

REFERENCES - References

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[3] Oh, L. & Polak, J.W., 2009, Measure of interpersonal interactions in maintenance activity duration decisions: An inference with respect to episode history and travel-related attributes, Working Paper, Centre for Transport Studies, Imperial College London

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APPENDIXES

Appendix A

A.1 Fact finding Techniques Used

Written documents and onsite observations just tell that how the system should operate. They do not include enough details to allow a decision to be made about the merits of system proposal and don't present the user views about the current system. I conducted interviews of the staff as given bellow, which were directly involved with the application.

Questionnaires

1. What are the data you need to collect?
2. Why do you need these data?
3. What are the ways of collecting them?
4. What type of system do you use correctly whether manual or automated system?
5. How do you analyze the collected data?
6. Is there a need to have another system or changing the existing system?
7. If another system is needed, what are the basic requirements of that system?
8. What are the benefits of having that system?
9. What are the draw backs of current system?
10. Can you easily access the data? Give the reasons?
11. Is the data or information you have sufficient or do you need to collect more data?
12. What are the ways of collecting data?
13. What are the requirements that the user needs?
14. What are the requirements that the system needs?
15. What are the technologies that you are planning to use for new system?
16. Is the necessary hardware configuration and software platform is already there?
17. Are you willing to bear the cost of hardware and software needs?
18. Do you need more trained users or will you be able to train existing users?

19. Are you willing to bear the training cost?

Also the regular users of the application were interviewed. Based on their viewpoints, clear system requirements were jolted down.

Analysis of gathered requirements

The main purpose of this activity is to clearly understand the exact requirements of the user/customer. The following basis questions pertaining to the project should be clearly understood by the analyst in order to obtain a good grasp of the problem.

1. What is the problem?
2. Why is it important to solve the problem?
3. What are the possible solutions to the problem?
4. What exactly are the data input to the system and exactly are data output required of the system?
5. What are likely complexities that might arise while solving the problem?

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The following tables describe how the other sources were used to cater the path in approaching in to the final solution for the current problem domain.

Main Objectives Approached	Reviewed Sources and Others	Final Outcomes
Discussion with stakeholders	Research Students, Research Assistant, Head of Division.	Problem Specification, functional requirements and implementation modulus.

Self Learning of Main Components in Traffic Engineering	Head of Division. Formal entry sheet of survey sheet, Lecture Materials of Traffic Surveys,	Functional requirements (contd). Top Level Architecture
Self Review of Traffic counts Estimations	Types of survey entry forms, calculation of growth rates formulas, survey reports	Top Level Architecture(contd.) Domain model

Table 1: Steps of how approach to the solution



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A.3 Vehicle Classification regarding for current problem domain

V.T No.	Vehicle Classes	Notation from	Categories
PASSENGER VEHICLES			
1	Motor Cycles	MCL	1. All type of Motor Cycles.
			II. All types of Scooters.
			III. Challis.
			IV. Very small Motor Cycles (such as Foot cycles.) With or without registration number.
2	Three Wheelers	TWL	1. All types of three wheel Vehicles.(Petrol or Diesel)
3	CARS	CAR	1. All types of Cars
			II. All types of Jeeps.
			III. Small Single & Double Cabs.





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			IV. Small VANS –(Micro Vans, Townace, Lightace, Vannet etc...) maximum 2 Rows sheet
4	Van	VAN	1. VANS (with or without Passengers & Goods.) Maximum 16 Passengers capacity.
			Eg.School vans, Office staff vans, delivery van etc...
5	Medium Passenger Vehicles	MBU	1. Medium Busses which having maximum 29 Sheets.
			Eg.Mitsubishi Rosa-Busses
6	Large Passenger Vehicles	LBU	1. All large busses which having single or double doors. More than 29 sheets. (Normally this type of busses has two doors)
			Eg. Lanka Ashok Leylend busses, TATA 909 busses,



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			ISSUZE busses,	
			Large toure busses, etc...	
GOODS VEHICLES				
	7 Light Vehicles	Goods	LGV	1. Small Lorries having two axles and four wheels.
				II. Crew cabs
				III. Large Cabs
	8 Medium Vehicles	Goods	MG1	All types of Lorries and Trucks having two Axles and 06 wheels
				and gross weight should be less than 8.5 Tons. (GVW<8.5Tons)
				(with or without Body) (Justify by experience)
				Eg. ELF250, delivery small Lorries, Cantor, etc...

	9 Large Lorries	MG2	All types of Lorries and Trucks having two Axles and 06 wheels
			and gross weight should be greater than 8.5 Tons. (GVW>8.5Tons)
			(with or without Body) (Justify by experience)
			Eg. TATA1210 lorry, Ashok Leyland lorry, ISSUZE lorry, etc....
	10 Three Axles Vehicles.(Combined)	HG3	All vehicles having combined three Axles.
	11 Three Axles Vehicles.(articulated)	AG3	All three Axles articulated Vehicles.
	12 Four Axles Vehicles.(articulated)	AG4	All four Axles articulated Vehicles.




13	Five Axles Vehicles.(articulated)	AG5	All five Axles articulated Vehicles.
14	Six Axles Vehicles.(articulated)	AG6	All six Axles articulated Vehicles.
FARM VEHICLES			
	15 Farm Vehicles	FV15	I. Two wheel Tractor with Trailer.(Land Master)
			II. Four wheel Tractor with or without Trailer.

Table 2: Vehicle Types –Road Development Authority

These vehicle classifications are regarding to the Road Development Authority. These Classifications were important as in some occasion Transportation Engineering Division needs conducted surveys conducted by the Road Development Authority. The next Table shows the Vehicle classification System usage in Transportation Engineering Division.

Vehicle Type	Description
Car/Saloon	All types Of Cars
Motor Cycle	<ul style="list-style-type: none"> • All type of Motor Cycles. • All types of Scooters. • Challis.
Three wheel	All types of three wheel Vehicles.(Petrol or Diesel)
 Van	<p style="text-align: center;"> University of Moratuwa, Sri Lanka. Electronic Theses & Dissertations www.lib.mrt.ac.lk </p> <p>Vans without Goods</p> <p>Truck without Trailers (dimo batta ,Nissan etc)</p> <p>School vans, Office staff vans, delivery van etc.</p>
Utility(Jeep/Van/Pickup)	<p>All types of Jeeps.</p> <p>Small Single & Double Cabs.</p>

Mini Bus	Medium Busses which having maximum 29 Sheets
Large Bus	All large busses which having single or double doors. More than 29 sheets. (Normally this type of busses has two doors)
Light Goods Vehicle	Small Lorries having two axles and four wheels.
Medium Goods Vehicle(MG1)	All types of Lorries and Trucks having two Axles and 06 wheels.
 Heavy Goods Vehicle(MG2)	All types of Lorries and Trucks having two Axles and 06 wheels
Multi Axel(HG3+AG3+AG4+AG5+AG6)	<p>All vehicles having combined three Axles.</p> <p>All three Axles articulated Vehicles.</p> <p>All four Axles articulated Vehicles.</p> <p>All five Axles articulated Vehicles.</p>

	All six Axles articulated Vehicles.
Tractors(FVH)	Two and Four wheel Tractor with or without Trailer.
Service Vehicles	School service vans
Bicycles	Motor Cycles which have no registration numbers
Carts	A vehicle that use animal power

Table 3: Vehicle Type-Transportation Engineering Division



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Car/van/jeep
Car/van
Car/jeep
Van/jeep
Large bus/Mini bus


Goods vehicle1(Light/medium/heavy)
Goods vehicle2(Light/medium/heavy/Multi axel)
Multi axle((HG3/AG3/AG4/AG5/AG6))

Table 4: Group Vehicle Type-Transportation Engineering Division

Each individual class is considered as a vehicle type. Some times in gathering traffic counts at surveys, equal characteristic. For example car, van, jeep can be grouped to generate separate other vehicle class. The current system has the classification relevant to the both above mentioned two ways. There is some occasion that all vehicle types got together as to a whole vehicle.



A.4 System Users

User	Tasks	Features proposed
Administrator	Manage Traffic Database(1)	Separate module to add/delete/update traffic database
	Maintain Survey reports(2)	Separate module with features to connect with file server and upload/download and manage survey reports
	Manage User Accounts(3)	Separate module to add/delete/update users and their privileges.
	Manage new survey entry sheets (4)	Separate modules with the features of add new survey sheets
	Configure default settings (5)	Separate modules for both time and vehicle
	Estimate Traffic Counts(6)	The Traffic Counts are estimated in different scenarios. Separate modules are proposed for each scenarios

	Analytical Estimations(7)	Separate modules for each analytical estimation like growth rate, forecasting and distribution chart to analyze
Department Users	Manage new survey entry sheets (4)	Same modules as Administrator with minor features
	Configure basic settings (5)	Same as mentioned in Administrator
	Maintain Survey reports(2)	Same modules as Administrator but only to upload documents.
	Estimate Traffic Counts(6)	Same as in Administrator
Normal Users	Estimate Traffic Counts(6)	Same as in Administrator

Table 5: System Users Tasks

Appendix B

B.2 Use Case Diagrams

Administrator

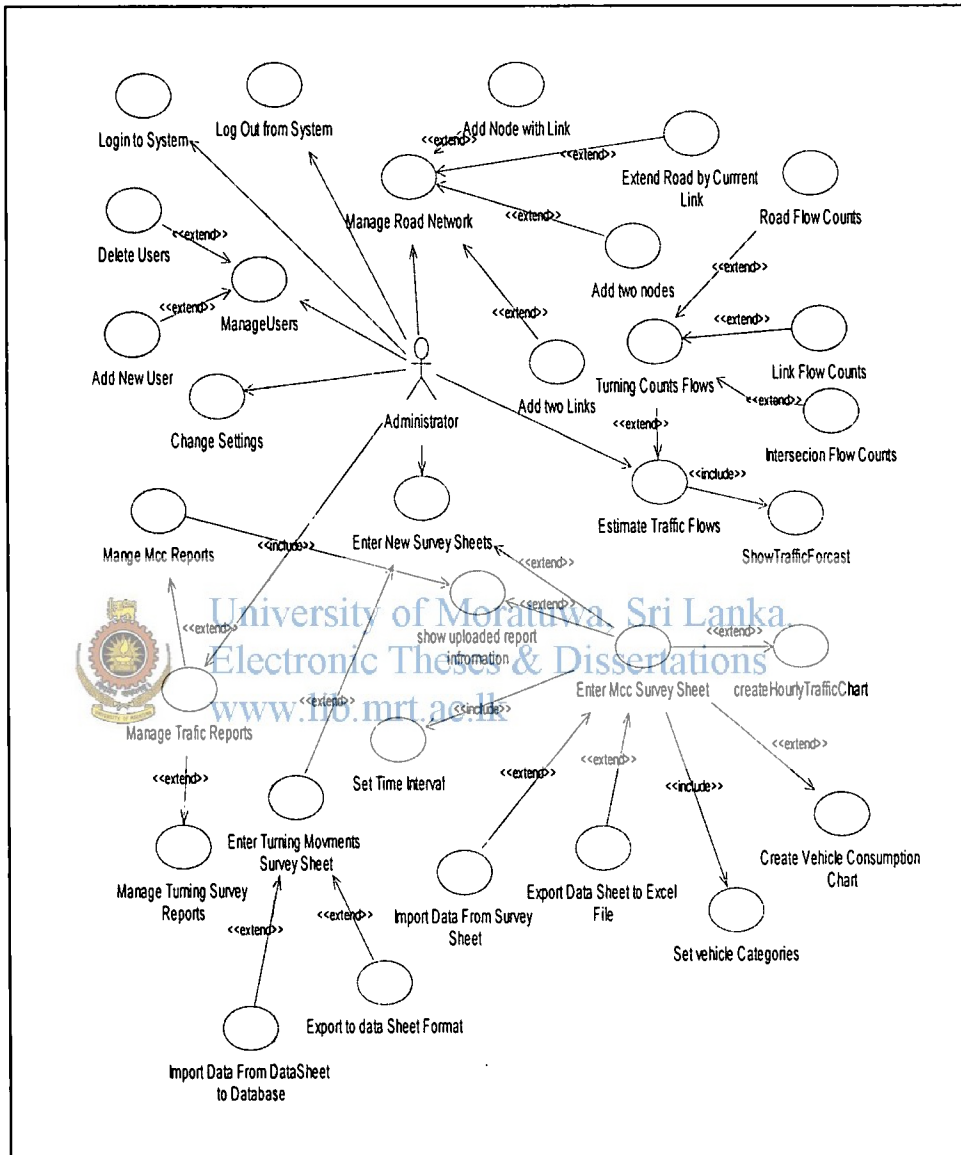


Figure 16: Administrator Use Case

Department User

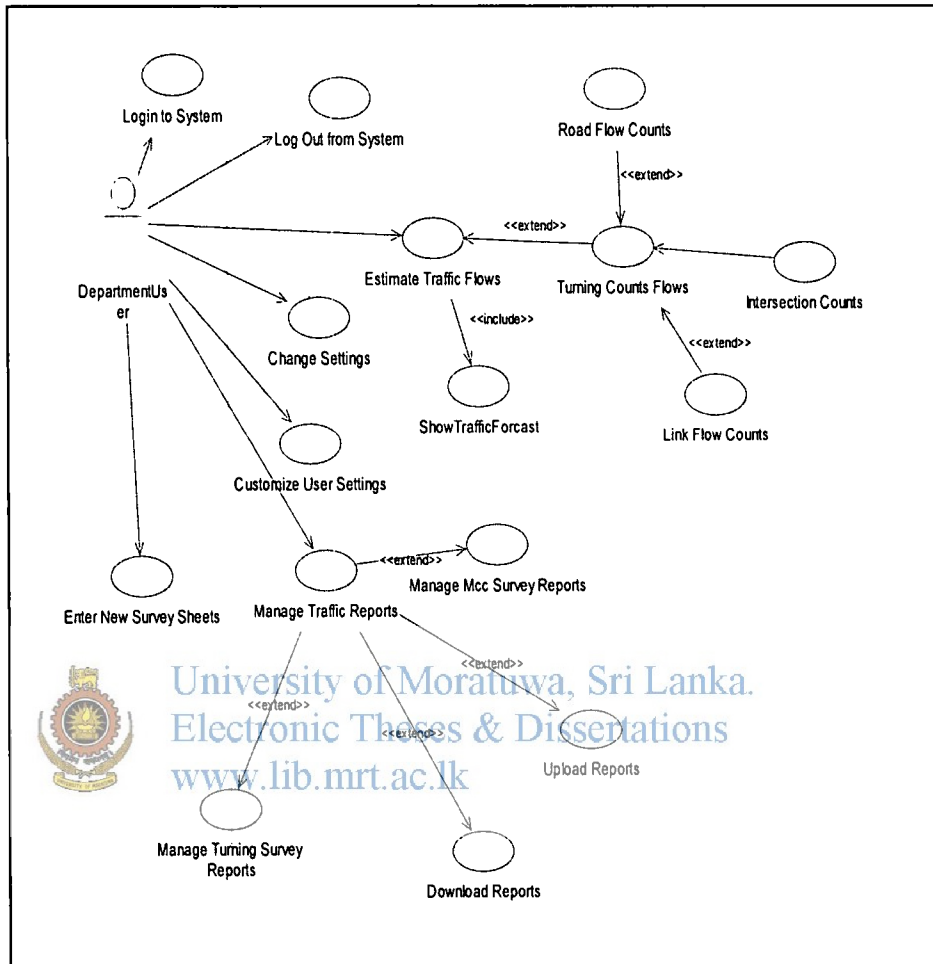
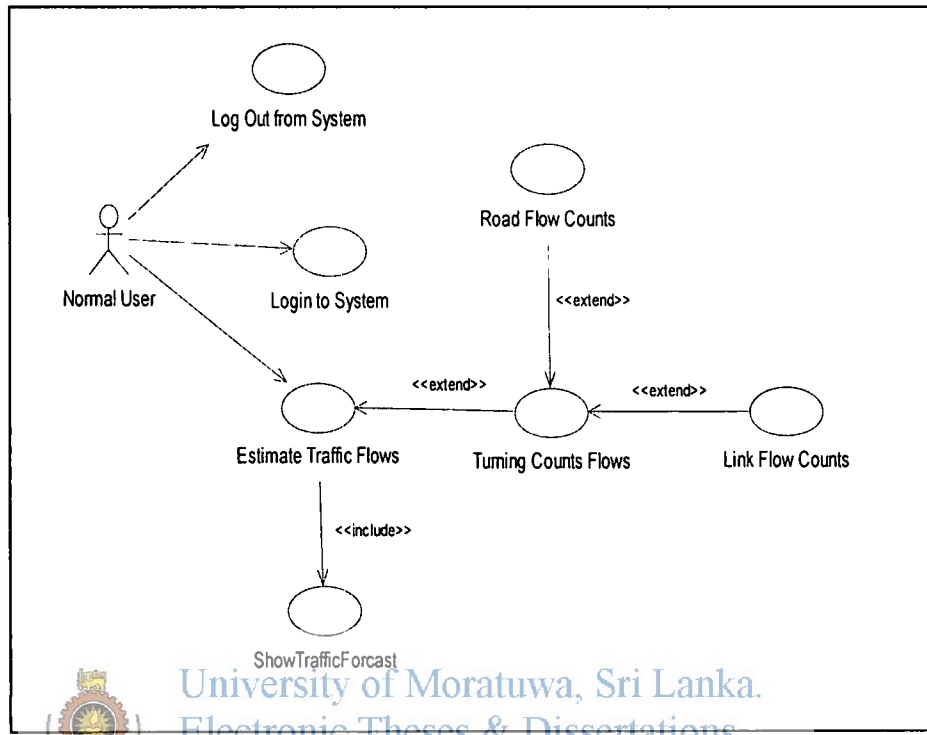


Figure 17: Department User's Use Case

Normal User



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Figure 18: Normal User's use case

B.3 Use Case Specification

B.3.1 Import Data from Excel Survey Sheet to the database

Basic Description:

This Use Case describes activities of how to enter a newly conducted MCC survey sheets in to the database by importing entered excel sheet file.

Flows of Events

- User selects the survey locations of regarding to the conducted survey sheet. (In Manual Classified Counts, Traffic location is given by the road, start node, end node, surveyed date, start time and end time parameters).
- If already have records for the location the survey sheet is loaded with those basic settings (Time and Vehicle class settings as for that survey sheet) and records. Otherwise the new survey sheet is created with default time and vehicle settings.
- The User prepare the System created survey sheet as it in the excel sheet.
- Lock the survey sheet.
- System display a dialog box to let the user to select the excel file.
- Import and extract all the records in to the database.

Alternative Flows

- If the user wants to delete current records, the users can delete the records and create a new survey entry sheet according to the default time and vehicle class settings.
- If the imported file format is not tally with the system survey entry form a message is displayed and stop the extracting.
- If the importing file is not available an error message is displayed.

Pre Condition

- The User should be logged as Administrator.

Post Condition

- None

B.3.2 Export survey entry sheet to a excel sheet.

Basic Description:

This Use Case describes the activities of how to export survey sheets in to the excel sheet file.

Flows of Events

- User selects the survey locations of regarding to the conducted survey sheet. (In Manual Classified Counts, Traffic location is given by the road, start node, end node, surveyed date, start time and end time parameters).
- If already have records for the location the survey sheet is loaded with those basic settings (Time and Vehicle class settings as for that survey sheet) and records. Otherwise the new survey sheet is created with default time and vehicle settings.
- User Click the export button
- System exports the records in to a file
- System ask to view the files
- User can open the exported file by clicking yes, otherwise it will save to the

Alternative Flows

- If the user wants to delete current records, the users can delete the records and create a new survey entry sheet according to the default time and vehicle class settings.
- If the exporting file does not have name a message is displayed and stop the extracting.
- If the system survey entry sheet does not have record the exported file is created with empty records.

Pre Condition

- The User should be logged as Administrator or Department user.

Post Condition

- None

B.3.3 Manage Users (Add New User).

Basic Description:

This Use Case describes the activities of how to create survey sheets in to the excel sheet file.

Flows of Events

- User selects the survey locations of regarding to the conducted survey sheet. (In Manual Classified Counts, Traffic location is given by the road, start node, end node, surveyed date, start time and end time parameters).
- If already have records for the location the survey sheet is loaded with those basic settings (Time and Vehicle class settings as for that survey sheet) and records. Otherwise the new survey sheet is created with default time and vehicle settings.
- User Click the export button
- System exports the records in to a file
- System ask to view the files
- User can open the exported file by clicking yes, otherwise it will save to the local path

Alternative Flows

- If the user wants to delete current records, the users can delete the records and create a new survey entry sheet according to the default time and vehicle class settings.
- If the exporting file does not have name a message is displayed and stop the extracting.
- If the system survey entry sheet does not have record the exported file is created with empty records.

Pre Condition

- The User should be logged as Administrator or Department user.

Post Condition

- None

B.4 Activity Diagram

B.4.1 Manage MCC Survey

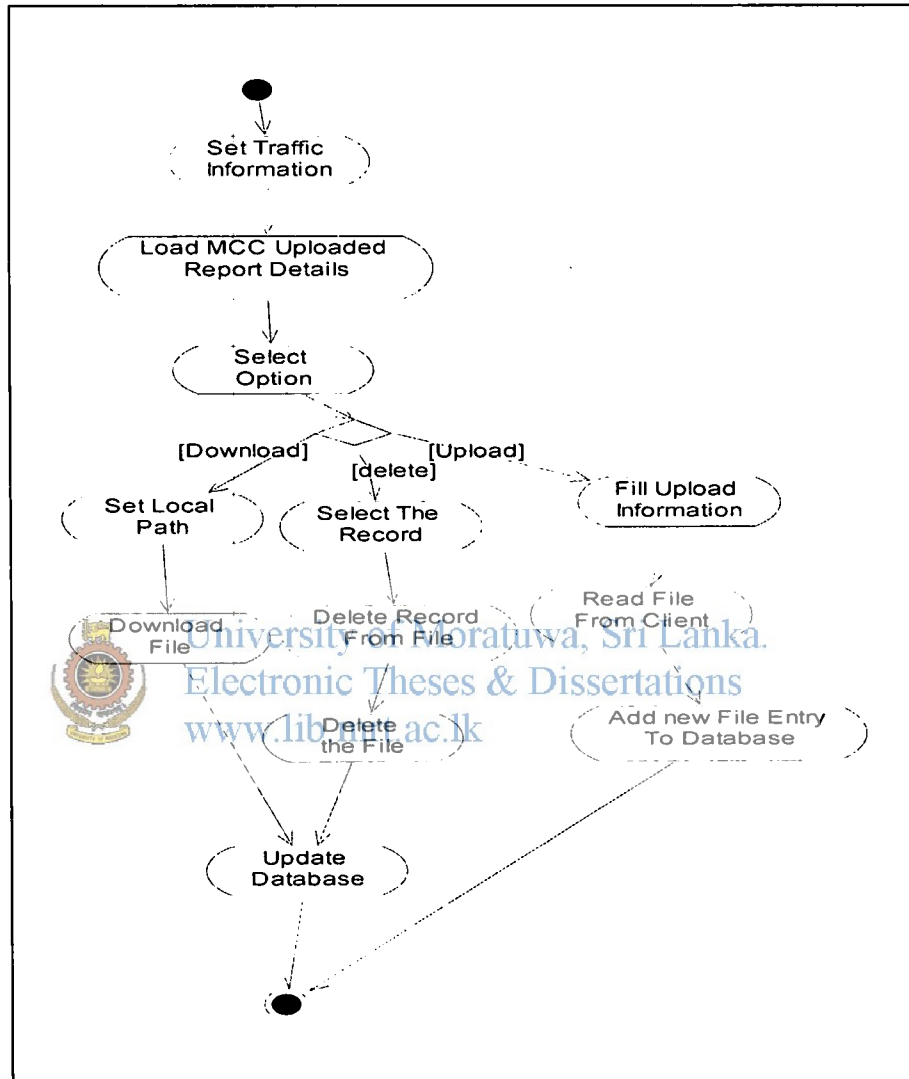


Figure 19: Manage MCC Survey

B.4. 2 Import Survey Sheet File to the database

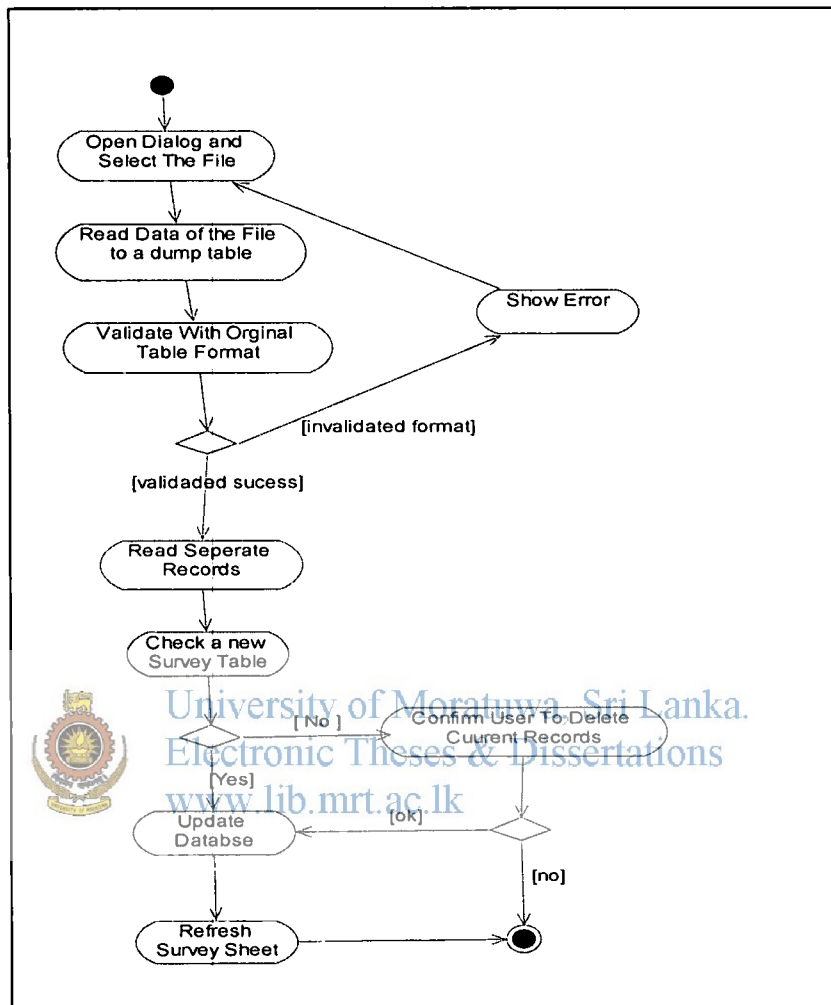


Figure 20: Import Survey Sheet Files to Database

B.4.3 Manage MCC Survey reports

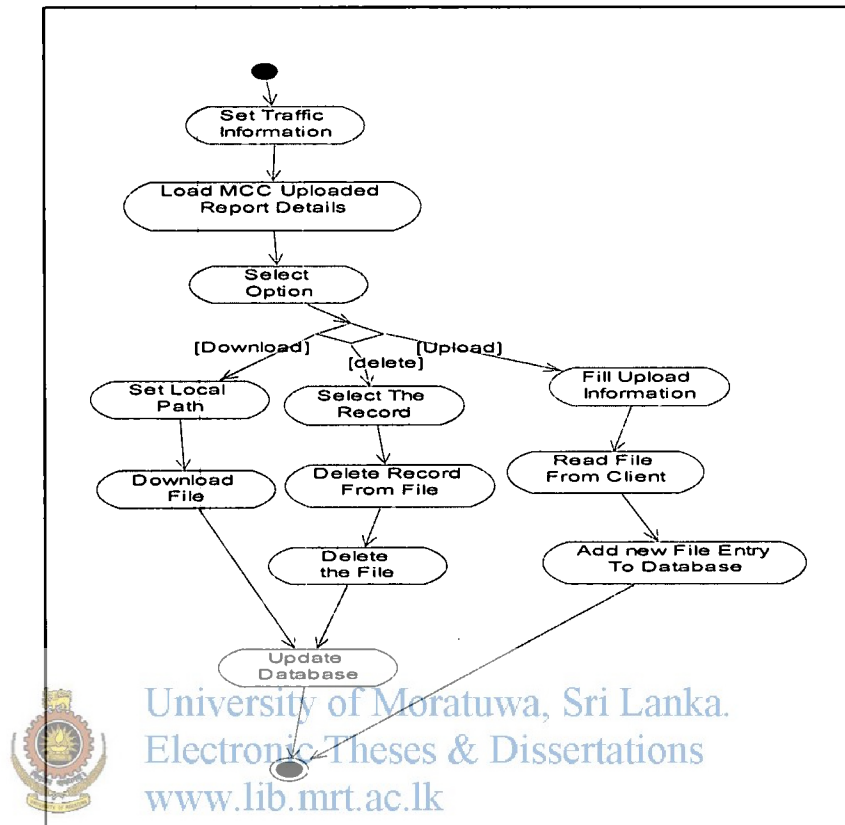


Figure 21: Manage MCC Survey reports

B.4.4 Set Default Settings

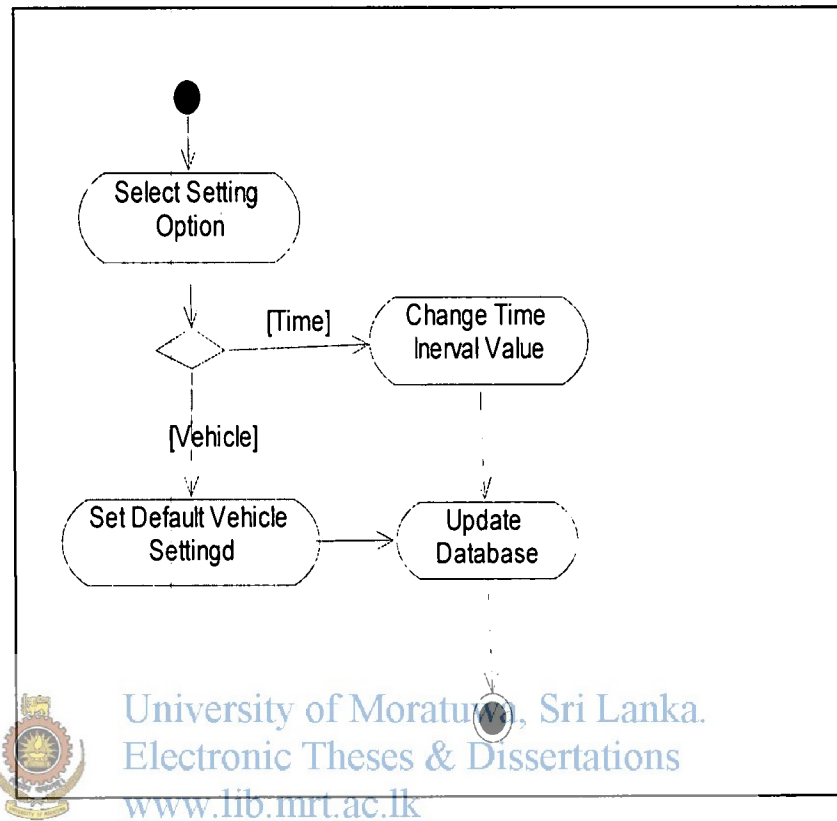


Figure 22: Set Default Settings

B.4.5 Estimate Traffic Flow Counts

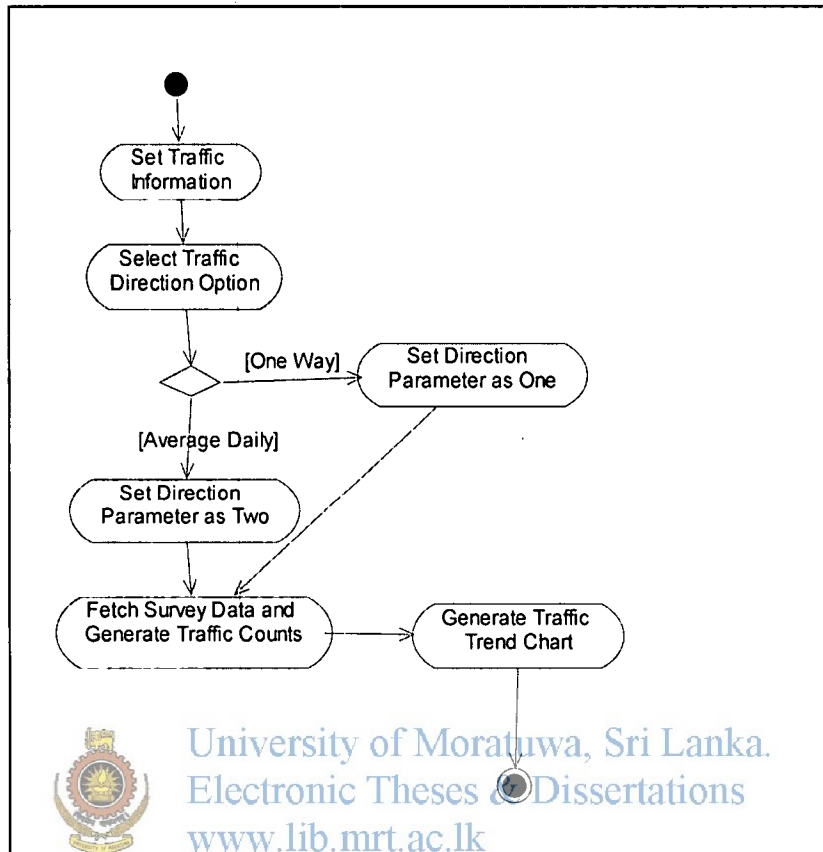


Figure 23: Estimate Traffic Flow Counts

B.4.6 Update Road Network

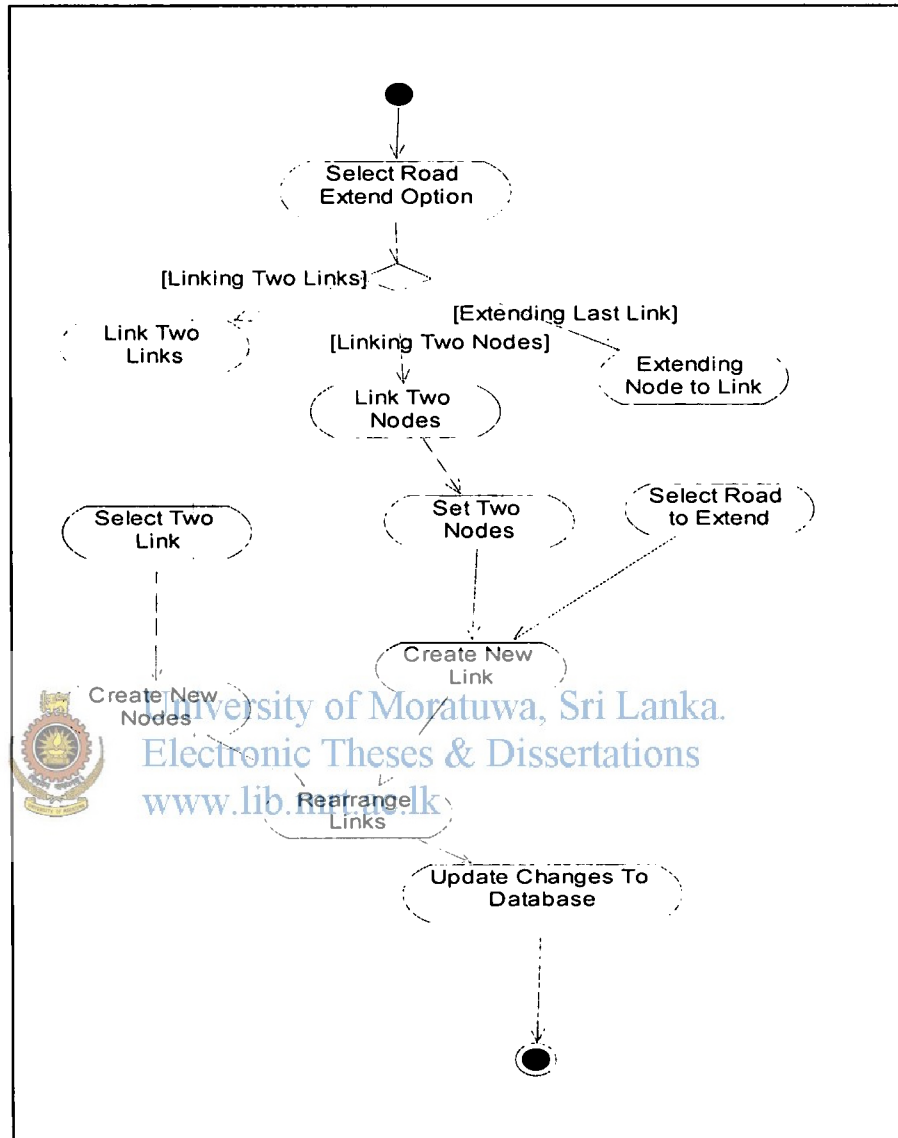


Figure 24: Update Road Network

B.4.7 Estimate Link Flow Counts

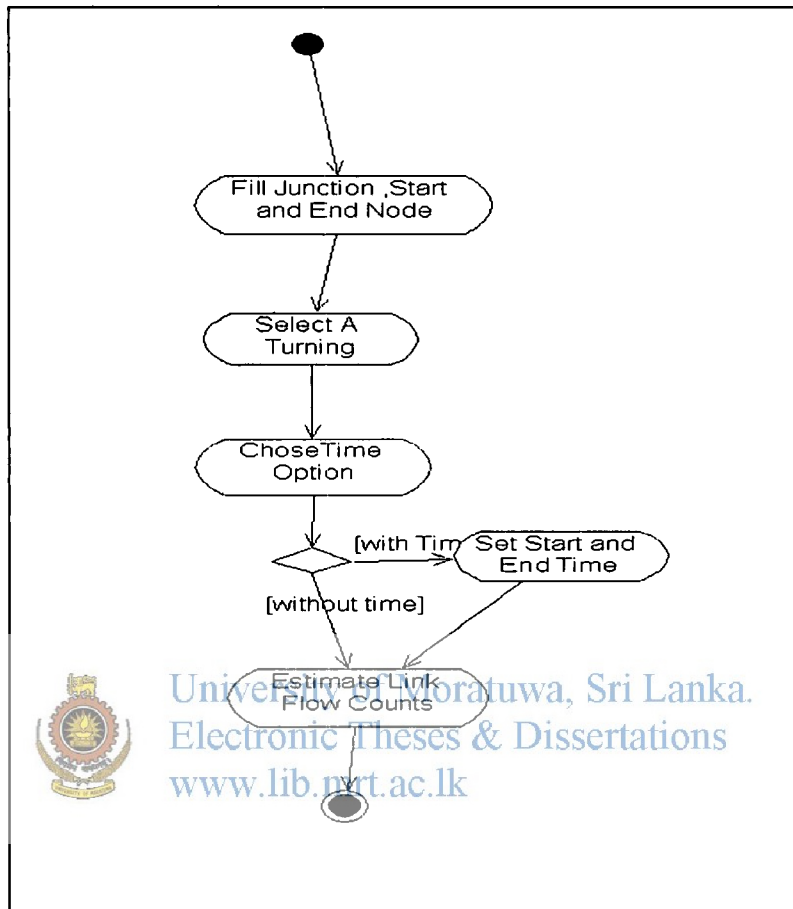


Figure 25: Estimate Link Flow Counts

B.4.8 Road Flow Counts

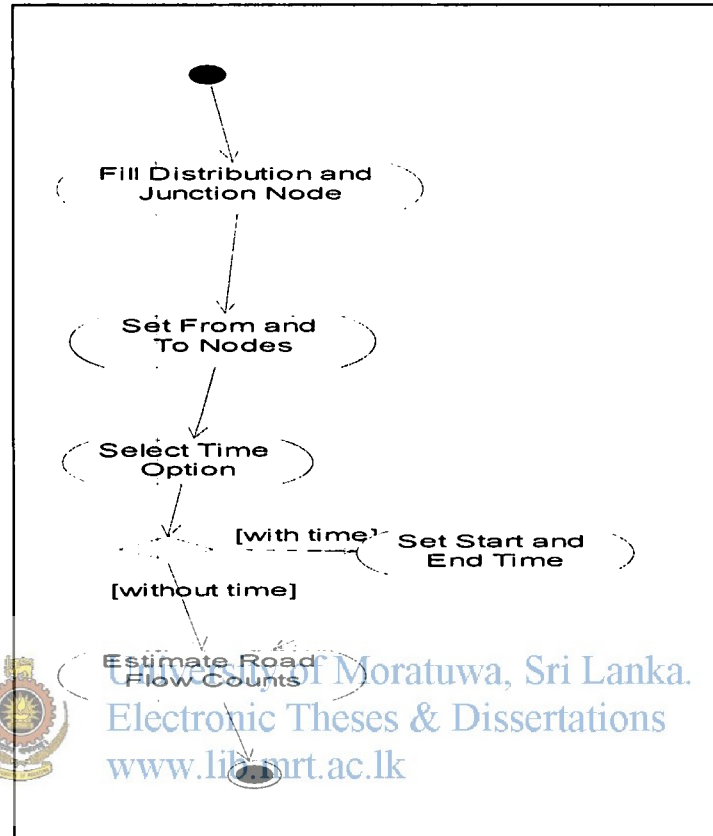


Figure 26: Road Flow Count

B.4.9 Enter Turning Movement Survey Sheet

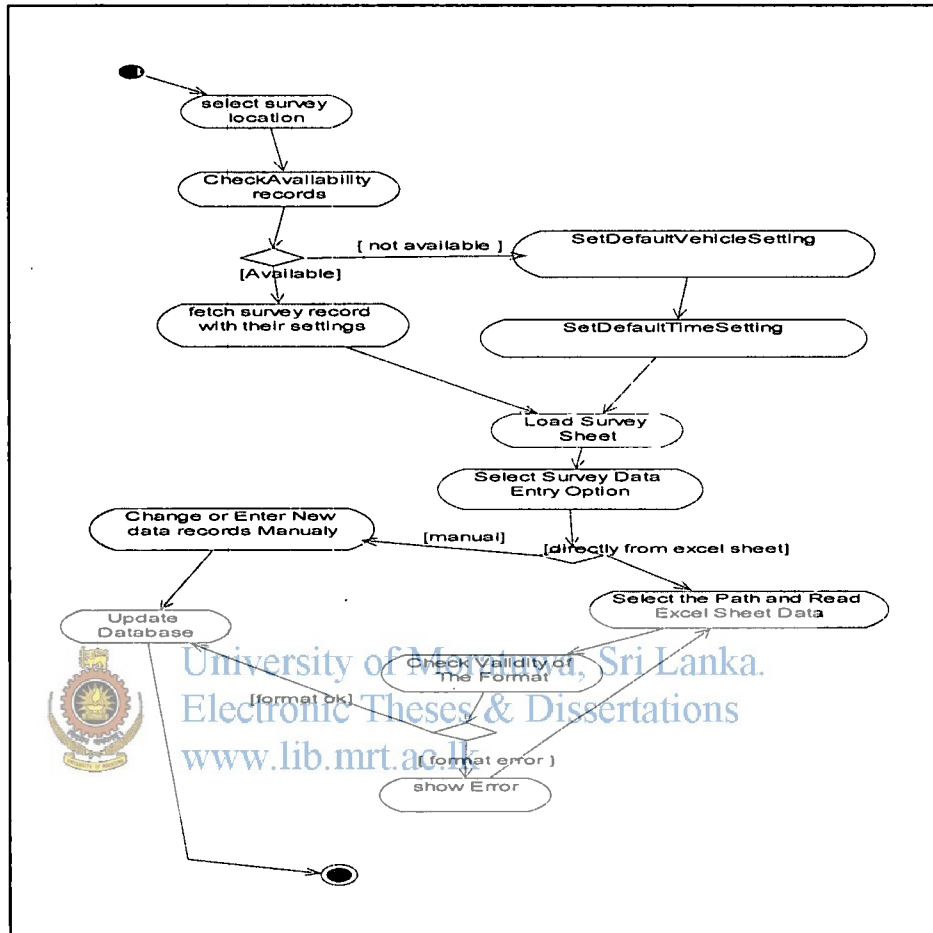
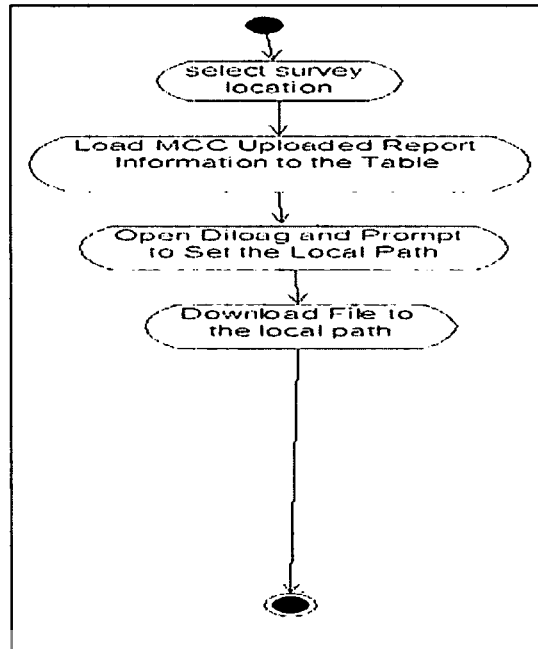


Figure 27: New Turning Sheet Entry

B.4.10 Manage MCC Reports (download)



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Figure 28: Manage MCC Reports

This Activity diagram describes visual abstraction for the use case specification of Manage MCC Survey Reports.

B.5 Business Activity Diagram

Business activity diagram shows the interaction between each of activities at separate processes. It represents all the business activities in a system regarding to particular actor in the system.

B.5.1 Enter New MCC Sheet

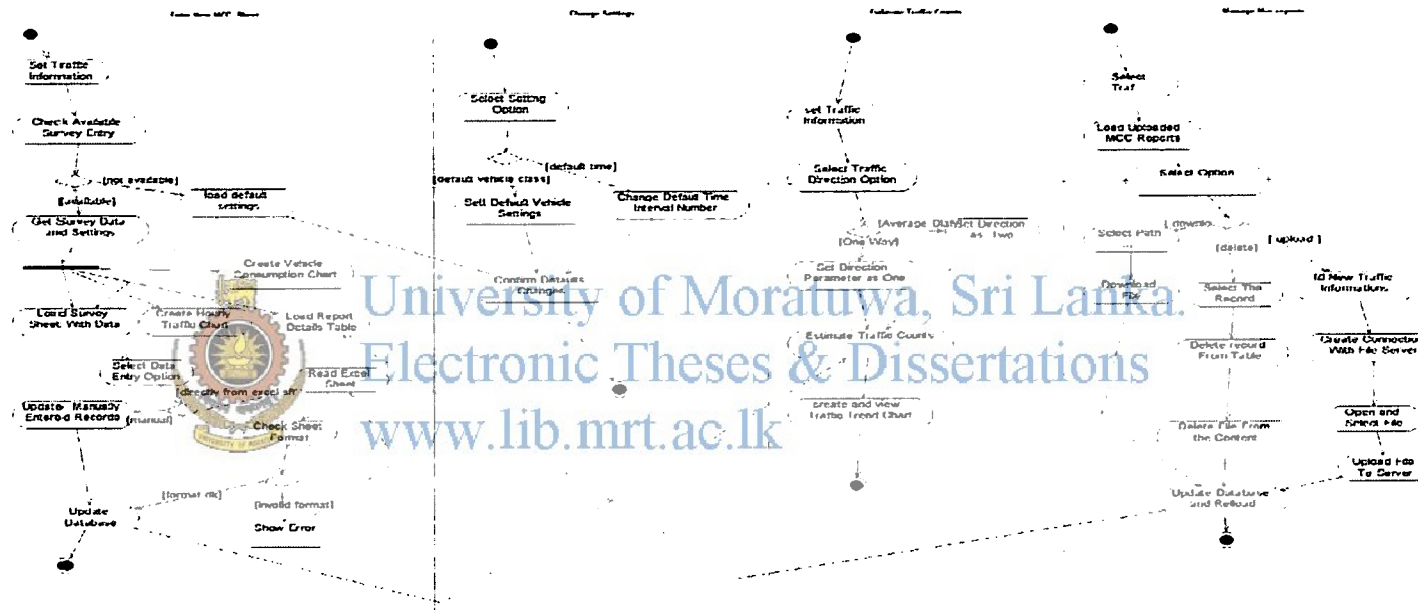


Figure 29: New MCC Entry Sheet-Business Activity Diagram

B.5.2 Enter New Turning Movement Sheet-Business Activity Diagram

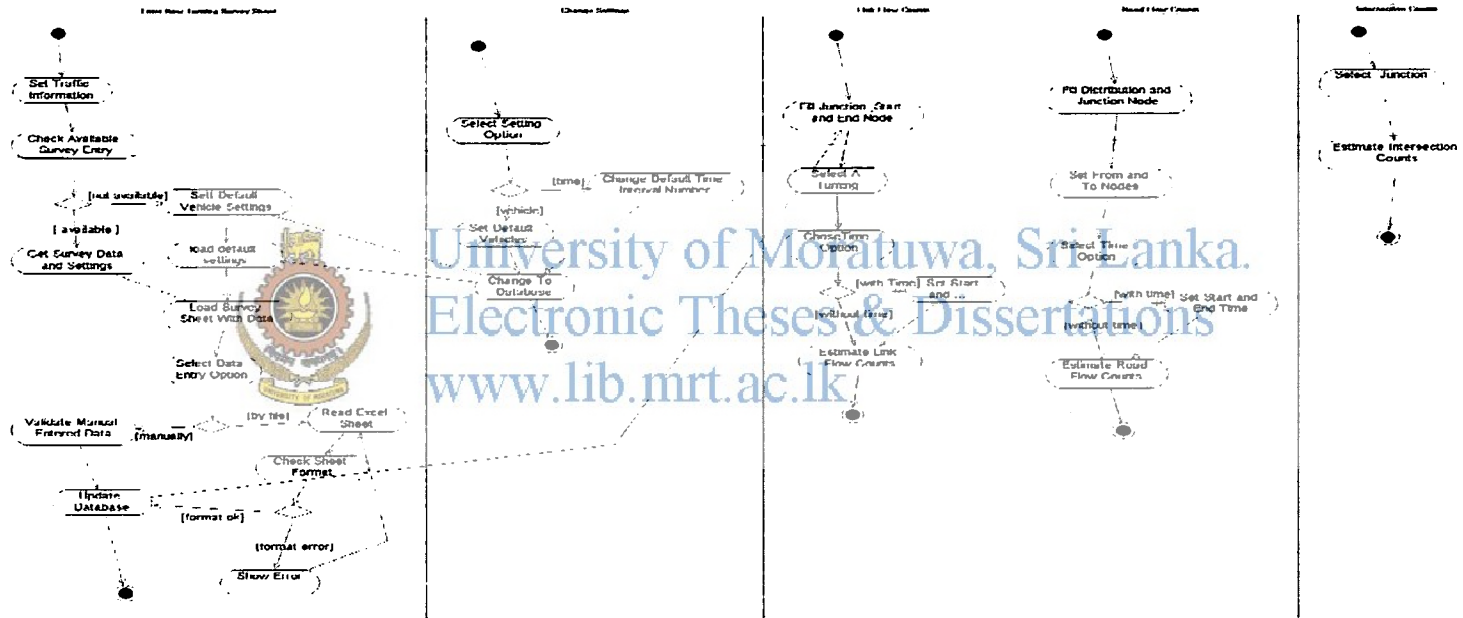


Figure 30: New Turning Entry-Buisness Activity Diagram

B.6 Sequence Diagram

B.6.1 Enter New Turning Movement Sheet-Sequence Diagram

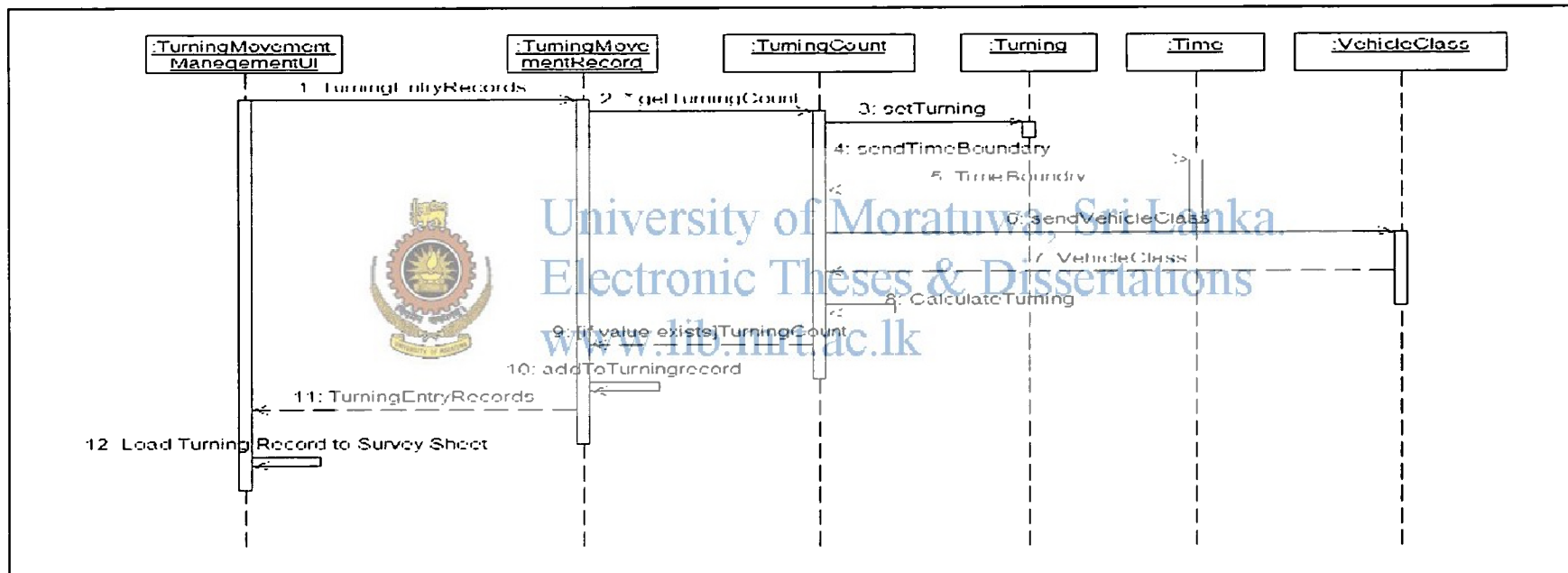


Figure 31: New Entry Turning Sheet –Sequence Diagram

B.7 Component Diagram

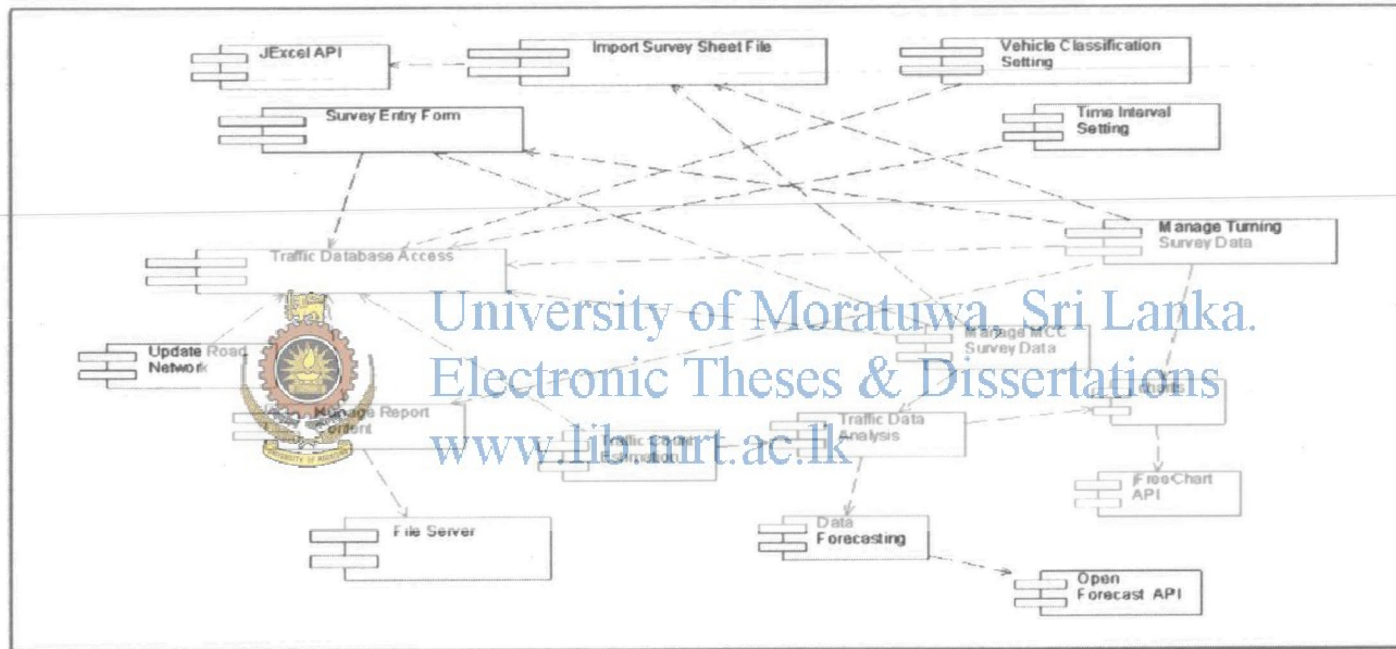


Figure 32: Component Diagram

B.8 Package Diagram

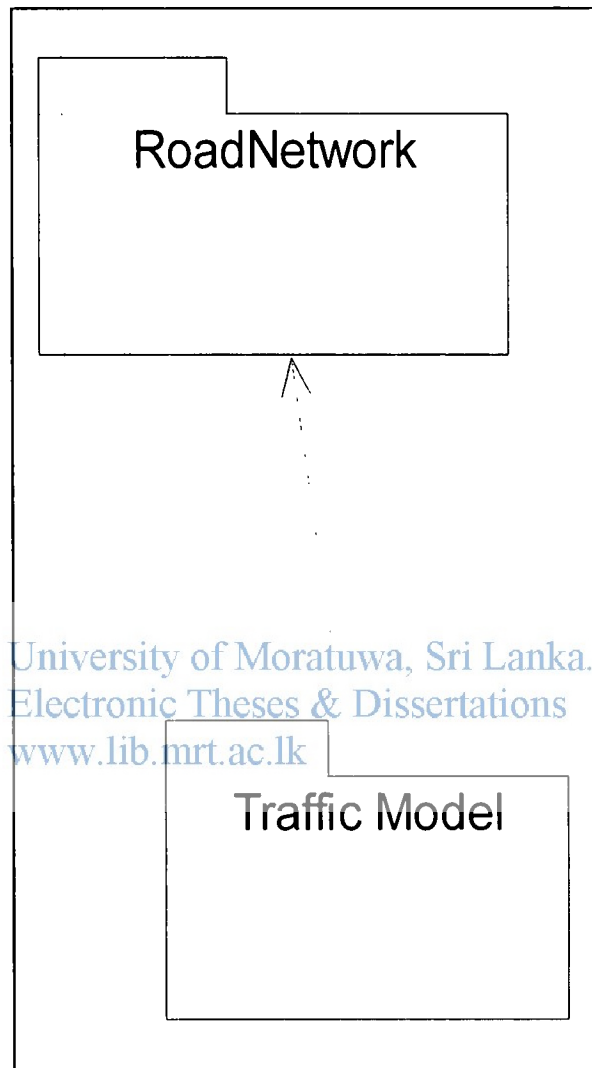


Figure 33: Package Diagram

B.9 Class Diagrams

B.9.1 Road Network

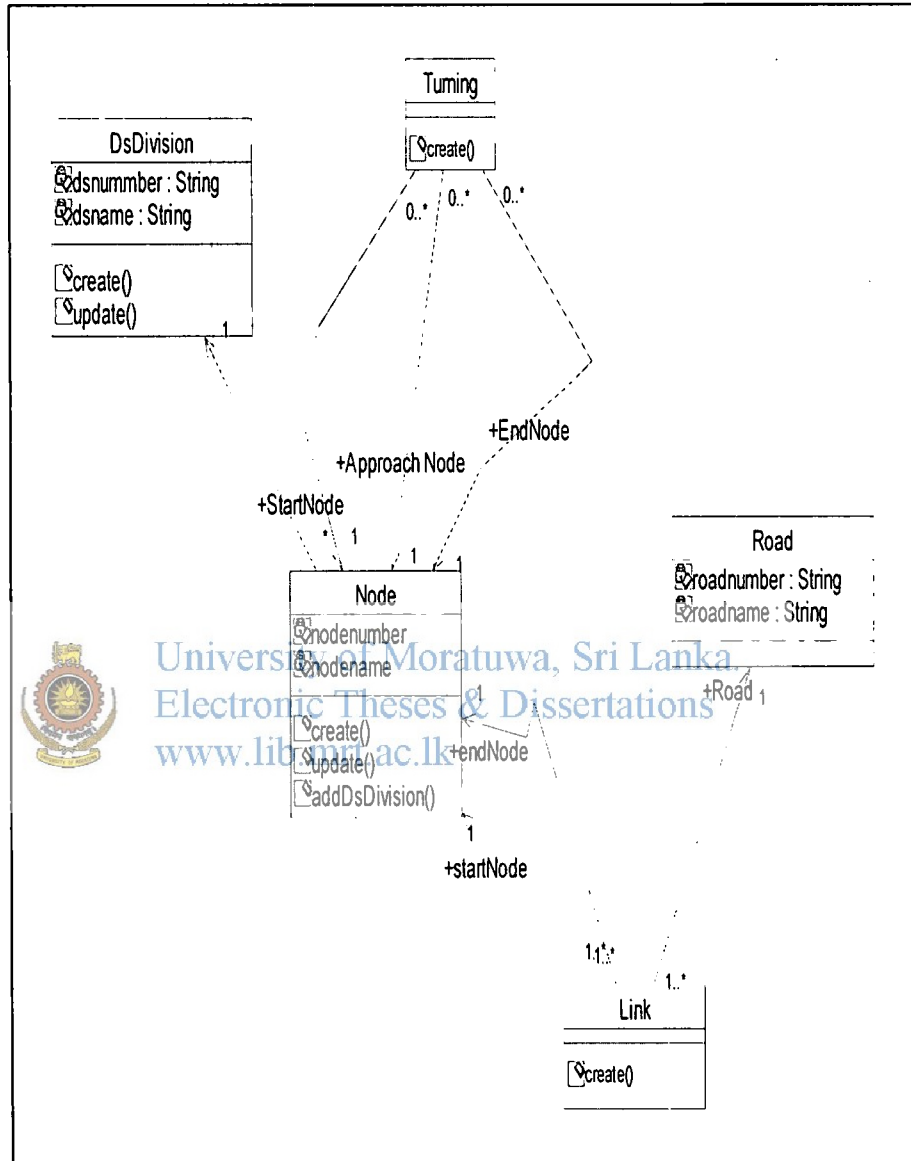


Figure 34: Road Network Package Diagram

B.9.2 Traffic Model

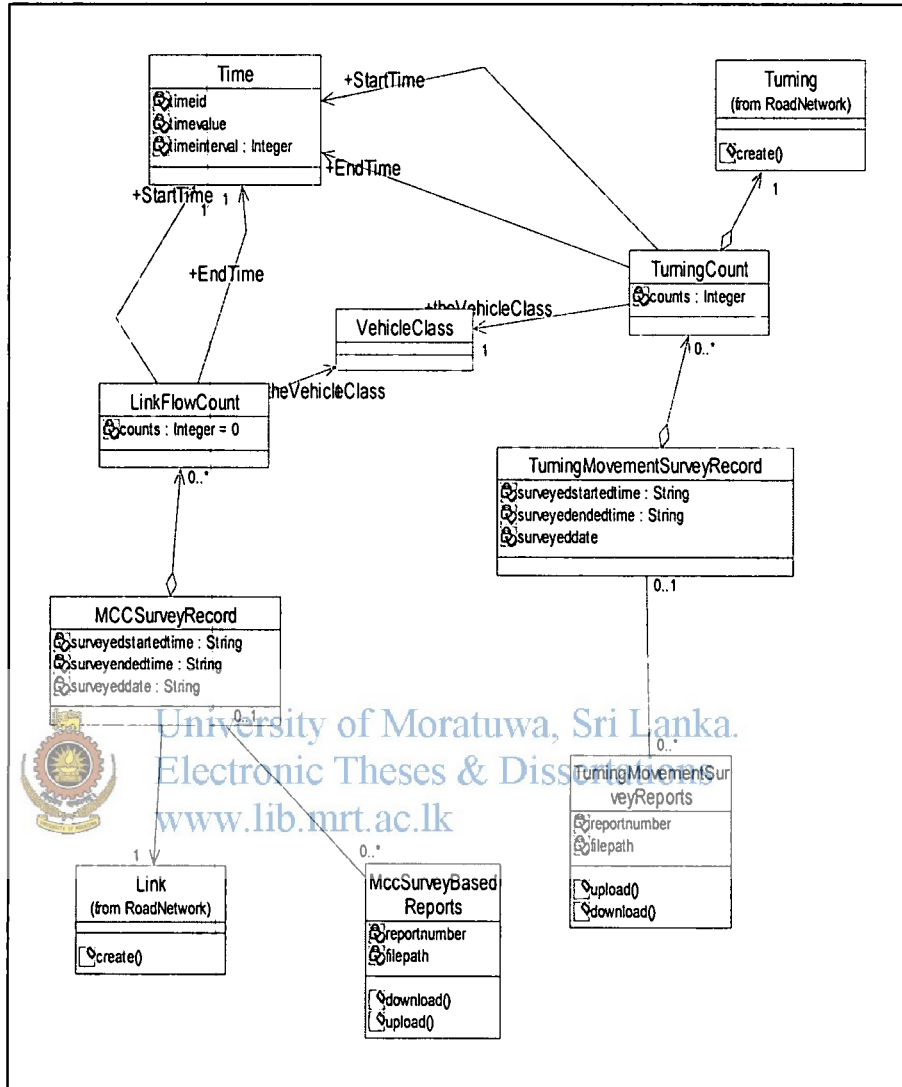


Figure 35: Traffic Model- Package Diagram

B.9.3 Component Details

Component	Task	Dependency
Java JDBC Driver	Provide access to the database	-
Traffic Database Access	Provide Appropriate Data Results from the Database	Java JDBC Driver
Traffic Counts Estimation	Estimate the Traffic Counts (Turning /Road)	Traffic Database Access
File Server	Provide secure connection with the file server	-
Manage Report Content	Provide Facility to upload/download and remove survey reports files	File Server Traffic Database Access
Survey Entry form	Provide useful data sheet views to enter data.	Traffic Database Access
Manage Turning Survey Data	Manage insert/update /delete of Turning survey entries	Survey Entry forms Traffic Database

		Access
Import Survey Sheet File	Provide File Input Stream handlers to obtain data from the survey entry sheet files to the UI grid view	jexcel API
Vehicle Classification Settings	Provide functionalities to customize vehicle class for new survey entry sheet	Traffic Database Access
Time Interval Settings	Provide facilities to customize the time interval settings for new survey entry sheet	Traffic Database Access
Manage Survey Data	Manage MCC insert/update/delete of Turning survey entries	Survey Entry forms Traffic Database Access Traffic Data Analysis
Update Road Network	Provide functionalities to update road network structures	Traffic Database Access

	(Add new Roads/extends roads)	
Open Forecast API	Provides forecasting methods	-
Data Forecasting	Provide functionalities to forecasting of value sets given by relevant periods.	Open Forecast API
charts	Provide functionalities to create graphical outcomes from datasets.	Traffic Database Access jfreecharAPI
Traffic Data Analysis	Retrieve analytical outcomes	Data Forecasting, charts



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Table 6: Usage of Component

B.9.4 ER Model

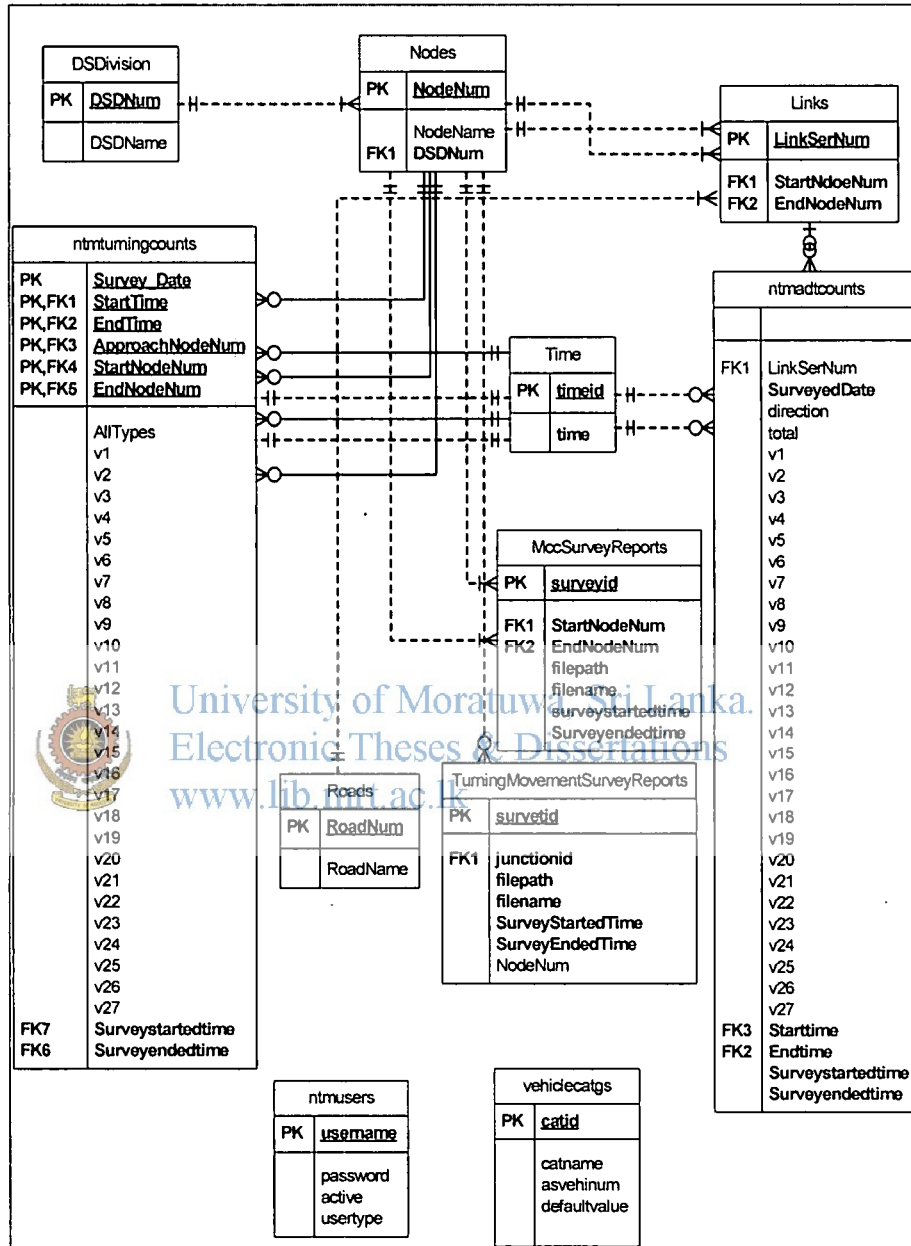


Figure 36: ER Diagram

Appendix C

C.1 Implementation (interfaces and Diagrams)

C.1.1 User Login



Figure 37: System Login page

This is the first interface that meets when the system starts. This interface provides all types of users to login to the system by giving user name and password.

C.1.2 Administrator Main Menu

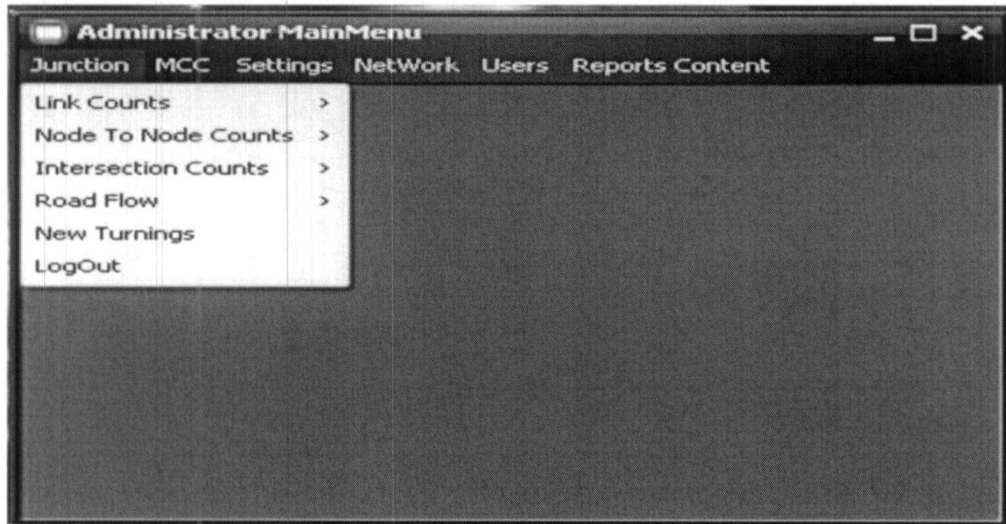


Figure 38: Administrator Main Page

All users have separate main interface with their functionalities. The above figure shows the main interface that meet after the Administrator was logged to the system. All administration functions that are declared at the use case can be seen in this interface.



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C.1.3 Link flow Counts with Time

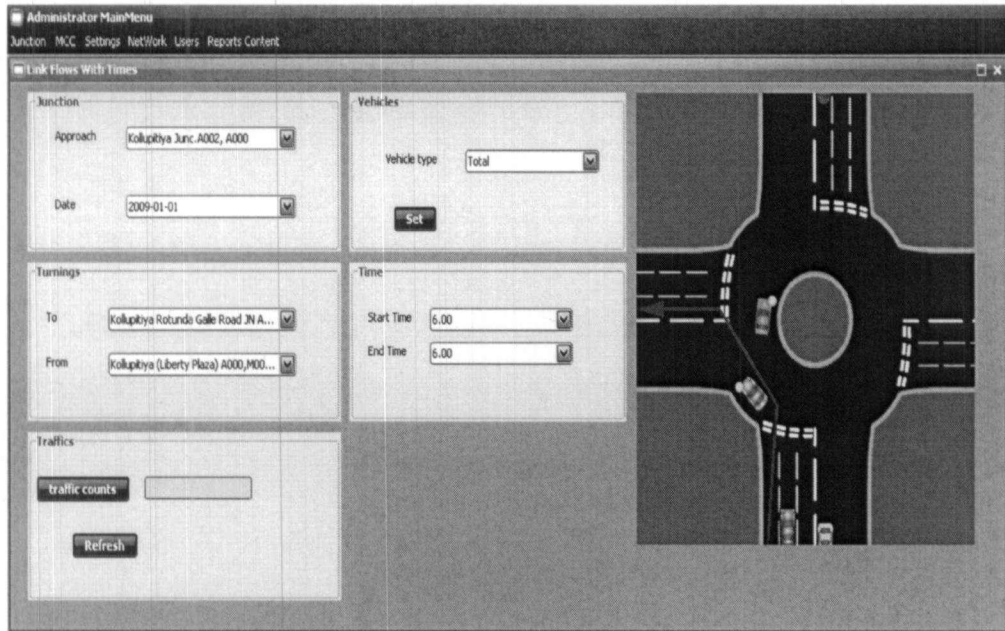
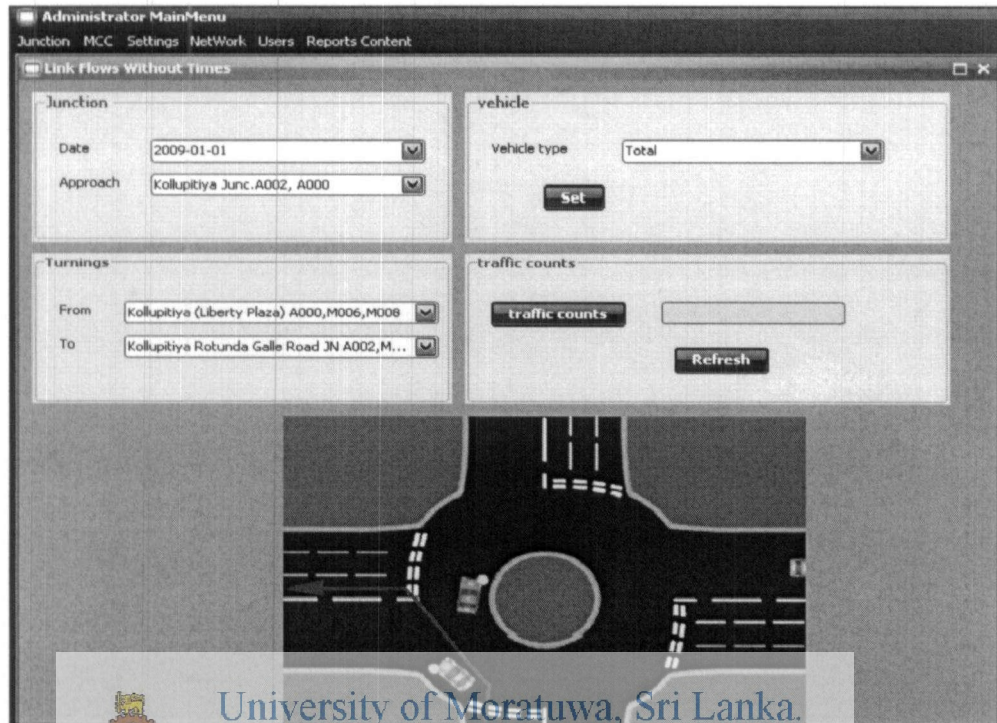


Figure 39: Link Flow Counts at The Junction

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This interface provides the user to obtain the link flow count at a junction. The link flow counts give the number of turnings from one direction to other possible direction through the main junction. There are 12 possibilities of turnings. First the user needs to select the junction and then from and to direction regarding to the junction. This interface provides to obtain the counts by each vehicle types and each of desired time intervals.

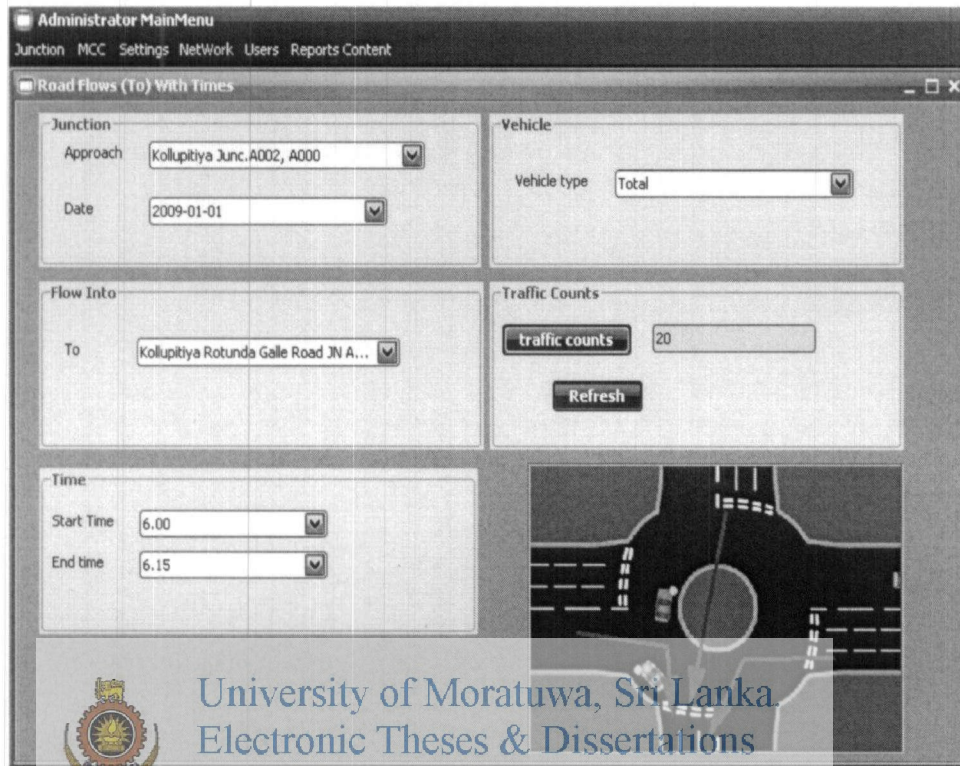
C.1.4 Link flow Counts without Time



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This the same as above mentioned interface, but without time interval the users are given total traffic counts.

C.1.5 Road Flow (To) Counts



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Figure 41: Road Flow (To) Counts at the Junction

This Interface provides the user to get the number of approaches from each direction on to a given road at junctions. This also provides get it from each vehicle class and any desired time interval. The user needs to select the junction and the main nodes to get the mentioned traffic counts. These turning counts are estimated from the Turning movement surveys results. Therefore the users can also select the date of the surveys.

C.1.6 Road Flow (From) Counts

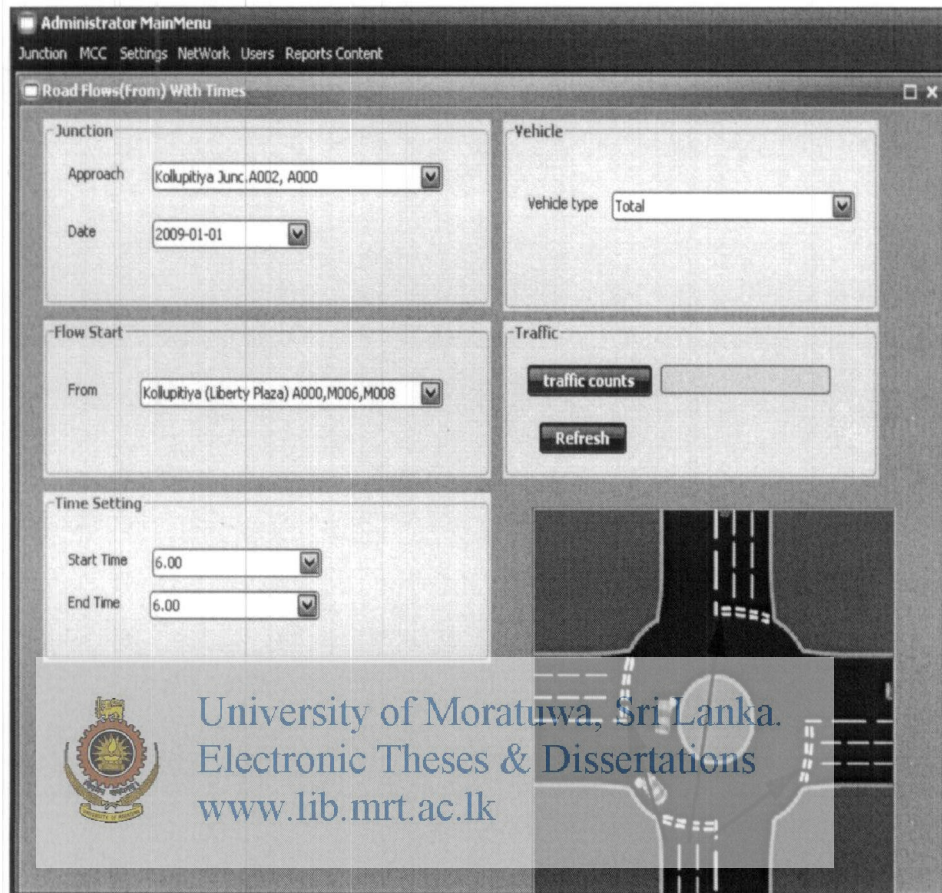


Figure 42: Road Flow (From) Counts at the junction

This is same as above, but the counts are estimate reverse order as above. That is number of flows from one direction to other possible directions. The users first select the desired junction and flow direction.

C.1.7 Manage Turning movement Surveys

This Interface provides the facilities to manage Turning movement survey Entry Sheets. Before does any management first user must select the survey location. This tab provides the facilities for that. Junction, start node, data, survey started time and survey ended time are the basic parameter for identifying a conducted survey location.

junction survey entry

source Read download

Junction Search

startnode

Date Set..

Start Time

End Time Refresh

Fill the information according to your survey sheet.
Set the different vehicle categories and Time Interval with your survey sheet by using "Setting" from menu bar.
New source

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Figure 43: Enter Information for new Turning movement data sheet

C.1.8 Turning movement traffic counts type Survey Sheet

This is tab provides a survey sheet to manage the traffic counts. This survey sheet can dynamically change the vehicle headers by using Vehicle Order button and change the direction by using Change Direction button. The Users can edit each entry and needs to save them by using "Save" button. In addition there is couple of other functionalities can be seen. The delete button to clear the survey sheet whiles the refresh button to refresh the survey sheet. The "convert to excel" button provides the facility to save the given sheet as excel sheet.

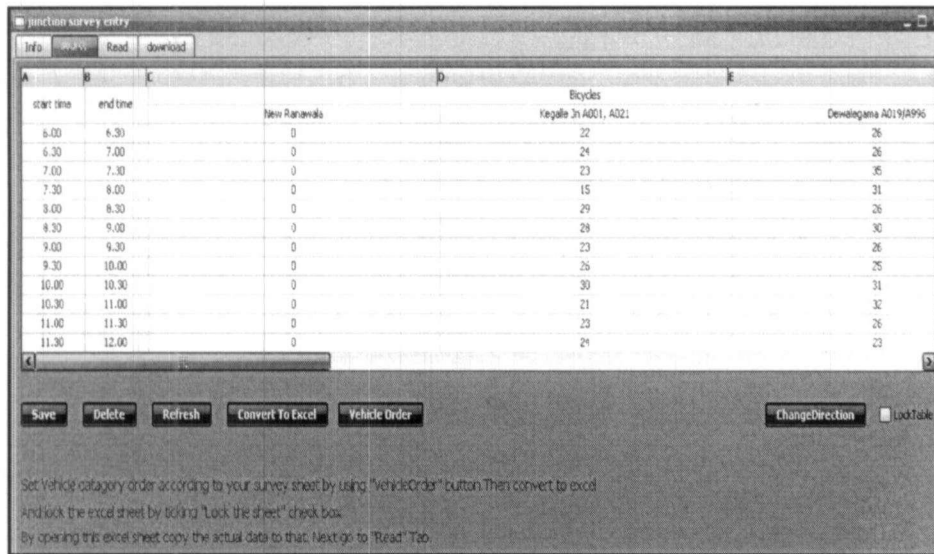


Figure 44; Data view on turning movement data sheet

C.1.9 Read survey sheet as a excel file

This interface gives the facility to import survey sheet as a excel sheet.



Figure 45: Import turning movement data as a excel sheet

This interface gives the download facility for turnings movement reports regarding to the conducted survey location.

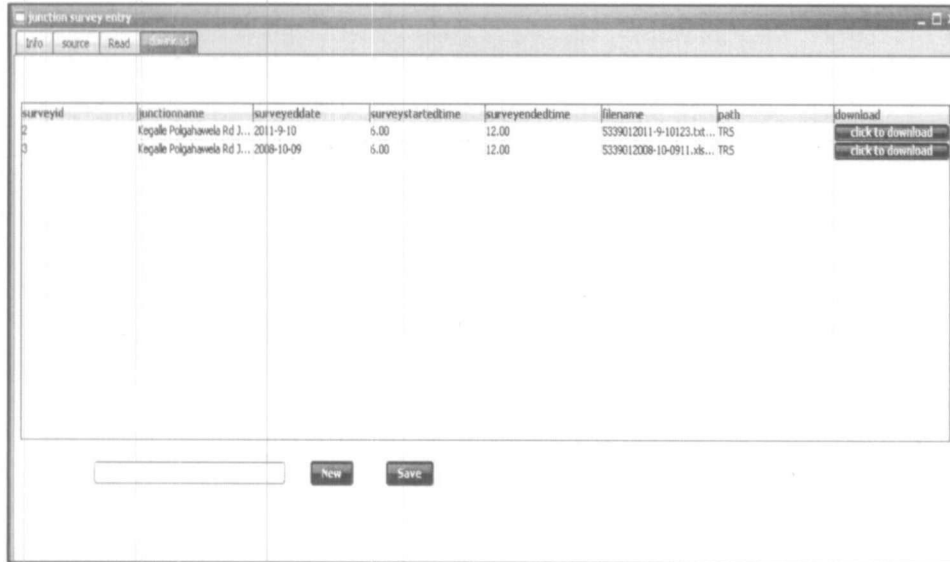


Figure 46: Download relevant reports regarding to the survey location

C.2.0 Manual classified reports download/upload

This interface provides the facility to upload or download soft document or report for particular survey location.

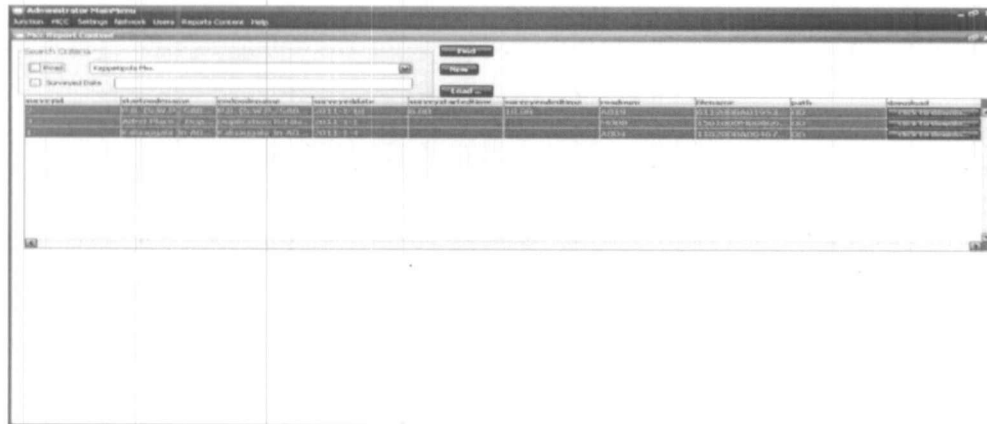


Figure 47: MCC survey reports content page

C.2.3 New road entry



Enter a New Name For New Link (ex: A002-Colombo Matara)

Road No

Road Name

Next



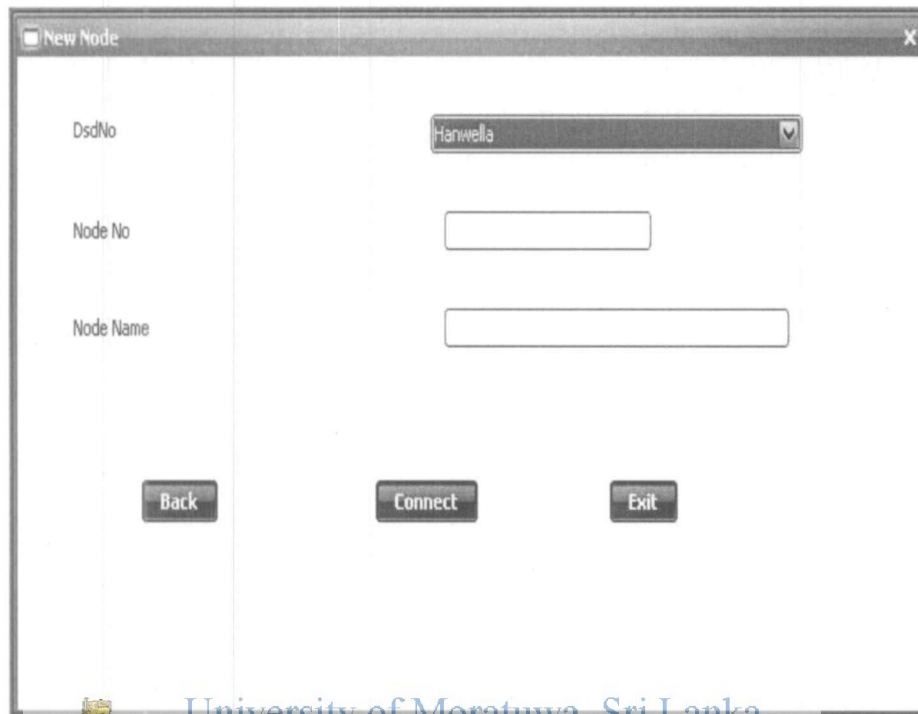
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This interface provides the facility to enter a new road. This interface mainly find at many flows of events, especially in adding new link. The user needs to enter new road number and road name. This is an administrative privileged function.

C.2.4 New node entry



The screenshot shows a software dialog box titled "New Node". It features three input fields on the left side: "DsdNo" with a dropdown menu currently displaying "Hanwella", "Node No" with an empty text box, and "Node Name" with an empty text box. At the bottom of the dialog, there are three buttons: "Back", "Connect", and "Exit".



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This interface provides the facility to enter new node. This can be often found at network database updating activities like extending a particular road, connecting two links and connecting particular node to the link.

C.2.5 New Link connecting existing node and link

New Link (connecting existing Node and Link)

From Node	To Road
Node No: 013101	RoadNo: Kollupitiya - Sri Jayewardenepura
Node Name: Periyavilan B398, B437	StartNodeNo: Kollupitiya Junc.A002, A000
	EndNodeNo: Kollupitiya (Liberty Plaza) A000,M006,M008

Get

Back Next

Figure 50: Creating new link with existing node and link

This interface can be found when adding a new link from current node to a particular link. This is the where user select which node and which links for connecting. This is administrative privileged function. On the left, the user needs to select the node and on the right user needs to select the link.

C.2.6 New link connecting existing nodes

The screenshot shows a window titled "New link connecting existing nodes". It is split into two main sections: "FROM NODE" on the left and "TO NODE" on the right. Each section contains two text input fields: "Node No" and "Node Name". Below each "Node Name" field is a "Get..." button. At the bottom of the window, there are three buttons: "Back", "Connect", and "Exit".

FROM NODE	TO NODE
Node No: 012401	Node No: 013102
Node Name: Kankasanturai A116, A121	Node Name: Pandattaripppn B276, B437



Figure 51: Creating new link connecting with existing nodes

This interface can be found when connecting two nodes for new link. This is an administrative function. The user needs to select the two nodes before they are connected. Relevant interfaces have been provided to enter the necessary information.

C.2.7 Upload/download turning movement's reports.

surveyid	junctionname	surveyeddate	surveystarttime	surveyendtime	filename	path	download
1	Polpahawela A006, A019	2011-1-5	6.00	12.00	6112005322012011-1-5.ds	TR5	click to download
2	Kegalle Polpahawela Rd Jn (...	2011-9-10	6.00	12.00	S339012011-9-10123.txt.txt	TR5	click to download
3	Kegalle Polpahawela Rd Jn (...	2009-10-09	6.00	12.00	S339012008-10-0911.ds.ds	TR5	click to download

Figure 52: Turning movement survey report content management sheet

This interface provides the facility to upload or download soft report or documents relevant to the particular survey locations. This provides the way of ordering and searching for documents. The users can download them to a desired location.



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C.2.8 Manage users

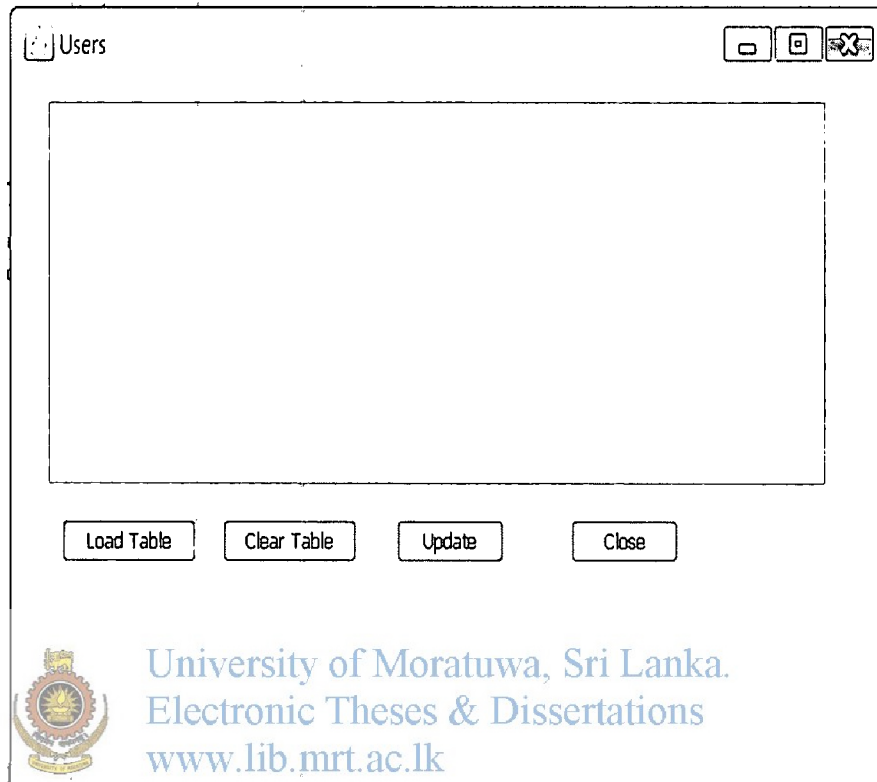


Figure 53: Interface for system User manage

This Interface provides the facility to Add/Update/Display general types Users in the system. Basically there are three types of users in the system. Only the administrator has the privileged to manage the users.

C.2.9 Data Entry Overview for MCC survey sheet

roadname	startnodenum	startnodename	endnodenum	endnodename	roadnum
Colombo - Gall...	662017	Kollupitiya Alfrad ...	662005	Bambalapitiya Ju...	A002
Colombo - Gall...	662017	Kollupitiya Alfrad ...	662005	Bambalapitiya Ju...	A002
Duplication Ro...	662051	C M C Ayurvedic ...	662018	Alfred Place / Dupl...	M008
Duplication Ro...	662051	C M C Ayurvedic ...	662018	Alfred Place / Dupl...	M008
Colombo - Gall...	661206	Kollupitiya Rotun...	661201	Kollupitiya Junc.A...	A002
Colombo - Gall...	661206	Kollupitiya Rotun...	661201	Kollupitiya Junc.A...	A002
Narandampita - ...	662152	Nawala Pagoda Li...	662108	Nawalapoda Super ...	B307
Colombo - R.A...	662010	Colombo 5 Lumbi...	662101	Colombo 5 Vilasit...	A004
Colombo - R.A...	662101	Colombo 5 Vilasit...	662117	Kirulapana Paman...	A004
Bauddhaloka ...	662028	Colombo 3 Tum...	662048	Baddhaloka Mw./...	A202
Bauddhaloka ...	661319	Borella Cemetery A...	661314	Devi Balika Borella...	A202
Colombo - R.A...	662101	Colombo 5 Vilasit...	662117	Kirulapana Paman...	A004
Colombo - Ho...	662112	Kohuwala Jn BOB...	662902	Peppilyana Juncti...	B0B4
Park Road	662122	Park Rd. / Fife Rd...	662123	Park Road Juncti...	M050
Kotte - Bopa	662104	Erukotte Parlima...	662201	Battaramulla Junc...	B240

No Of Entries 67

Figure 54: Data Entry Overview for MCC survey sheets

This interface provides the facility to see the already entered MCC survey data sheet. All the sheet details can be sort out from road and start node name.

C.2.10 Data Entry Overview for turning movement Sri Lanka.

S_node	startnodename	A_node	approachnode	E_node	endnodename
662051	C M C Ayurvedic Hospital M008,M028	662018	Alfred Place / D...	662006	Duplication Rd Bambalapitiya A202,M000
662051	C M C Ayurvedic Hospital M008,M028	662018	Alfred Place / D...	662017	Kollupitiya Alfrad Place on Galle Rd. (A00
533102	Dewalegama A019/A996	533901	Kegalle Polgah...	533901	Colombo 7 Thurston College A004,M017
533102	Dewalegama A019/A996	533901	Kegalle Polgah...	533902	Galgamuwa Jn A001, B127
533102	Dewalegama A019/A996	533901	Kegalle Polgah...	533905	Kegalle Jn A001, A021
533801	Galgamuwa Jn A001, B127	533901	Kegalle Polgah...	533102	Dewalegama A019/A996
533801	Galgamuwa Jn A001, B127	533901	Kegalle Polgah...	533902	Kegalle Jn A001, A021
533902	Kegalle Jn A001, A021	533901	Kegalle Polgah...	533905	New Ranawala
533902	Kegalle Jn A001, A021	533901	Kegalle Polgah...	533102	Dewalegama A019/A996
533905	New Ranawala	533901	Kegalle Polgah...	533801	Galgamuwa Jn A001, B127
533905	New Ranawala	533901	Kegalle Polgah...	533905	New Ranawala
533905	New Ranawala	533901	Kegalle Polgah...	533102	Dewalegama A019/A996
533905	New Ranawala	533901	Kegalle Polgah...	533901	Galgamuwa Jn A001, B127
533905	New Ranawala	533901	Kegalle Polgah...	533902	Kegalle Jn A001, A021

No Of Entries 47

Figure 55: Data Entry Overview for turning movement data sheets

This interface provides the facility to see the already entered Turning movement survey data sheet. All the sheet details can be sort out from road and start node name.

Appendix D

D.1 Screenshots (sample inputs and out puts)

Inputs

Location		Data											
From													
To													
Time	MOTOR CYCLES	3- WHEELERS	CAR / SALOON	UTILITY (PICK UP/JEEP/VAH)	LIGHT GOODS VEH	MULTY AXLE VEHICLE	HEAVY GOODS VEH	BUS	LARGE BUS	SERVICE VEH	BICYCLE	CART	Total
7 00-7 30	2	2	5	1	0	0	0	0	0	0	0	0	10
7 30-8 00	2	2	16	14	0	0	0	0	0	0	0	0	34
8 00-8 30	4	3	30	11	0	0	0	0	0	0	0	0	48
8 30-9 00	8	13	21	12	0	0	1	0	0	0	0	0	55
9 00-9 30	4	8	28	10	0	0	0	0	0	0	0	0	50
9 30-10 00	4	11	20	8	1	0	2	0	0	0	0	0	46
10 00-10 30	2	15	31	16	1	0	0	0	0	0	1	0	66
10 30-11 00	3	2	26	12	0	0	4	0	0	0	0	0	63
11 00-11 30	6	22	43	19	2	0	0	0	0	0	0	0	92
11 30-12 00	8	19	39	23	0	0	1	0	0	0	0	0	90
12 00-12 30	9	15	47	35	2	0	0	0	0	0	0	0	108
12 30-13 00	4	25	66	31	0	0	2	0	0	0	0	0	130
13 00-13 30	1	20	55	35	0	0	0	0	0	0	0	0	111

Figure 56: Sample survey data sheet for MCC

This is kind of Basic input, a Manual Classified Count entered excel survey sheet that includes traffic counts for a particular conducted survey.

Out puts

Traffic Flow Counts Estimation

Figure 57: Input data to estimate Traffic Flow counts

Administrator Main Menu
Jurisdiction MCC Settings Network Users Reports Content

Traffic Flow Counts Estimation Forecast

Forecast

Road Polgahawela Kogabz

survey date 2009-01-01


Start Node P.B. (N.W.P./SABA)

End Node Polgahawela ADD6/A019

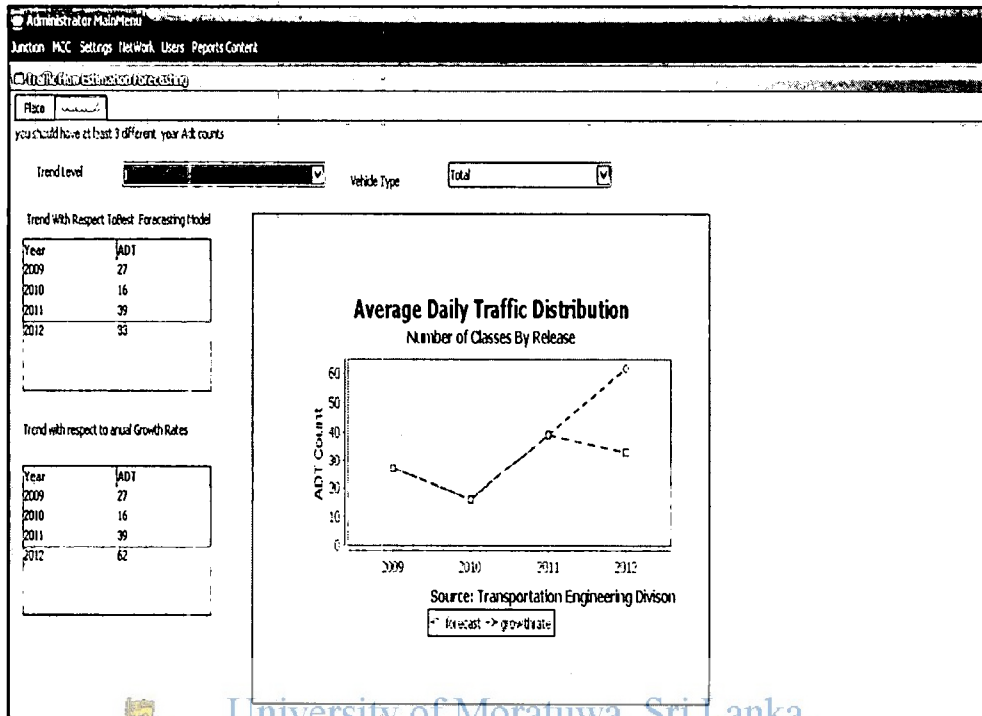
Vehicle Category Total

ADT

Traffic Counts 27

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Traffic Distribution Forecasting



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Figure 58. View the output of the forecasted traffic counts

This interface provides the analytical overview of traffic flow distribution obtained from passed surveyed data and the future estimated values that are obtained using common forecasting methods. The basic inputs for this output also the entered surveyed data.

Hourly Traffic Flow Distribution

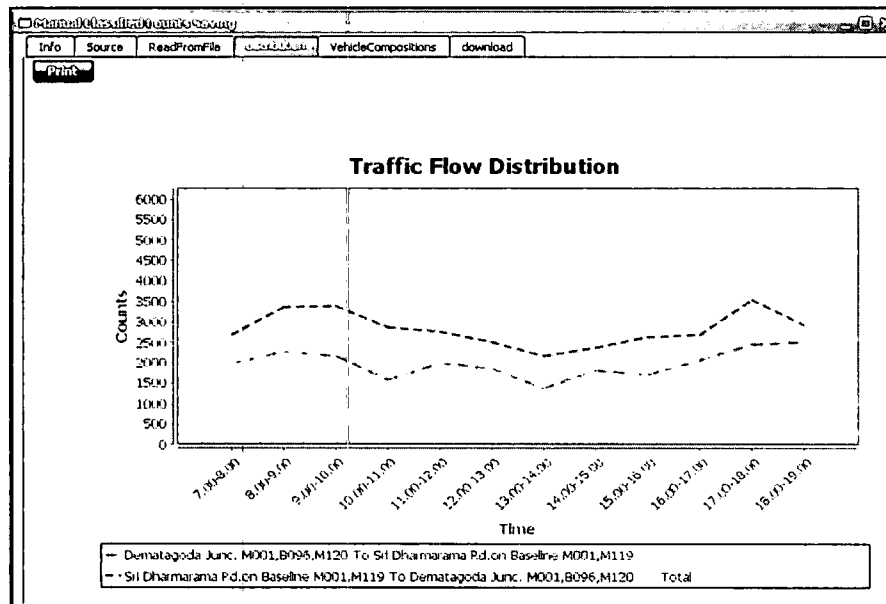


Figure 59: Graphical Output of survey data of MCC with hourly distribution

This is a graphical output of analytical estimation view of traffic flow between two nodes at a selected road in either side with their total. These estimations are calculated from the entered input survey sheet conducted at a date.

Vehicle Consumption

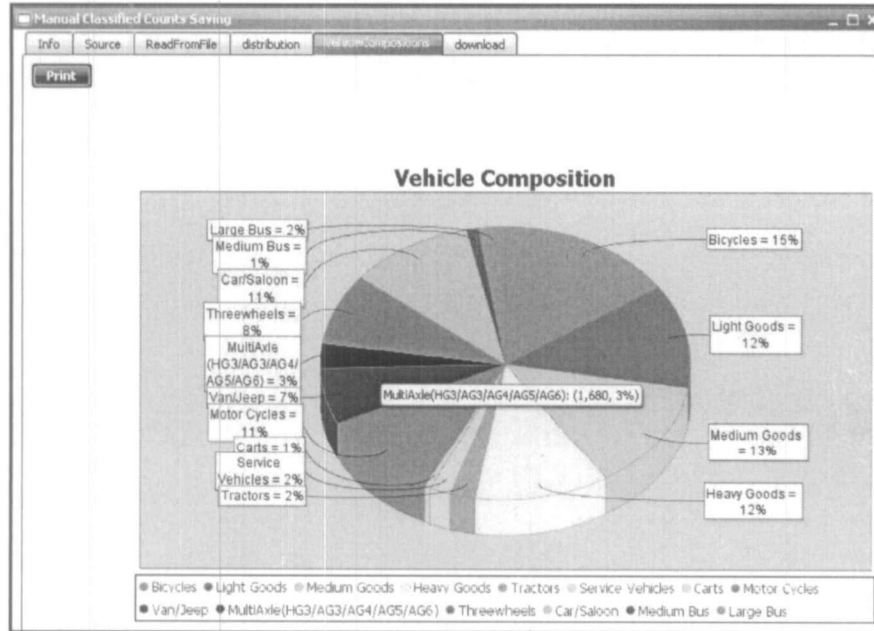


Figure 1. Graphical Output of survey data of MCC with vehicle composition

This output views the vehicle distribution between two nodes at a selected road. This output was made by the particular entered survey data conducted at a date.

D.2 Process of Manage Network

This is a pictorial base goodness to identify the different scenarios changes in road network system. There are mainly two possible scenarios.

- a. Extending current road
- b. Adding new roads

The explanation of both of these two cases is based on the following sketch.

Normal View of sample network sketch

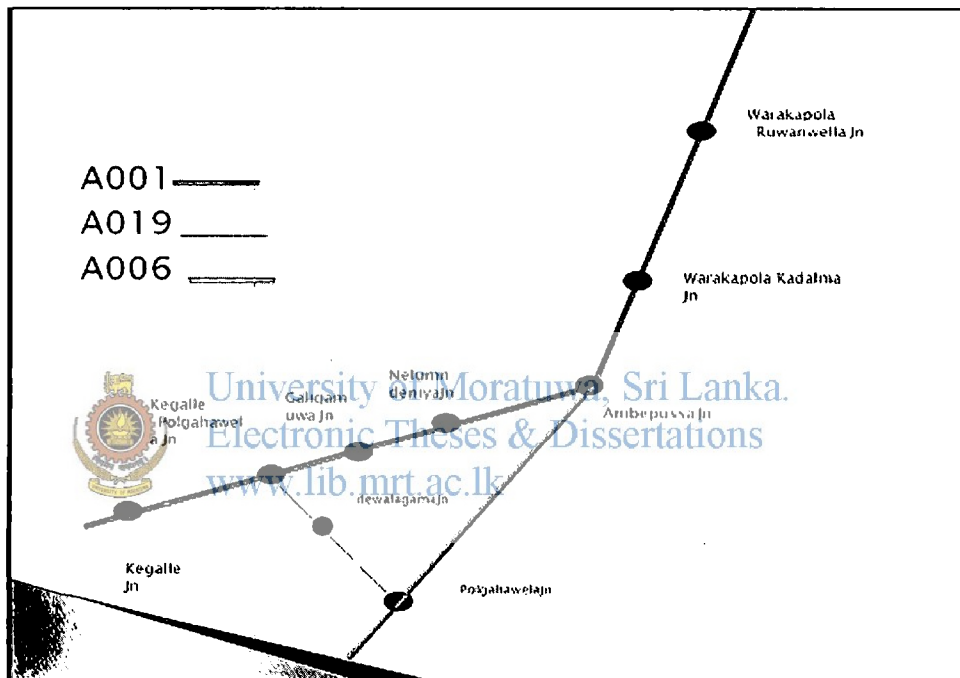
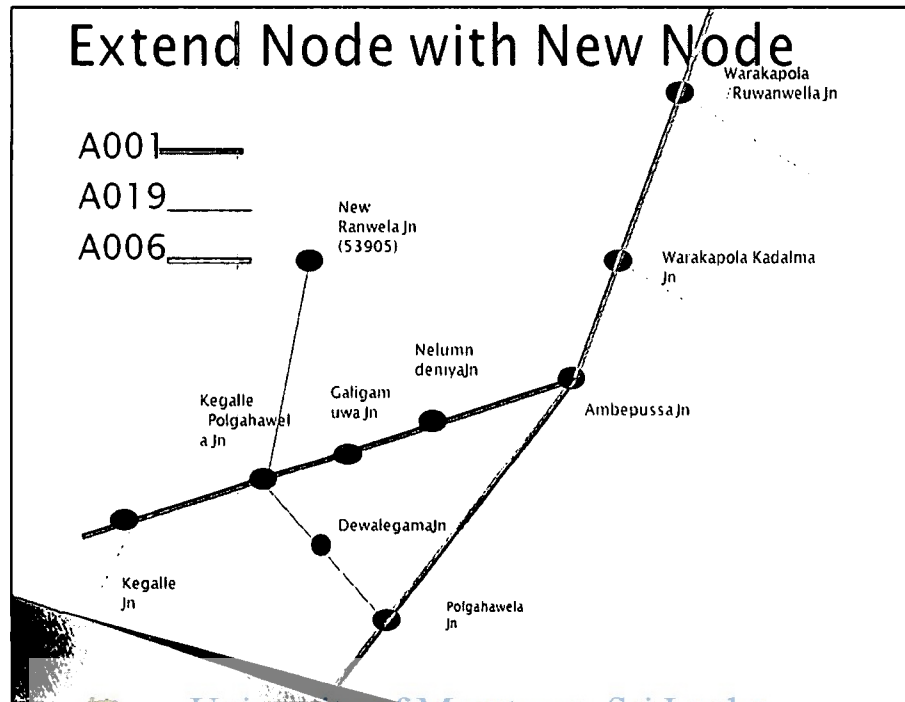


Figure 61: Sample Road network

Case 1: After View of extending road A019 at Polagahawela/Kegalle Junction

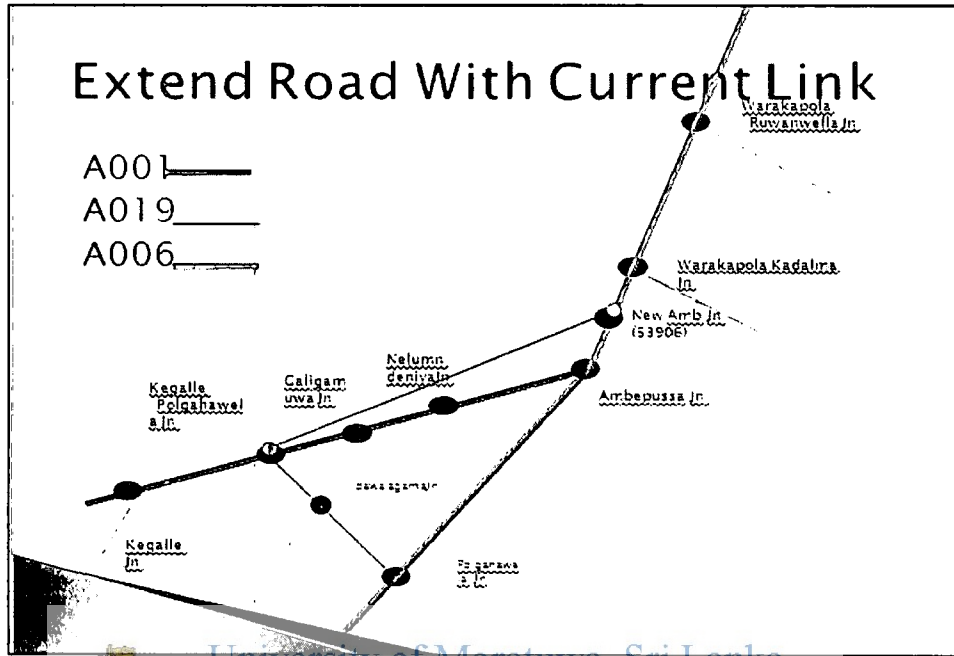


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Figure 62: Creating new link by new node

A new node is created (New Runwela Junction) and new link is created between last node of the road and kegalle/polgahawela junction.

Case 2: After view of extending road from Kegalle/polgahawela junction to Ambepussa junction and Warakapola Kadagama junction.

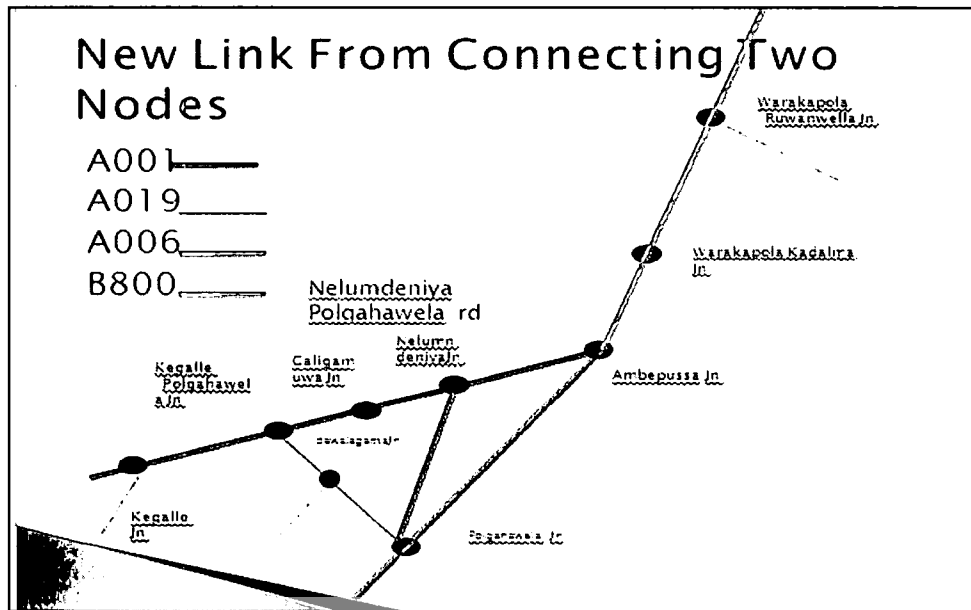


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Figure 63: Extend road with current link

A new node is created between the selected link and new link is created from last node of the road to the newly created road

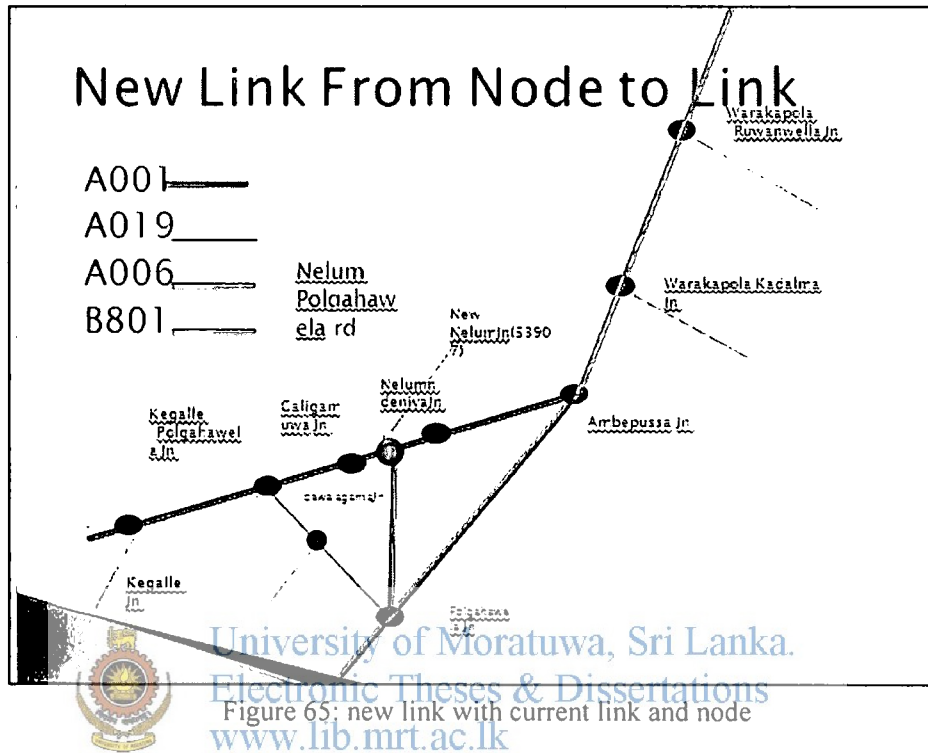
Case 3: After view of creating new road from polgahawela junction to Nelumdeniya junction



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Figure 64: new link with current nodes
A new road is created (B800) from polgahawela Junction to Nelumdeniya junction

Case 4: After view of creating new road from polgahawela junction to the link between galigamuwa junction and nelumndeniya junction



A new road is created (B801) connecting polgahawela junction and new node called new nelumndeniya junction

Case 5: After view of create new road from dewalegama-ranwela link to the Galigamuwa-new nelumndeniya junction

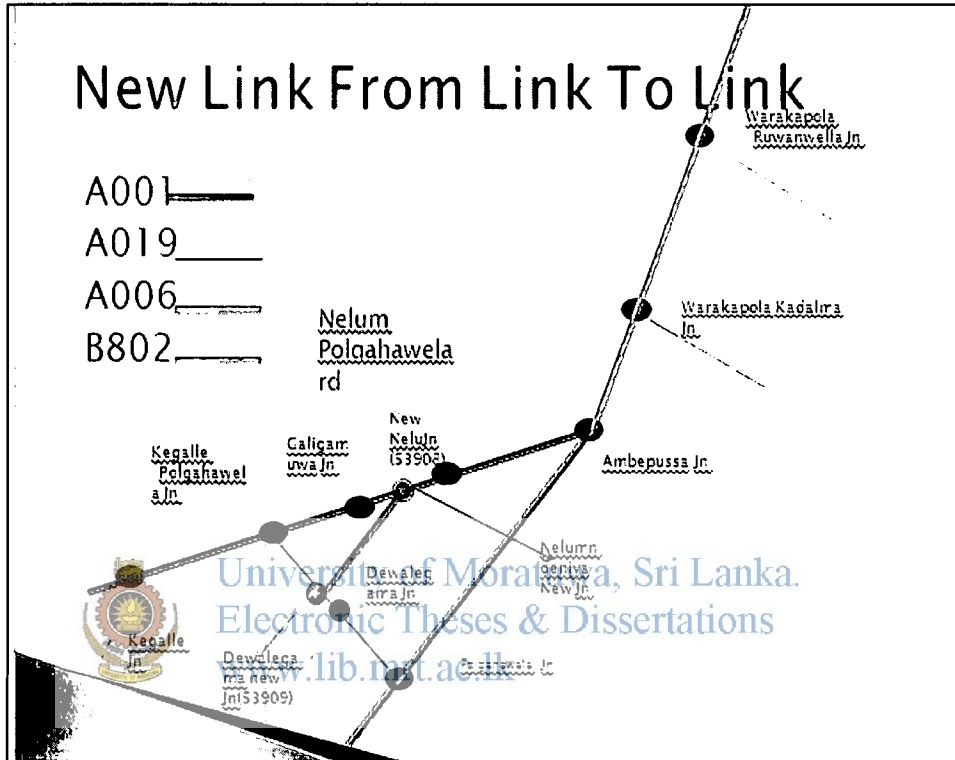


Figure 66: new link with current links

Appendix E

E.1 Evaluation

As described in Chapter the basic evaluation was conducted from randomly selected 4 Research Assistant at Transportation Engineering Division. The evaluation Target is to make a decision through statistical analytical method. Final Target was to get the average points for each evaluation items and check whether the values are exceeded the critical line.

- Number of Questions for Evaluation Item : Q_i
- Number of Participation: P
- Number of Excellent Points given by the participants for Evaluation Item $i=E_i$
- Number of Good Points for Evaluation Item $i=G_i$
- Number of Fairly Good Points for Evaluation Item $i=FG_i$
- Number of Bad Points for Evaluation Item $i=B_i$
- Average Points per Evaluation item $i= (E_i*10+G_i*8+FG_i*6+B_i*3)/P$

$$E_i+G_i+FG_i+B_i=Q_i*P$$

Critical Line=40%



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E.2 Evaluation Forms

E.2.1 Target Oriented

Target oriented	
Criterion	
Does the system gives service as you need?	E/G/FG/B
Is it easy to get the service from the product?	E/G/FG/B
Does the outcome in clear format?	E/G/FG/B
Does the System gives all functions as in specification?	E/G/FG/B
Is some functionality conflicted with one another?	E/G/FG/B
Are you proposing some additional to the given functionalities	E/G/FG/B
Is it easy to understand the steps	E/G/FG/B

Table 7: Evaluation Form-Target Oriented

E.2.2 Usability of the System

Usability of The System	
Criterion	
Is it easy to start the program?	E/G/FG/B
Is the user interface easy to understand? (For example, is the screen layout clear and easy to interpret?)	E/G/FG/B
Is it easy to navigate through the program?	E/G/FG/B
Is it useable to manage activities (Add/ Delete/Update) for each modules.	E/G/FG/B
Can you understand the design items functionalities (SAVE button indicates to save something etc)	E/G/FG/B
Are you proposing some additional to the given functionalities	E/G/FG/B
Is it easy to handle forms?	E/G/FG/B

Does the System explain what you expected?	E/G/FG/B
Does the System contain useful links?	E/G/FG/B
Does all Interfaces have proper layout?	E/G/FG/B

Table 8: Evaluation Form-Usability of the System



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E.2.2 Comprehensibility of Information

Table 9: Evaluation Form- Comprehensibility of Information

Comprehensibility of Information	
Criterion	
Is the level of language that the program offers clearly indicated?	E/G/FG/B
Can you seek help and understand the guides easily	E/G/FG/B
Can you easily read the instructions on each menus and forms	E/G/FG/B
Is the current layout, font and foreground is applicable for your eyes.	E/G/FG/B
Is the level of language that the System offers suitable	E/G/FG/B

Table 9: Evaluation Form- Comprehensibility of Information



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E.2.3 Clear Outcomes

Clear Outcomes	
Criterion	
Do you get a valid outcome?	E/G/FG/B
Are You Satisfied with the current model output format?	E/G/FG/B
Is the Output Format is readable and Understandable?	E/G/FG/B
Do you think the suitable data format is applicable?	E/G/FG/B

Table 10: Evaluation Form- Clear outcomes

No of Participations	4
----------------------	---


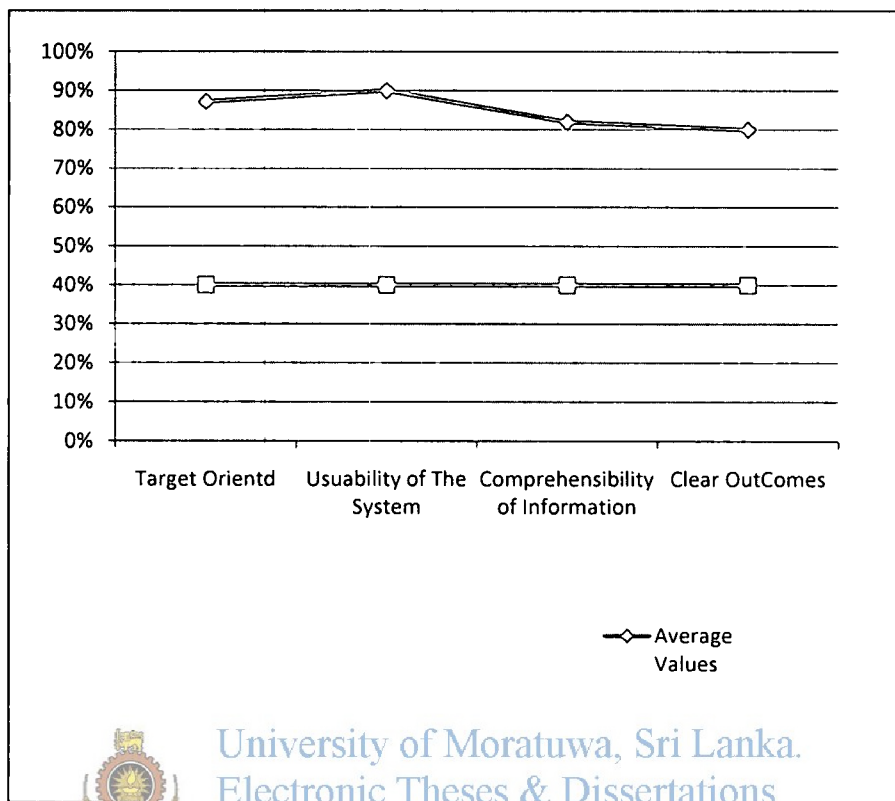
 Evaluation		Weight	Target Oriented	Usability of The System	Comprehensibility of Information	Clear Outcomes
No Of Questions			7	10	5	4
Excellent	10	11	24	12	2	
Good	8	16	12	4	12	
Fairly Good	6	1	3	0	2	
Bad	3	0	2	4	0	
Average Points		61	90	41	32	
Average Percentage		87%	90%	82%	80%	

Table 11: Final Estimation of evaluation



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Figure 67: Evaluation Chart as output

The Average point Values have been exceeded the critical line. Therefore the current system has approached to their Target Evaluation Points.

E.3 Test Cases

E.3.1 Login

Description:-

This Test case was defined to validate whether the user is able to login and prompt to the relevant main window.

Test data:-

User name and password

Expected software responds:-

The User is prompted to relevant user type main window.

Performance bounds:-

The user will not be able to login if the user name or password or both are incorrect.

E.2.2 Load survey entry form:-

Description:-

This test case was defined to test whether the relevant survey entry sheet is created for both manual classified counts and turning movement counts.

Test data:-

Survey locations (road, surveyed date, survey started and ended time etc)

Expected software responds:-

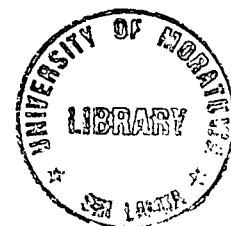
The survey entry form should be created according to the given survey information. It should be possible to enter traffic counts manually. If database has already entered data then the form should be filled with those data.

Performance bounds:-

No

Testing Component:-

Survey entry form.



E.2.3 Insert new surveyed counts.

Description:-

This test case was defined to test whether all new entry traffic counts for both types of survey types are entered correctly.

Test data:-

User entered traffic counts on survey entry form.

Expected software responds:-

All traffic counts should be saved into the respective tables. If the survey is new all data should be new otherwise the relevant fields of the tables should be updated with changed values.

Performance bounds:-

If there is a problem with database connection or at the invalidated format entry all exception messages should be displayed and all database transaction should be rollback.

Testing component:-

Manage survey entry, traffic database access.

E.2.4 Import survey sheet file.

Description:-

This test case was defined to test whether an external excel sheet file including some survey counts can directly import in to the system and display in to a table.

Test Data:-

Excel sheet file

Expected software responds:-

The files should be imported and display the contents in a table.

Performance bounds:-

If the file is corrupted or invalid type of file the relevant exception message should be displayed.

Testing component:-

Import survey sheet file, Manage survey entry.

E.2.5 Traffic counts estimation

Description:-

This test case was defined to test whether traffic counts between two links and this test case was defined to test whether traffic counts between two links.

Test data:-

Conducted survey location.

Expected software responds:-

Correct traffic counts regarding to the information given should clearly estimated and displayed.

Performance bounds:-

If there is a problem with database connection, should be displayed message.

Test Components:-

Estimate traffic counts.

E.2.6 Test charts

Description:-

This test case was defined to test whether all graphical outcomes (charts) are created and displayed.

Test data:-

Traffic surveyed data.

Expected software responds:-

Chart should be displayed on the panel.

Performance bounds:-

If there is no sufficient data to create chart, should display a message saying insufficient data.

Test components:-

Chart, traffic database access.

E.2.7 Test forecasting

Description:-

This test case was defined to test the forecasting of data sets.

Test Data:-

Traffic total data at a defined survey location with past years.

Expected software responds:-

List of past and future forecasted data and display them in a table and line chart for this data set. Chart for this data set.

Performance bounds:-

If sufficient data is not available should display a message saying data is not sufficient to forecast.

Test components:-

Data forecasting, Traffic data access, traffic count estimation, charts

E.2.8 Test new user entry

Description:-

This test case was defined to test management of new users.

Test Data:-

New user details

Expected software responds:-

New users are saved in to the database.

Performance bounds:-

If sufficient data is not available should display a message saying given is not sufficient

Test components:-

Mange Users, traffic access database.

