200004	1275.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.67	61
100003	200004	1275.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	15
100003	200004	1275.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.58	172
100003	200004	1290.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	10
100003	200004	1290.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.7	57
100003	200004	1290.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	19
100003	200004	1290.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.63	173
100003	200004	1305.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	1305.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.54	43
100003	200004	1305.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	27
100003	200004	1305.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.46	179
100003	200004	1320.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	1320.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.44	68
100003	200004	1320.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.82	14
100003	200004	1320.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.36	168
100003	200004	1335.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	1335.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.77	86
100003	200004	1335.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	14
100003	200004	1335.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.69	149
100003	200004	1350.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	10
100003	200004	1350.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.58	35
100003	200004	1350.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	17
100003	200004	1350.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.5	197
100003	200004	1365.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.13	11
100003	200004	1365.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.51	64
100003	200004	1365.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	34
100003	200004	1365.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.44	150

100003	200004	1380.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	6
100003	200004	1380.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.45	37
100003	200004	1380.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.37	216
100003	200004	1395.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	5
100003	200004	1395.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.83	46
100003	200004	1395.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.75	208
100003	200004	1410.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	9
100003	200004	1410.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.59	63
100003	200004	1410.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.84	18
100003	200004	1410.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.53	169
100003	200004	1425.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	13
100003	200004	1425.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.75	64
100003	200004	1425.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.81	50
100003	200004	1425.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.67	132
100003	200004	1440.0	{546,505,520,355,364,339,310,301,14,22,23,12,513,502,523,680}	40.482	7.12	8
100003	200004	1440.0	{549,440,74,467,112,114,116,154,155,278,250,246,243,265,676}	36.965	6.36	45
100003	200004	1440.0	{549,440,74,467,112,114,116,154,155,285,284,263,262,20,269,677}	40.029	6.83	39
100003	200004	1440.0	{549,440,74,467,112,114,116,154,157,160,529,528,256,250,246,243,265,676}	37.338	6.28	167

Table B2 is automatically developed by specifying the following: Origin, Destination, the time interval of the desired statistics. The report produces, in addition to the input data the number of paths generated for the OD pair, the average path length, the Path Length Standard Deviation, the Maximum Path Length and the Minimum Path Length.

Table B2 Summary OD report per 15-minute time interval

Origin	**Destination**	**Time Interval (M)**	**Num of Paths**	**Avg Length (Mile)**	**Length STD (Mile)**	**Max Length (Mile)**	**Min Length (Mile)**
100003	200004	15.0	3	38.111	0.1671	40.029	36.965
100003	200004	30.0	3	38.111	0.1671	40.029	36.965
100003	200004	45.0	4	38.544	0.1616	40.029	36.965
100003	200004	60.0	3	38.111	0.1671	40.029	36.965
100003	200004	75.0	3	38.111	0.1671	40.029	36.965
100003	200004	90.0	3	38.111	0.1671	40.029	36.965
100003	200004	105.0	4	38.544	0.1616	40.029	36.965
100003	200004	120.0	3	38.111	0.1671	40.029	36.965
100003	200004	135.0	3	38.111	0.1671	40.029	36.965
100003	200004	150.0	4	38.544	0.1616	40.029	36.965

100003	200004	165.0	3	38.111	0.1671	40.029	36.965
100003	200004	180.0	5	38.931	0.1646	40.482	36.965
100003	200004	195.0	4	38.704	0.1808	40.482	36.965
100003	200004	210.0	4	38.704	0.1808	40.482	36.965
100003	200004	225.0	5	38.931	0.1646	40.482	36.965
100003	200004	240.0	3	38.262	0.1932	40.482	36.965
100003	200004	255.0	4	38.704	0.1808	40.482	36.965
100003	200004	270.0	3	38.262	0.1932	40.482	36.965
100003	200004	285.0	4	38.704	0.1808	40.482	36.965
100003	200004	300.0	4	38.704	0.1808	40.482	36.965
100003	200004	315.0	3	38.262	0.1932	40.482	36.965
100003	200004	330.0	4	38.704	0.1808	40.482	36.965
100003	200004	345.0	4	38.704	0.1808	40.482	36.965
100003	200004	360.0	4	38.704	0.1808	40.482	36.965
100003	200004	375.0	4	38.704	0.1808	40.482	36.965
100003	200004	390.0	3	38.262	0.1932	40.482	36.965
100003	200004	405.0	5	38.931	0.1646	40.482	36.965
100003	200004	420.0	4	38.704	0.1808	40.482	36.965
100003	200004	435.0	4	38.704	0.1808	40.482	36.965
100003	200004	450.0	4	38.704	0.1808	40.482	36.965
100003	200004	465.0	4	38.704	0.1808	40.482	36.965
100003	200004	480.0	4	38.657	0.1764	40.482	36.965
100003	200004	495.0	5	38.931	0.1646	40.482	36.965
100003	200004	510.0	4	38.704	0.1808	40.482	36.965
100003	200004	525.0	3	38.262	0.1932	40.482	36.965
100003	200004	540.0	4	38.704	0.1808	40.482	36.965
100003	200004	555.0	4	38.704	0.1808	40.482	36.965
100003	200004	570.0	4	38.704	0.1808	40.482	36.965
100003	200004	585.0	4	38.704	0.1808	40.482	36.965
100003	200004	600.0	4	38.704	0.1808	40.482	36.965
100003	200004	615.0	3	38.262	0.1932	40.482	36.965
100003	200004	630.0	4	38.704	0.1808	40.482	36.965
100003	200004	645.0	3	38.262	0.1932	40.482	36.965
100003	200004	660.0	4	38.704	0.1808	40.482	36.965
100003	200004	675.0	4	38.704	0.1808	40.482	36.965
100003	200004	690.0	5	38.931	0.1646	40.482	36.965
100003	200004	705.0	4	38.704	0.1808	40.482	36.965
100003	200004	720.0	4	38.704	0.1808	40.482	36.965
100003	200004	735.0	4	38.704	0.1808	40.482	36.965
100003	200004	750.0	5	38.931	0.1646	40.482	36.965
100003	200004	765.0	4	38.704	0.1808	40.482	36.965
100003	200004	780.0	3	38.262	0.1932	40.482	36.965
100003	200004	795.0	4	38.704	0.1808	40.482	36.965
100003	200004	810.0	4	38.704	0.1808	40.482	36.965
100003	200004	825.0	4	38.704	0.1808	40.482	36.965
100003	200004	840.0	4	38.704	0.1808	40.482	36.965
100003	200004	855.0	4	38.704	0.1808	40.482	36.965
100003	200004	870.0	4	38.704	0.1808	40.482	36.965
100003	200004	885.0	4	38.704	0.1808	40.482	36.965
100003	200004	900.0	4	38.704	0.1808	40.482	36.965
100003	200004	915.0	4	38.704	0.1808	40.482	36.965
100003	200004	930.0	4	38.704	0.1808	40.482	36.965
100003	200004	945.0	3	38.262	0.1932	40.482	36.965
100003	200004	960.0	4	38.704	0.1808	40.482	36.965
100003	200004	975.0	4	38.704	0.1808	40.482	36.965
100003	200004	990.0	3	38.262	0.1932	40.482	36.965
100003	200004	1005.0	5	38.931	0.1646	40.482	36.965
100003	200004	1020.0	5	38.931	0.1646	40.482	36.965
100003	200004	1035.0	3	38.262	0.1932	40.482	36.965

100003	200004	1050.0	4	38.704	0.1808	40.482	36.965
100003	200004	1065.0	3	38.262	0.1932	40.482	36.965
100003	200004	1080.0	5	38.931	0.1646	40.482	36.965
100003	200004	1095.0	3	38.262	0.1932	40.482	36.965
100003	200004	1110.0	4	38.704	0.1808	40.482	36.965
100003	200004	1125.0	4	38.704	0.1808	40.482	36.965
100003	200004	1140.0	4	38.704	0.1808	40.482	36.965
100003	200004	1155.0	4	38.704	0.1808	40.482	36.965
100003	200004	1170.0	4	38.704	0.1808	40.482	36.965
100003	200004	1185.0	3	38.262	0.1932	40.482	36.965
100003	200004	1200.0	3	38.262	0.1932	40.482	36.965
100003	200004	1215.0	5	38.931	0.1646	40.482	36.965
100003	200004	1230.0	4	38.704	0.1808	40.482	36.965
100003	200004	1245.0	4	38.704	0.1808	40.482	36.965
100003	200004	1260.0	4	38.704	0.1808	40.482	36.965
100003	200004	1275.0	4	38.704	0.1808	40.482	36.965
100003	200004	1290.0	4	38.704	0.1808	40.482	36.965
100003	200004	1305.0	4	38.704	0.1808	40.482	36.965
100003	200004	1320.0	4	38.704	0.1808	40.482	36.965
100003	200004	1335.0	4	38.704	0.1808	40.482	36.965
100003	200004	1350.0	4	38.704	0.1808	40.482	36.965
100003	200004	1365.0	4	38.704	0.1808	40.482	36.965
100003	200004	1380.0	3	38.262	0.1932	40.482	36.965
100003	200004	1395.0	3	38.262	0.1932	40.482	36.965
100003	200004	1410.0	4	38.704	0.1808	40.482	36.965
100003	200004	1425.0	4	38.704	0.1808	40.482	36.965
100003	200004	1440.0	4	38.704	0.1808	40.482	36.965

Table B3 produces a summary report for a specific OD pair for the entire time period of the analysis. It requires as input the Origin and the Destination. It produces the number of DUE paths, the average path length, the corresponding path length standard deviation, the maximum and the minimum path length.

Table B3. Sample Summary OD (100003 – 200004) Report

Origin	Destination	Num of Paths	Avg Length (Mile)	Length STD (Mile)	Max Length (Mile)	Min Length (Mile)
100003	200004	5	38.931	0.1646	40.482	36.965

APPENDIX C. VISTA-NICOSIA-IM-VMS Module Sample Case Study

We present here the VISTA-IM-VMS as implemented the Monitor Integrated Safety System (MISS) project. A set of incident and VMS –based case studies will be developed once the first complete Nicosia model will be developed.

The following models were developed and executed using the VISTA-IM module:

Base Case – the VISTA DTA is executed using the current demand for a 24 hour time period. The assignment interval is 15 minutes. The traffic simulator RouteSim is using a six second time step to emulate the traffic flow propagation. All results can be aggregated at the time interval of interest.

No VMS Case – An incident is emulated to have occurred that starts at the 120th minute of the simulation and lasts for 6 hours. The VISTA RouteSim is executed only based on the DTA paths that were generated in the Base case – assuming that the no travelers diverted to a new route.

VMS Case – The VMS sub-module within the IM module where a set of diversion routes are generated around the incident. The VMS module is used to emulate the behavior of travelers who will ―see‖ it once they are at the VMS location. The VMS is emulated to display the set of available routes and the corresponding travel time from the incident location to the destination. A percentage of travelers are assumed to follow these paths that are input by the analyst. Under this scenario, the VISTA RouteSim simulator is executed using the original Base case paths plus the designed route diversion paths.

It is noted that the Vehicle Delay is estimated based on a reference free flow travel time – hence a delay is reported also for the Base Case in the following tables.

Table 3. MISS-Nicosia VISTA-IM *Partial Closure*

6-hour closure starting at 2 hours into simulation. One lane of link 467 is closed during this time					
	Demand (vehs)	**Total TT (hours)**	**Average TT (min)**	**StdDev TT (min)**	**Total VKT (Veh-Km)**
Base	517.514	26.289 (0,00%)	3,05	2,18	1508127
No VMS	517.514	28.121 (6,96%)	3,26	2,75	1508127
VMS	517.514	26.593 (1,16%)	3,08	2,24	1511449

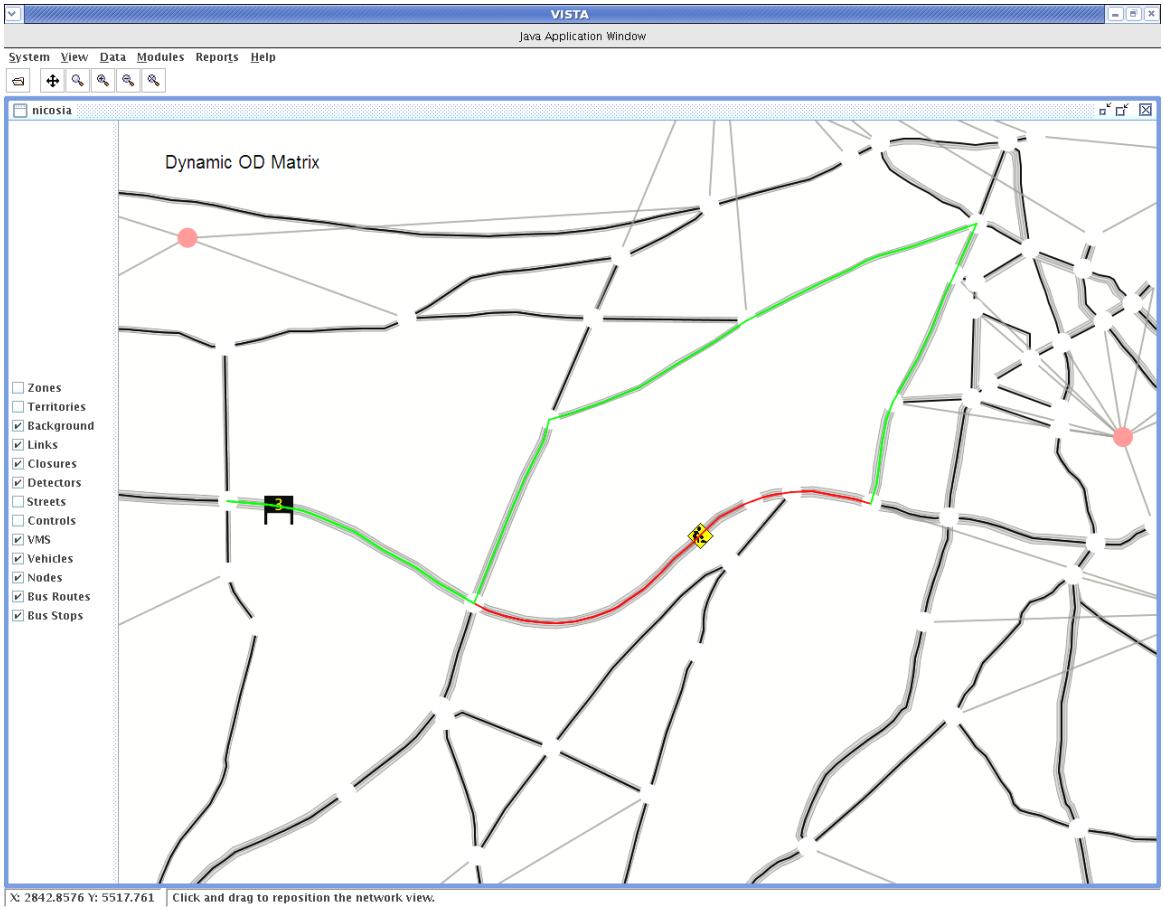


Figure 77. Nicosia Incident Characteristics with VMS as modeled in VISTA

The incident causes an increase in network travel time of 6,96% under the no traveler information option (No-VMS). Travelers are assumed to follow the same paths as without the incident – the Base case DTA paths found under normal conditions. Comparatively, the installation of the VMS (see Figure 2) upstream of the location of the incident in combination with the identification of a diversion route "displayed" on the VMS reduces the impact of the incident to 1,16% from the Base case.

Table 4. MISS-Nicosia VISTA-IM Partial Closure Travel Time Statistics for Affected Vehicles only

Affected Vehicle Travel Time					
Case	**Demand (Vehs)**	**Total (hours)**	**% Difference from Base Case**	**Average (minutes)**	**StdDev (minutes)**
Base	33.576	3.106	0,00	5,55	1,75
Inc-No VMS	33.576	14.236	358,38	25,44	18,59
Inc-VMS	33.576	4.824	55,32	8,62	60,41
Affected Vehicle Delay					
Base	33.576	207	0,00	0,37	0,36
Inc-No VMS	33.576	11.337	5.375,68	20,26	17,98
Inc-VMS	33.576	1.863	800,00	3,33	60,61
Affected Vehicle VKT (Veh-Km)					
Base	33.576	173.309	0,00	5,16168	1,57584
Inc-No VMS	33.576	173.309	0,00	5,16168	1,57584
Inc-VMS	33.576	176.548	1,87	5,25816	1,62408

Table 4 demonstrates that the impact of the VMS sign offers a dramatic improvement to the IM case study versus the Non-VMS – a drop of vehicle delay hours from 11.337 to 1.863, respectively. This further signifies that the implementation of a MISS UOC with an integrated traffic monitoring and traveler information system could have substantial impact on the efficiency of the transport system and the demand that is affected by the incident. The estimated VKT for affected vehicles show an increase under the VMS case versus the Base and the No-VMS, which correctly are the same. The increase in VKT is accompanied with a reduction of travel time as some vehicles are diverted to the diversion route (2.233) (see Table 5).

Table 5. MISS-Nicosia VISTA-IM – Partial Closure Rerouted Vehicle Travel Time Statistics

Rerouted Vehicle Travel Time					
	Demand	**Total (hours)**	**% Difference from Base**	**Average TT (min)**	**StdDev TT (min)**
Base	2.233	210	0,00	5,63	1,77
No VMS	2.233	1.368	552,66	36,77	16,33
VMS	2.233	220	4,73	5,90	1,97
Unrerouted Vehicle Travel Time					
Base	29.972	2.772	0,00	5,55	1,77
No VMS	29.972	12.638	355,86	25,30	18,53
VMS	29.972	4.238	52,85	8,48	2,13
Rerouted Vehicle Delay					
Base	2.233	14	0,00	0,38	0,35

No VMS	2.233	1.175	8250,97	31,57	16,22
VMS	2.233	122	767,89	3,28	1,11
Unrerouted Vehicle Delay					
Base	29.972	214	0,00	0,43	0,42
No VMS	29.972	10.049	4603,82	20,12	17,83
VMS	29.972	371	73,53	0,74	0,91
Rerouted Vehicle Kilometre Traveled (Veh-Km)					
Base	2.233	192	0,00	5,16	1,56
VMS	2.233	250	30,00	6,72	1,56

'Rerouted' vehicles in Table 5 refer to whether a vehicle chose a different route under the Incident VMS case. Under this case a total of 2.233 vehicles were rerouted and 29.972 vehicles stayed in their original routes. The Base case Rerouted vehicles reports the travel times, which were experienced by vehicles on their original route and were later rerouted under the Incident VMS case.

It can be observed that the rerouting information provided by the VMS resulted in a reduction to the incident vehicle delay for unrerouted and reroute vehicles from 10.049 to 371 and from 1.175 to 122 hours, respectively.

Table 6 provides a sample of OD trips travel times for the Base, Incident No VMS and Incident VMS cases. Similarly to the earlier conclusions, it can be observed that the VMS case reduces the corresponding travel time for each OD pair versus the No VMS case substantially.

Table 6. MISS-Nicosia VISTA-IM Partial Closure Scenario; Sample OD Pair Average Travel Time Incident and VMS Impact

Affected Vehicle Trip TT			**Average TT (minutes)**		
Origin Zone	**Destination Zone**	**Demand**	**Base**	**No VMS**	**VMS**
3	4	24041	6,57	31,35	7,13
3	11	9	5,08	11,07	5,08
3	12	42	6,48	7,38	6,48
3	13	273	3,78	13,54	4,32
3	14	121	4,38	11,75	4,79
3	15	7072	2,46	10,66	2,93
3	16	706	2,76	11,36	3,10

MISS-VISTA-IM Scenario 2 – Full Closure Case study

Link 467: six-hour full closure starting at 2 hours into simulation. Both lanes of link 467 are closed during this time. This is a more dramatic case as link 467 is closed completely in one direction. This impacts the network performance substantially as vehicles are forced to move under gridlock conditions.

Table 7. MISS-VISTA-IM case study 2 – Full Closure Case study

All Vehicles						
	Demand	**Total TT (hours)**	**% Difference from Base**	**Average TT (minutes)**	**StdDev TT (minutes)**	**Total VKT (Veh-Km)**
Base	517.514	26.289	0	3,05	2,18	1.508.127
No VMS	517.514	372.603	1.317,33	43,20	103,60	1.398.695
VMS	517.514	238.461	807,08	27,66	80,71	1.450.945

Table 7 reveals a more dramatic increase in travel times due to the full roadway closure versus the partial closure. Whereas under the partial closure the VMS case provided a dramatic improvement in travel time (6,96% to 1.16%) under the full closure the reduction is substantially less (from 1.317 to 807%). In addition, the average travel time increases substantially from 3,05 (base) to 43,2 (No VMS) and 27,8 (VMS) minutes for the overall network.

Table 8. MISS-VISTA-IM case study 2 – Full Closure Case study; Traffic Flow Characteristics

Affected Vehicle Travel Time					
	Demand	**Total (hours)**	**% Difference from Base**	**Average (minutes)**	**StdDev (minutes)**
Base	33.576	3.105	0	5,55	1,75
No VMS	33.576	149.732	4721	267,57	111,92
VMS	33.576	33.900	991	60,58	139,01
Affected Vehicle Delay					
Base	33.576	207	0,00	0,37	0,36
No VMS	33.576	147.208	71.00	263,06	111,12
VMS	33.576	30.688	14.72	54,84	139,37
Affected Vehicle VKT (Veh-Km)					
Base	33.576	173.309	0	5,16	1,58
No VMS	33.576	150.633	-13	4,49	2,19
VMS	33.576	191.665	11	5,71	1,80

The affected vehicles for the Full closure in Table 8 demonstrate similar results for the vehicles that were affected by the incident as the partial closure but in a much more profound way.

It is noted that the reduction of VKT reflects the fact that some vehicles under the incident No- VMS case did not manage to reach their destination during the allocated assignment time period. The No-VMS case reflects a rather rare traffic “gridlock” condition. In reality it is expected that a good percentage of travelers will be informed of the full closure at some point and choose other routes or other modes of transport or change their destinations. We emphasize that these scenarios are conducted for illustration purposes only. Under an operational DTA model, a travel behavior model should be integrated with the DTA to provide an estimate of the travelers that will follow different routes and other modes of transport.

Table 9. MISS-VISTA-IM Scenario 2 – Full Closure Case study; Reroute Vehicles Travel Time Statistics

Rerouted Vehicle Travel Time					
	Demand	**Total (hours)**	**% Difference from Base**	**Average (minutes)**	**StdDev (minutes)**
Base	12.333	1.158	0	5,63	1,77
No VMS	12.333	68.750	5.837,28	334,47	28,58
VMS	12.333	10.891	840,53	52,98	27,38
Unrerouted Vehicle Travel Time					
Base	19.644	1.812	0,00	5,53	1,75
No VMS	19.644	77.894	4.199,70	237,92	118,90
VMS	19.644	14.498	700,30	44,28	37,78
Rerouted Vehicle Delay					
Base	12.333	86	0,00	0,42	0,39

No VMS	12.333	67.677	79.020,01	329,25	27,65
VMS	12.333	9.818	11.378,51	47,77	26,85
Unrerouted Vehicle Delay					
Base	19.644	119	0	0,36	0,34
No VMS	19.644	76.197	63.918	232,73	118,75
VMS	19.644	12.801	10.655	39,10	37,13
Rerouted Vehicle Km Traveled (VKT) (Veh-Km)					
Base	12.333	1.061	0	5,16	0,16
VMS	12.333	1.381	30	6,72	1,56

Under the full closure 12.333 vehicles were rerouted (Table 9). The rerouted vehicles under the VMS show much more improvement in vehicle delay (9.818 hours) versus the No VMS case (67.577 hours). The improvement still does not remove the network from gridlock conditions.

Table 10. MISS-VISTA-IM Case study 2 – Scenario 2 Full Closure; Sample OD Pair Average Travel Time Incident with VMS Impact

Affected Vehicles Trip Travel Time					
Average TT (minutes)					
Origin Zone	**Destination Zone**	**Demand**	**Base**	**No VMS**	**VMS**
3	4	24041	6,57	284,48	56,07
3	11	9	5,08	314,98	44,92
3	12	42	6,48	284,53	32,50
3	13	273	3,78	265,18	36,08
3	14	121	4,38	244,37	31,30
3	15	7072	2,46	248,25	21,85
3	16	706	2,76	245,42	12,33

Table 10 shows a sample of OD pair travel times under the Base, No-VMS and VMS cases. The OD travel times under the incident are much higher than the corresponding OD travel times under the partial closure. Similarly, the VMS provided a substantial reduction in the OD trip travel time versus the No VMS case.

The above two case studies demonstrated the potential impact that a centralized system such as MISS could provide to improve traffic conditions when an incident occurs and reduces the capacity in one roadway for a substantially long time period – 6 hours in these two examples. These examples demonstrate the potential impact of the use of traveler information – in this case a VMS together with rerouting information – with substantial improvements in the overall network travel time as well as individual paths.

A more comprehensive analysis could be conducted where more than one diversion routes could be specified. In addition, a parametric analysis on the percentage of vehicles that will be diverted in each route could be conducted to find the best combination of routes and OD demand diversion. Further, an analysis of In-vehicle navigation and traveler information devices could be modeled in a similar manner as the VMS scenarios.

APPENDIX B

SHORT COURSE: VISTA SCENARIO MANUAL

Scenario Manual

August 7, 2008 VISTA Training

INTRODUCTION

The following scenarios are to be conducted using VISTA demonstration accounts provided by the City College of New York. Support of the training session will be provided, and follow up Q&A sessions will be held to answer any questions about the scenarios or material.

BASE CASE PREPARATION

There are a number of steps involved in preparing an equilibrium assignment on a base case network. These instructions assume the network and demand data have already been imported into VISTA and verified as correct.

Network Preparation

To prepare the network for simulation, the **`Cell Generator`** module should be run. The cell generator takes two options.

Set the **`Time Step`** for the mesoscopic simulator to a small value, ideally six. It's not recommended this value be changed.

Set the **`Minimum Density`** to the minimum cell density you want for mesoscopic cells. Again, it's not recommended this value be changed.

The default values for these parameters have been tested and work well for most networks.

Demand Preparation

Next, run the **`Prepare Demand`** module to turn the trip table into individual vehicles for assignment and simulation.

Specify a **`Demand Percentage`** to increase or decrease the total demand by the amount specified.

Checking **`Use Dynamic Trips`** will use the dynamic trip table instead of the static trip table. Your VISTA administrator, or whoever imported your trip tables for you, will inform you whether or not to use this option.

Dynamic Traffic Assignment

You're finally ready to run an assignment on the network.

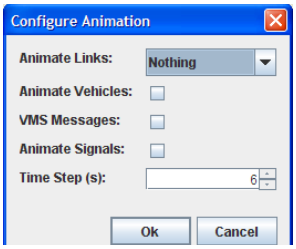
Start with the **`DTA - Path Generation`** module. You'll want to run this for at least 3 iterations to create a good set of paths for your early assignments.

When this completes, run **`DTA - Dynamic User Equilibrium`** for 5 to 10 iterations. This will take the paths already generated and attempt to find the best distribution of traffic among those paths.

You should now start another path generation run, followed by a DUE run, and so on. You'll have a good convergence when few new paths are being generated (check the log files) and the gap value from DUE is low (less than 5%).

Visualize Outputs

The performance of your base case may be visualized using the animation facility in VISTA's GIS. Open up your network in the GIS, then select **`Data Animation`** from the **`Data`** menu.



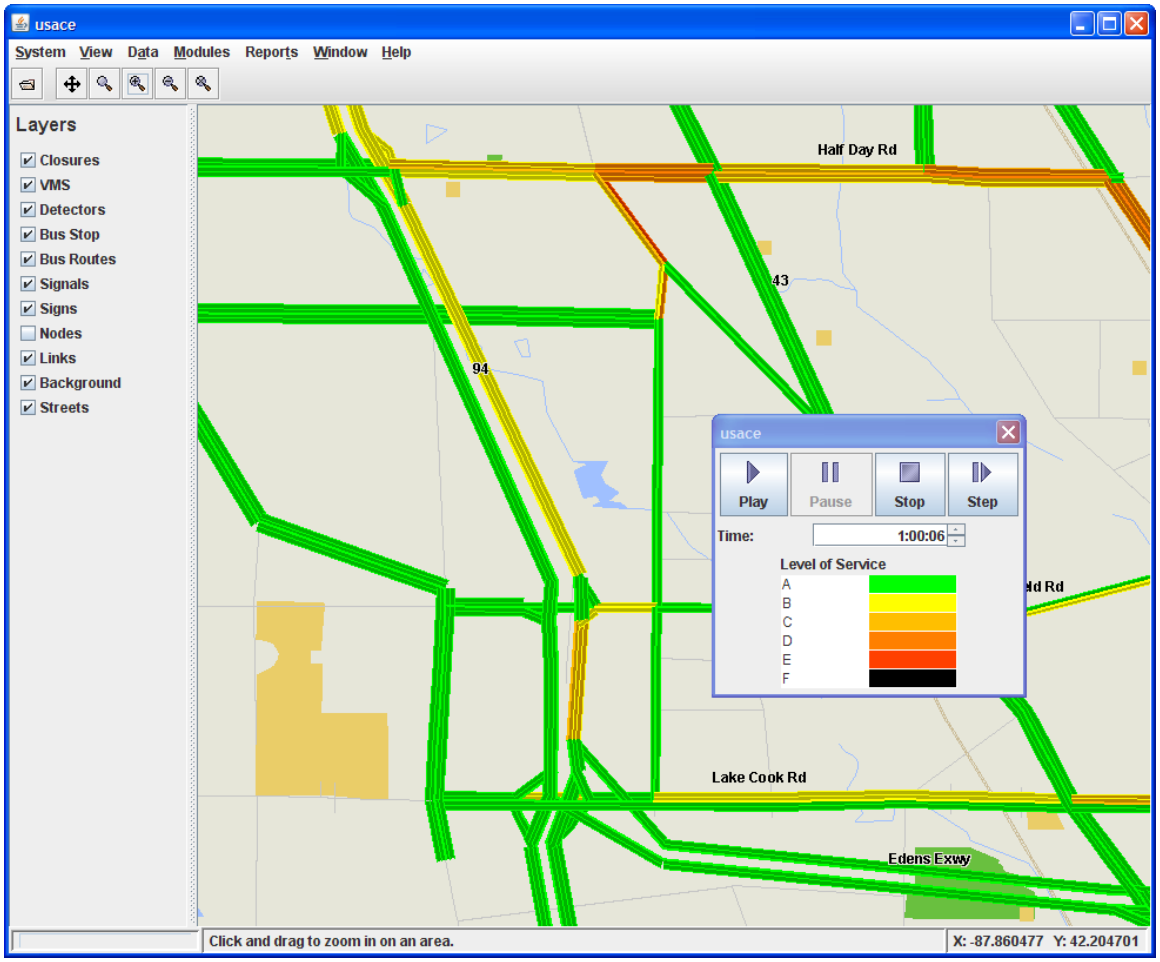
You can select to have links color-coded by density, travel time, inflow or outflow. During animation, a color-code legend will appear to show the values associated with each color. If the animation is by density, the colors indicate the proportion of density to jam density associated on each link, approximating a level of service.

If the animation is by travel time, the colors indicate the link travel time as a multiple of free flow travel time on each link.

If animation is by inflow or outflow, the colors indicate the number of vehicles entering or leaving the link during each time step.

You may enable signals, vehicles, and variable message signs to be animated by checking the respective boxes. Note that these will require the GIS to load a large amount of data before animation can begin. This can be a time consuming process.

When ready to animate, click **Ok**.



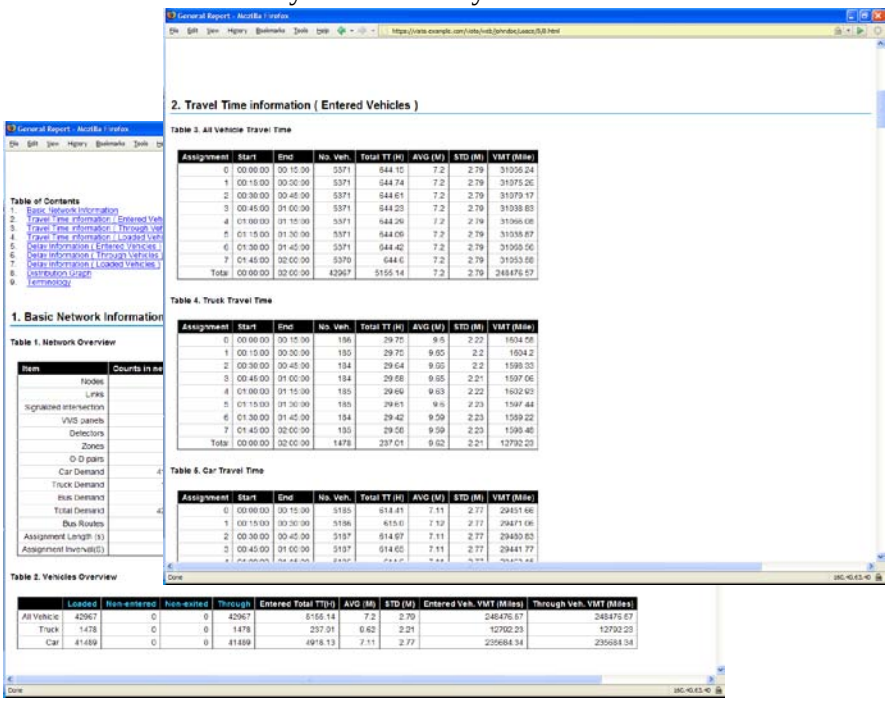
The animation control window allows you to play, pause, stop, and step (one timestep at a time) through an animation. When the animation is paused, you can edit the current time, then restart the animation.

Prepare Reports

VISTA provides a variety of reports for evaluating the performance of a given scenario. Before any report may be run, the results of the assignment must be imported.

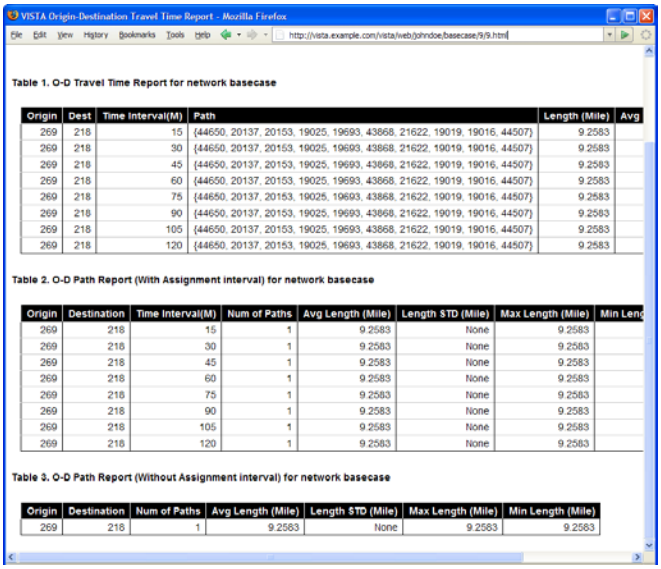
Run the **`Import Simulation Results`** module to bring the results of your assignment into the database. The assigned paths and vehicles will be stored in the **`vehicle_path`** and **`vehicle_path_time`** tables.

First, run **`General Report (short)`** in the web interface. Leave the options as-is. When complete, you will find a report similar to the one below in your task history.



Now, run the **`O-D Travel Time Report`** in the web interface. For the Destination ID, use **`218`**. For the Origin ID, use **`269`**. This OD pair is for northbound traffic on the expressway. Leave the other options as they are.

When complete, you will have a report similar to the one shown below.



This report details the routes used by trips between the given origin in destination, group into time intervals, a summary of routes used per time interval, and a summary of all time intervals.

ADD LANE SCENARIO

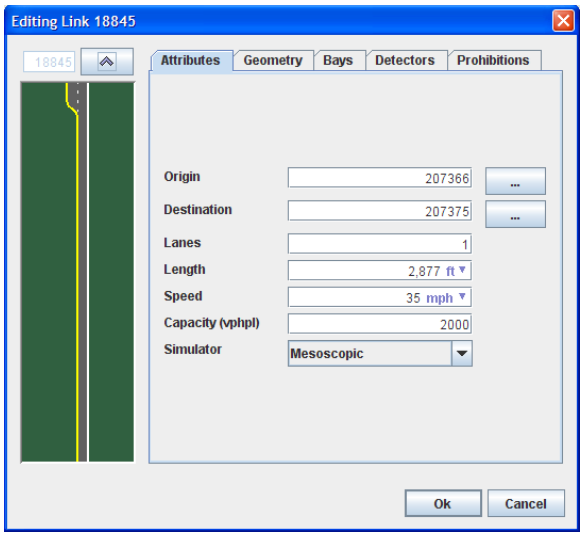
In this scenario, you will add additional lanes to some links in the traffic network, then compare the performance of this network with the base case prepared earlier.

Add Lanes

Bring up the **`Add Lanes`** network in the GIS.

To add a lane to a link, select **`Edit Link`** from the **`Links`** menu in the **`Data`** menu. Now, click on the link you wish to edit.

> Selecting links can be tricky, particularly when both directions of a link share the same geometry. Click next to a link to select the link whose lanes are nearest your mouse. Clicking directly on a link may select either direction.



The above window will be shown with attributes relevant to the link you selected. If you selected the wrong link, click **`Cancel`** and try again. If you clicked the link going the opposite direction of the link you want, click the upward-pointing arrow button in the upper-left corner of the window. This switches between links going in opposite directions.

Increase the number of lanes on the link, the click **`Ok`**.

Repeat this process for any other links to which you would like to add a lane.

Copy Assignment

Copy the assignment from your base case network to this network. This ensures that the scenario you are preparing is starting from the same conditions as your base case, and will therefore be directly comparable when running reports later.

Run the **`Manage Data`** module on the **`Base Condition`** network. Check the **`Copy Assignment`** option, and select the **`Add Lane Scenario`** network in the **`Copy to Network`** drop-down.

Do not run this module on the scenario network and copy to the base case network.

Assignment and Results

Repeat steps **`1`**, **`3`**, **`4`** and **`5`** from the base case preparation procedure.

You must re-run the cell generator any time you change the traffic network by changing a link.

You need not re-run the demand profiler since you have not changed the demand.

Both path generation and dynamic user equilibrium should be run to ensure the increased capacity of the links with additional lanes has the opportunity to attract traffic.

Watching the animation of the results will demonstrate any potential increases or reductions in congestion due to the additional lanes.

Comparative Reports

Repeat step **`6`** from the base case preparation procedure, but specify the **`Compare To`** network to be the **`Base Condition`** network. Leave the other options as that are.

The reports will appear as they did from the base case preparation, but will include results for both networks side-by-side. This will allow you to better analyze the differences between the two.

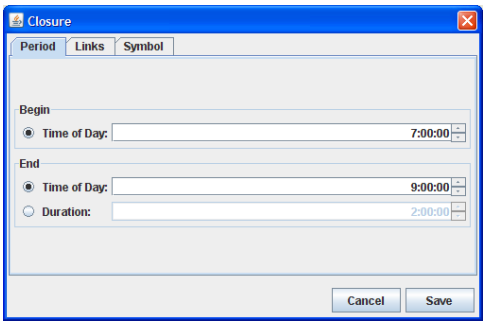
INCIDENT SCENARIO

In this scenario, you will be adding a temporary closure to the traffic network and analyzing the effects of the closure on traffic.

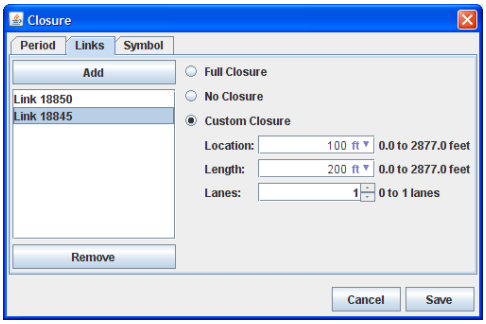
You will be performing this work on the **Incident Analysis** network.

Add a Closure

To create a closure, select **Add Closure** from the **Data|Closures** menu. The closure editing window will be displayed.



First, define the time during which the closure is in effect. Set the starting time in the **Begin** section. Set the ending time or duration in the **End** section. Now, click the **Links** tab at the top.



To add links to the closure, click the **Add** button. Then, click or drag on the map to select a group of links.

For each link you add to the closure, you must define the severity of the closure on that link. Select a link in the list on the left-hand side of the closure editing window. The form elements to the right will become available.

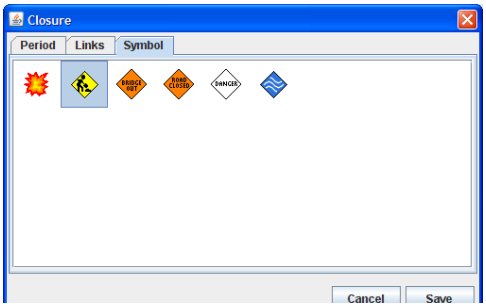
Select **Full Closure** to close all lanes for the entire length of the link.

Select **No Closure** to leave the link completely open to traffic.

Select **Custom Closure** to define your own severity. Input the **Location** at which the closure starts, which is the distance from the origin of the link. Input the **Length** of the closure, which is measured from the location towards the destination of the link. Finally, set the number of lanes closed. You must do this for every link in the closure.

To remove a link from the closure, select it in the list and click the **Remove** button.

Now, click on the **Symbol** tab at the top.



Select a symbol to represent the closure on the map. This has no effect on how the simulator handles the closure.

When you are done editing the closure, click the **Save** button.

Perform Worst Case Analysis

Repeat step **2** from the Add Lane Scenario procedure.

Run the **Simulate** module from the web interface. This will simulate traffic interacting with the closure using the existing base case assignment. Traffic will not reroute; it will instead be delayed by the closure until it clears.

When running reports for this scenario, be sure to put some text in the Notes field of each report run indicating which analysis of the scenario was conducted. Any notes you specify will be shown in the task history, making it easier to identify which reports are relevant to which analyses.

Repeat steps **4** and **5** from the base case preparation procedure.

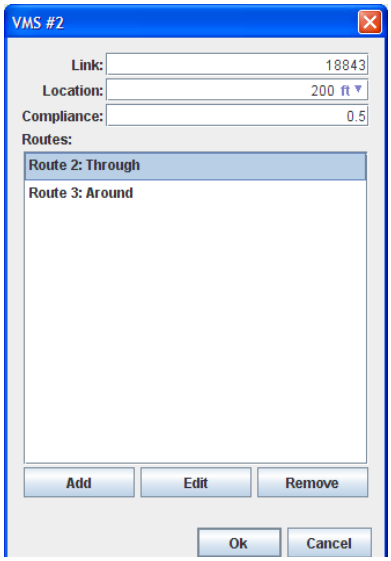
Repeat step **4** from the Add Lane Scenario procedure.

The comparative reports will demonstrate the relative impacts of adding this closure to your traffic network.

The addition of the closure to your network will likely cause delay to some vehicles. If no delay is observed, the closure may not be severe enough to affect the traffic flowing through the affected links, or the affected links may not carry any traffic to begin with.

Perform a VMS Analysis

Select **Add VMS** from the **Data|VMS** menu. Click on the link where you would like your new VMS to be located. The VMS editing window will be shown.



If you clicked on the wrong link, change the **Link** field to contain the correct link id.

Set the **Location** to the distance from the origin of the link at which the VMS is located.

The **Compliance** rate is a fractional value as discussed above. 1.0 means all vehicles comply. 0.0 means no vehicles comply.

To add routes to your VMS, click the **Add** button. This will bring up the route editing window.

Click the **Add** button to begin adding links to the route. Add links by clicking on successive links on the map.

To remove a link from your route, select the link in the list and click **Remove**.

When finished, click **Ok**.

You should add two or more routes to your VMS. With only one route, the vehicles passing the VMS will not have information available to make a rerouting decision.

The routes you add to your VMS should begin and end at the same node. Routes for different trips won't offer meaningful rerouting options to any vehicles. Also, routes must not include the VMS itself. Routes including the VMS will not be able to properly reroute vehicles.

Simulate the network and run reports as in the previous analysis.

Run the VMS report with the id number of the new VMS to obtain detailed performance measures on the VMS itself.

Perform Best Case Analysis

Remove the VMS added in the previous analysis step.

Repeat steps 3, 4 and 5 from the base case preparation procedure. This will ensure all traffic routes around the closure, providing the best possible performance of traffic in these conditions.

Run comparative reports as before.

APPENDIX C

STUDY ABROAD PROMOTIONAL MATERIALS

UAB ALABAMA-IN-GREECE PROGRAM BROCHURE, 2010

ALABAMA IN GREECE
Study Away @ UAB

June 2-24, 2010 GREECE: A Cultural Expedition

UAB in collaboration with the University of Alabama is offering students the opportunity to earn up to **six course credits** while visiting the most important archaeological and historical sites **in Greece** over the course of **three weeks.**

The program is under the direction of *Dr. Tatiana Tsakiropoulou-Summers (UA-Modern Languages & Classics)* and will be facilitated by *Dr. Virginia Sisiopiku (UAB-Engineering).* UAB students who successfully complete the program will earn 6 semester hours in CL 380 Ancient Greek Civilization and Culture through UA. These 6 semester hours will be transferred from UA to UAB and will satisfy **6 of the 12 required semester hours and the course sequence** requirement for the UAB Core Curriculum (AREA II).

Requirements and Conditions

- ✓ Students must have completed their freshman year
- ✓ Cumulative GPA of at least 2.7
- ✓ At least 18 years old

Only **five (5) spots** are currently available to UAB students on a first-come, first-serve basis with paid enrollment. If interested conduct Dr. Sisiopiku at vsisiopi@uab.edu to reserve a spot. Application deadline is *February 15th, 2010.*

Itinerary

June 2: Depart USA for Athens

June 3: Arrive to Santorini via Athens

June 4-6: Santorini

June 7: Sail to Athens

June 7-9: Athens

June 10: Corinth, Nafplio

June 11: Mycenae

June 12: Epidavros

June 13-14: Olympia

June 15: Delphi

June 16: Litohoro

June 17: Mt. Olympus

June 18: Dion

June 19: Vergina, Litohoro

June 20-23: Pefkohori

June 24: Depart for US from Thessaloniki

Course Description

CL 380- Ancient Greek Civilization & Culture (6 hrs)

This course examines the cultural milestones of Greek civilization and its remains that have survived for over 2500 years. Participating students will visit ancient monuments, temples, agoras, gymnasia, ruins of ancient cities, and a large number of museums, all of which will give visual reinforcement to the lectures through the study of artifacts directly related to the historic events discussed. In so doing, participating students will become familiar with the social, economic, technological, intellectual, military, cultural, and religious aspects of Greek civilization and culture from the pre-historic settlements to the beginnings of the Byzantine Empire. Background readings, tests, quizzes, essays and daily journals will help the students assimilate the information presented.

PROGRAM COST

The cost of the program is $3,300. This includes:

- **Tuition & fees for 6 hours** of courses
- **International Student ID Card**
- **Student Health Insurance**
- **Transportation** in Greece with coach bus, boat, and hydrofoil
- **Group airport transfers**
- **Hotel rooms for 21 nights**
- **Breakfasts and some group dinners**
- **All entrance fees to museums & archaeological sites**

Students are responsible for purchasing their own airfare ticket.

ADDITIONAL INFORMATION

Additional information are available through the Study Away office, at http://www.eng.uab.edu/cee/faculty/vsisiopi/study_away.pdf, or directly from **Dr. Virginia Sisiopiku** (email: vsisiopi@uab.edu). Also, an information meeting will take place at UAB on November 17th, 2009. If interested, please email Dr. Sisiopiku to confirm location and time.

In preparation of the travel, a UA/UAB orientation meeting will be held in April 2010, where students will be given a booklet with information about Greece, travel preparations, and a list of suggested items to bring with them.

ALABAMA IN GREECE STUDY ABROAD PROGRAM

June 2 - June 24, 2010

General Information

UAB in collaboration with the University of Alabama is offering students the opportunity to earn up to **six course credits** while visiting the most important archaeological and historical sites **in Greece** over the course of **three weeks**.

The program is under the direction of Dr. Tatiana Tsakiropoulou-Summers (UA-Modern Languages & Classics) and will be facilitated by Dr. Virginia Sisiopiku (UAB-Engineering). Students who successfully complete the program will earn 6 semester hours in **CL 380 Ancient Greek Civilization and Culture** through UA. These 6 semester hours will be transferred from UA to UAB and will satisfy 6 of the 12 required semester hours and the course sequence requirement for the UAB Core Curriculum (AREA II). This option is only available for this particular study abroad course and will be treated as an exception to the UAB Core Curriculum requirements as outlined in the UAB Undergraduate Catalog.

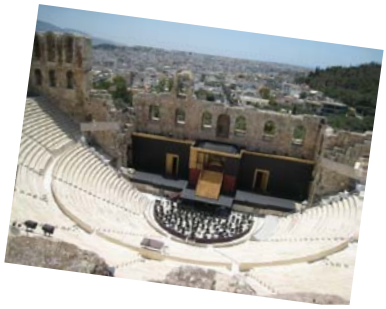
Pre-requisites and conditions: Students must have completed their freshman year, have a cumulative GPA of at least 2.7, and be at least 18 years old. **Only five (5) spots are available to UAB students** on a first-come, first-serve basis with paid enrollment. Application deadline is February 1st, 2010.

Course Description

CL 380- Ancient Greek Civilization & Culture (6 hrs.)

This course examines the cultural milestones of Greek civilization and its remains that have survived for over 2500 years. Students will visit ancient monuments, temples, agoras, gymnasia, ruins of ancient cities, and a large number of museums, all of which will give visual reinforcement to the lectures through the study of artifacts directly related to the historic events discussed. In so doing, students will become familiar with the social, economic, technological, intellectual, military, cultural, and religious aspects of Greek civilization and culture from the pre-historic settlements to the beginnings of the Byzantine Empire. Background readings, tests, quizzes, essays and daily journals will help the students assimilate the information presented.

Program Cost



The cost of the program is **$3,300** and includes

- Tuition & fees for **6 hours** of courses
- International Student ID Card
- Student Health Insurance
- Transportation in Greece with coach bus, boat, and hydrofoil
- Group airport transfers
- Hotel rooms for 21 nights
- Breakfasts and some group dinners (as funds permit)
- All entrance fees to museums and archaeological sites

Hotel Accommodations and Ratings

All hotels are first or second class and rooms are double or triple occupancy. Participants should be forewarned, however, that hotels in Europe tend to be smaller than US hotels and include fewer amenities.

Tentative Itinerary

The following itinerary is planned for the program. It follows roughly the chronological order of major events in the development of the ancient Greek civilization. Slight changes may be likely.

June 2 Depart the United States.

June 3 Arrive at Santorini via Athens. The island of Santorini is the site of an ancient catastrophic volcanic eruption, whose ashes preserved Akrotiri, a prehistoric village of the 17th century B.C. We begin, then, by examining the magnificent building remains of the Minoan civilization at that site and the brilliant artifacts found there, now exhibited at the museum. Spend the night at Thera [Blue Suites Hotel, 011-30-22860-25863].

June 4 First class lecture begins at 9:30 a.m. followed by a visit to the Museum of Prehistoric Thera. After that, you will have the chance to explore the island on your own. Spend the night at Thera.

June 5 Travel to Akrotiri to examine the remains of the ash-covered village. If Akrotiri is still closed, we will visit the acropolis of Ancient Thera. In the evening we will visit Ia to see one of the 10 most beautiful sunsets in the world. Spend the night at Thera.

June 6 Take a boat trip to the volcano's crater above the mythic Atlantis and later swim in the Thermal Springs. Spend the night at Thera.

June 7 Sail to Athens, a huge and bustling city and the capital of Greece. There we will study the famous Parthenon, the ancient Agora, where Socrates and Plato taught, and the National museum that holds treasures from all over Greece. Undoubtedly you will want to visit the Plaka area near the hotel, where you can stroll through the winding roads of the Old Town. Spend the night at Athens [Hotel Electra 011-30-21033-78000].

June 8 Visit the Acropolis, Mars Hill, the Parthenon, the Agora, and the Acropolis Museum. In the late afternoon, we will make our way to the Cape of Sounion, where the Temple of Poseidon sits on the edge of a promontory, to view the temple (where Lord Byron inscribed his name) and to see the magnificent sunset. Spend the night at Athens.

June 9 Visit Syntagma Square, the seat of Modern Greek government, and go by the University of Athens and the mansion of the archaeologist Heinrich Schliemann (who discovered the city of Troy), now housing the Ancient Numismatic Museum. Proceed to the National Archaeological Museum. Other sites you can visit on your free time are Lykavitos, the Epigraphical Museum, and the ancient cemetery of Kerameikos. In the evening, we will dine at "Ancient Tastes," a restaurant that recreates famously ancient Greek recipes-impressive enough to have hosted former President Clinton! Spend the night at Athens.

June 10 Travel to Nafplion. On the way, we will visit the ancient Agora of Corinth and its fortifications on the Acrocorinth. You will need <u>good</u> <u>hiking shoes</u> today! After we settle at the picturesque town of Nafplion, you will have the chance to climb the steps to the Medieval Castle of the city, Palamidi, explore the Old Town, or rent a boat to the Medieval prison on the island of Bourtzi [Agamemnon Hotel, 011-30-27520-28021].

June 11 Visit Mycenae, the palace of Agamemnon, and the famous "beehive" royal tombs. Bring a <u>flash light</u> to the site to explore the underground water fountain. Spend the night at Nafplion.

June 12 Visit Epidauros with one of the best preserved theaters from antiquity, an ancient hospital, the Asklepieion, and a museum. If you are so inclined, you may sing a song (no Rammer Jammers please!), play an instrument, recite a favorite poem or act out an excerpt from an ancient Greek play to test the marvelous acoustics of the ancient theater. Spend the night at Nafplion.

June 13 Drive to Olympia, the original home of the ancient Olympic Games and the chryselephantine statue of Zeus, counted among the Seven Wonders of the ancient world. Spend the night at Olympia [Hotel Antonios, 011-30-26240-22348].

June 14 Visit the site of the ancient Olympic Games and the Museum. We have a yearly tradition that those who want can run a foot race in the ancient Olympic stadium. The winning Olympians, one man and one woman, will be awarded the prize that was customary for the ancient Olympic victors! Spend the night at Olympia.

June 15 Travel to Delphi and visit the site of the oracle, where Apollo's priestess, the Pythia, gave predictions about the future. Bring a <u>flash light</u> to explore the underground tunnels. Spend the night at Delphi [Hotel Hermes, 011-30-22650-82318].

June 16 Travel to northern Greece. Litohoro is at the foothills of Mt. Olympus, the tallest mountain in Greece and the abode of the 12 mythological gods of ancient Greece. Spend the night at Litohoro [Hotel Pantheon, 011-30-23520-83931].

June 17 Today we will hike the foothills of Mt. Olympus along the Enipeus gorge. You will need hiking shoes and some provisions (water & snacks). Spend the night at Litohoro.

June 18 Travel to the site and museum of Dion, Alexander the Great's religious center, later transformed into a Roman colony. Spend the night at Litohoro.

June 19 Visit Vergina to see the palace and the magnificent tomb of Philip II, father of Alexander the Great. Spend the night at Litohoro.

June 20 Leave Litohoro and proceed to Pefkohori, a beach resort known for its clear water but also for its strategic geographic location, as it was through here that the Persians passed on their way to invade Greece ca. 490 B.C. We will spend the remaining days of the program at Pefkohori, where you will have the chance to complete your assignments before turning them in by June 23nd. [Adriana Studios 011-30-23740-61501]

June 24 Return to the US via Thessaloniki.

Attendance Policy

Attendance of class lectures at museums and archaeological sites is mandatory. Absences will seriously affect the student's final course grade.

What You Will Need

Students are responsible for obtaining their own passport (must allow at least 8 weeks for the process). U.S. citizens do not require visas or vaccinations to enter Greece.

Airline Tickets

The cost of the program does not include airfare tickets to and from Greece. Participants should purchase their own ticket, preferably through our agent, Gabriele Williams, at International Travel Consultants at 1-800-466-4660. Make plans to depart the U.S. on June 2nd and be on Santorini, Greece, on June 3rd (you lose one day traveling to Europe). June 4th is officially the first day of the program; class begins at 9:30 a.m. Hotel rooms and transportation are provided only for the duration of the program. Students who wish to travel elsewhere before or after the program dates are responsible for their own hotel and transportation arrangements.

Your airline itinerary should comply with these dates:
6/2 depart US; arrive Athens, GR
6/3 depart Athens; arrive Santorini, GR
6/24 depart Thessaloniki GR; arrive USA

Additional Information

Additional information can be obtained from **Dr. Virginia Sisiopiku** via email vsisiopi@uab.edu. Also, an information meeting will take place at UAB on November 17th, 2009. If interested, please email Dr. Sisiopiku to confirm location and time.

In preparation of the travel, a UA/UAB orientation meeting will be held in April 2010, where students will be given a booklet with information about Greece, travel preparations, and a list of suggested items to bring with them.

APPENDIX D

5TH ANNUAL STUDENT AWARDS LUNCHEON PROGRAM

5th ANNUAL STUDENT AWARDS LUNCHEON

Celebrating the Achievements of Transportation Students

Friday, November 19, 2010
11:30 a.m.-1:00 p.m.

The University of Alabama at Birmingham
Business and Engineering Complex (BEC) Room 215
1150 10th Avenue South, Birmingham, AL

AGENDA

11:30	Buffet Lunch and Networking	
11:45	Welcome	*Dr. Virginia P. Sisiopiku*, Associate Professor - Alabama at Birmingham
11:50	Student Competition Awards Presentation	*Dr. Mike Anderson*, Associate Professor - University of Alabama in Huntsville
12:00	Evaluation of Ramp Metering on Interstate 65 in Montgomery, AL	*Mr. Brian Wysock*, University of Alabama
12:20	Incident Management Study in the Birmingham Region	*Ms. Ozge Cavusoglu*, University of Alabama at Birmingham
12:40	New Factors for Disaggregation of Freight to a Local Level	*Ms. Tahmina Khan,* University of Alabama in Huntsville
1:00	Closing Remarks	*Dr. Virginia Sisiopiku*, Associate Professor University of Alabama at Birmingham

Congratulations to all 2010 UTCA Travel Award Recipients:
Rong Li (UA), Gaurav Mehta (UA), Zack Ryals (UA), Brian Wysock (UA), Ozge Cavusoglu (UAB), Bharat Kallem (UAB), Cheng Zhong (UAB), Tahmina Khan (UAH); Mary Catherine Dondipati (UAH), Dong Wang (UAH); Nitin Sharma (UAH).

This event is sponsored by the University Transportation Center for Alabama (UTCA) and the UAB ITE Student Chapter

http://maps.google.com/?q=1150+10th+Avenue+South+Birmingham+AL