CHAPTER 5

SYSTEM IMPLEMENTATION

5.1 System Specification

5.1.1 Hardware

The implementation of the web application system is done on the author's laptop. Basically, the application can run on system which has similar capabilities as the author's laptop. The specification of the laptop is:

- Processor: Intel Centrino Duo 1.83 GHz
- RAM: 1014MB DDR2
- Hard Disk: 80GB 5400rpm SATA
- Display: 14.1" WXGA (1280×800 resolution)
- Modem: 56K v.92

5.1.2 Software

There is some software which supports the development and the runtime of the web application system and the whole thesis. Below is the software specification.

- Operating System: Windows XP Professional
- XAMPP 1.4.16, includes:
    - Apache 2.0.54

    - PHP 5.0.5
- MySQL Server 5.0
- MySQL Query Browser
- Edit Plus 2
- CodeIgniter 1.6.1 Framework
- Adobe Flex Builder 3
- Adobe Flash Player 9
- Adobe Photoshop CS3
- map_flex_1_16 (Google Maps API for Flex)
- Web Browser: Mozilla Firefox 3.5.5, Google Chrome
    - Cannot run well on Internet Explorer 7 due to cache problem. Internet Explorer 7 has different Flex HTTP header handler for the cache which makes the map cannot run properly.
- Microsoft Word 2007

5.2 Operational Procedures

In order to develop and run the application, there are some operational procedures needed to be conducted.

Below are the operational procedures to develop the map application:

1. Install Adobe Flex Builder 3, including Adobe Flash Player 9, as the tool to build the map application.

2. Add the library map_flex_1_16 of Google Maps API for Flex.

   The library can be downloaded at:

   http://maps.googleapis.com/maps/flash/release/sdk.zip
3. Start developing the application by creating new Flex project that can be run within the Adobe Flex Builder 3.

Below are the operational procedures in developing the whole application.

1. Install the XAMPP 1.4.16 which includes the Apache 2.0.54 as the web server to host the web application and the PHP 5.0.5 so that the Apache can recognize PHP scripts.
2. Install MySQL Server 5.0 as the database server to manage the database. Additionally, install MySQL Query Browser to ease the database management.
3. Install EditPlus 2 as the editor for programming the PHP scripts.
4. Extract and configure CodeIgniter 1.6.1 as the web application framework. Put the CodeIgniter folder inside the htdocs in XAMPP folder.
5. Start coding based on the CodeIgniter framework.

To run the whole application, the operational procedures are:

1. Dump the database jakartatraffic.sql.
2. Copy the folder TrafficSolution into the htdocs in XAMPP folder.
3. Open web browser (Mozilla Firefox or Google Chrome) which is already integrated with Adobe Flash Player 9.

   Access the Traffic Solution main website through URL:

   http://localhost/TrafficSolution

Access the Traffic Solution administrator website through URL:

http://localhost/TrafficSolution/index.php/admin/login

(The default username and password for administrator is ‘admin’ and ‘password’)

5.3 Implementation Strategy

The implementation began by developing the map application first. The map application was built by using Flex which was integrated with PHP and MySQL in order to build the Flex application with three layers which are the presentation layer, the business logic layer, and the data layer. By using Flex, the map application can become more powerful. For further development, animation and 3D features can be added to the map application. As long as the computer has Adobe Flash Player 9 or newer, the Flex application which is compiled into SWF file can be run.

The next development was the web application development. The map application was also embedded to the web application to construct the whole application. The web application was built based on CodeIgniter framework with PHP scripts and MySQL for the database system. The whole application was constructed by implementing the solution per module step by step.

5.4 Test Plan

5.4.1 Module Testing

After the implementation is done, the testing is conducted. The module or unit testing is conducted to ensure that each module works properly as a unit. The testing is done per each test case.

Table 5.1 Sign Up Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Sign up with correct input	The user has not been registered and logged in yet to the system.	1. User clicks the sign up link. 2. User fills the sign up form and submits it.	The system stores the information into database.	OK
2	Sign up with incorrect input	The user has not been registered and logged in yet to the system.	1. User clicks the sign up link. 2. User fills the sign up form with incorrect input and submits it.	The system returns the notification message to user to complete the form with correct input.	OK

Table 5.2 SMS Service Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	View available services of SMS system	-	1. User clicks the view available services on SMS system menu.	The system responds by providing the list of available SMS services.	OK
2	Request automatic SMS	-	1. User clicks the automatic SMS on the SMS menu. 2. User fills the automatic SMS form and submits it.	The system stores the information into database.	OK

Table 5.3 General Pages Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	View FAQ	-	1. User clicks the FAQ menu.	The system responds by providing the list of FAQ.	OK
2	View contact us	-	1. User clicks the contact us menu.	The system responds by providing the list of contact us.	OK
3	View about us	-	1. User clicks the about us menu	The system responds by providing the list of about us.	OK

Table 5.4 Member Login/Logout Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Member login with correct username and password	The user must have already registered to the system.	1. User goes to the Traffic Solution website. 2. User fills the username and password on login form.	The system validates the username and password and redirects the user to the logged in page.	OK
2	Member login with incorrect username and password	-	1. User goes to the Traffic Solution website. 2. User fills the incorrect username and password on login form.	The system validates the form and returns the notification message to user to re-enter the correct username and password.	OK
3	Member logout	The user must have already logged in to the system.	1. User clicks the logout link.	The system responds by logging the user out from the system.	OK

Table 5.5 Comment System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	View recent comments	The user must have already logged in to the system.	1. User clicks home menu.	The system responds by showing the recent comments that are queried from the database.	OK
2	Member add comment by filling all required field	The user must have already logged in to the system.	1. User clicks the add comment link on the comment system. 2. User fills all required field in the add comment form and submits it.	The system stores the information into database.	OK
3	Member add comment by not filling all required field	The user must have already logged in to the system.	1. User clicks the add comment link on the comment system. 2. User does not fill all required field in the form and submits it.	The system returns the notification message to user to complete the form.	OK
4	Member view comment	The user must have already logged in to the system.	1. User clicks the comment menu.	The system responds by providing the comment list.	OK
5	Member delete comment	The user must have already logged in to the system and the comment that will be deleted is his own comment.	1. User views his own comment. 2. User clicks the delete link. 3. User clicks ‘OK’ on the confirmation dialog.	The system responds by deleting the comment from database.	OK
6	Member cancel to delete comment	The user must have already logged in to the system and	1. User views his own comment. 2. User clicks the delete link.	The system cancels the delete.	OK

		the comment that will be deleted is his own comment.	3. User clicks 'Cancel' on the confirmation dialog.		

Table 5.6 Profile System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Member view my profile	The user must have already logged in to the system.	1. User clicks my profile menu.	The system responds by showing the profile of the user.	OK
2	Member edit profile with valid data	The user must have already logged in to the system.	1. User clicks edit profile link. 2. User changes his data and save the form.	The system updates the database.	OK
3	Member edit profile with invalid data	The user must have already logged in to the system.	1. User clicks edit profile link. 2. User changes the data with invalid information.	The system returns the notification message to user to change the data with the valid information.	OK
4	Edit profile picture with valid file	The user must have already logged in to the system.	1. User clicks edit profile picture link. 2. User uploads new valid picture. 3. User sets the default picture for his profile.	1. The system stores the new picture into the database. 2. The system marks the default picture for the user in the database.	OK
5	Edit profile picture with invalid file	The user must have already logged in to the system.	1. User clicks edit profile picture link. 2. User uploads new invalid picture.	The system returns the notification message to user to re-upload with the valid file.	OK
6	Member change password with correct old	The user must have already logged in to the system.	1. User clicks change password link. 2. User fills the	1. The system updates the database. 2. User can log	OK

	password and new password		form with correct old password and new password.	in with the new password.	
7	Member change password with incorrect old password and new password	The user must have already logged in to the system.	1. User clicks change password link. 2. User fills the form with incorrect old password and new password.	The system returns the notification message to user to fill the form with the correct information.	OK

Table 5.7 Map System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Member view map	The user must have already logged in to the system.	1. User clicks map menu.	The system responds by showing map feature.	OK
2	Member change street/marker status	The user must have already logged in to the system and finished loading the map.	1. User clicks one of the markers on the map. 2. User changes the combo box of status into Unknown, Crowded, or Light. 3. User clicks 'Yes' on the confirmation dialog.	The system updates the database and reloads the map.	OK
3	Member cancel the street/marker status change	The user must have already logged in to the system and finished loading the map.	1. User clicks one of the markers on the map. 2. User changes the combo box of status into Unknown, Crowded, or Light. 3. User clicks 'No on the	The system cancels the update.	OK

			confirmation dialog.		
4	Member search shortest path	The user must have already logged in to the system and finished loading the map.	1. User chooses the street from the 'From' combo box to initiate the start street. 2. User chooses the street from the 'To' combo box to initiate the destination street. 3. User can check or uncheck the 'Avoid Crowd' check box. 4. User clicks the 'Get Direction' button.	If there is a path, the system will respond by providing the direction on the map and the explanation on the table. If there is no path, the system will respond by showing 'No Direction' message.	OK

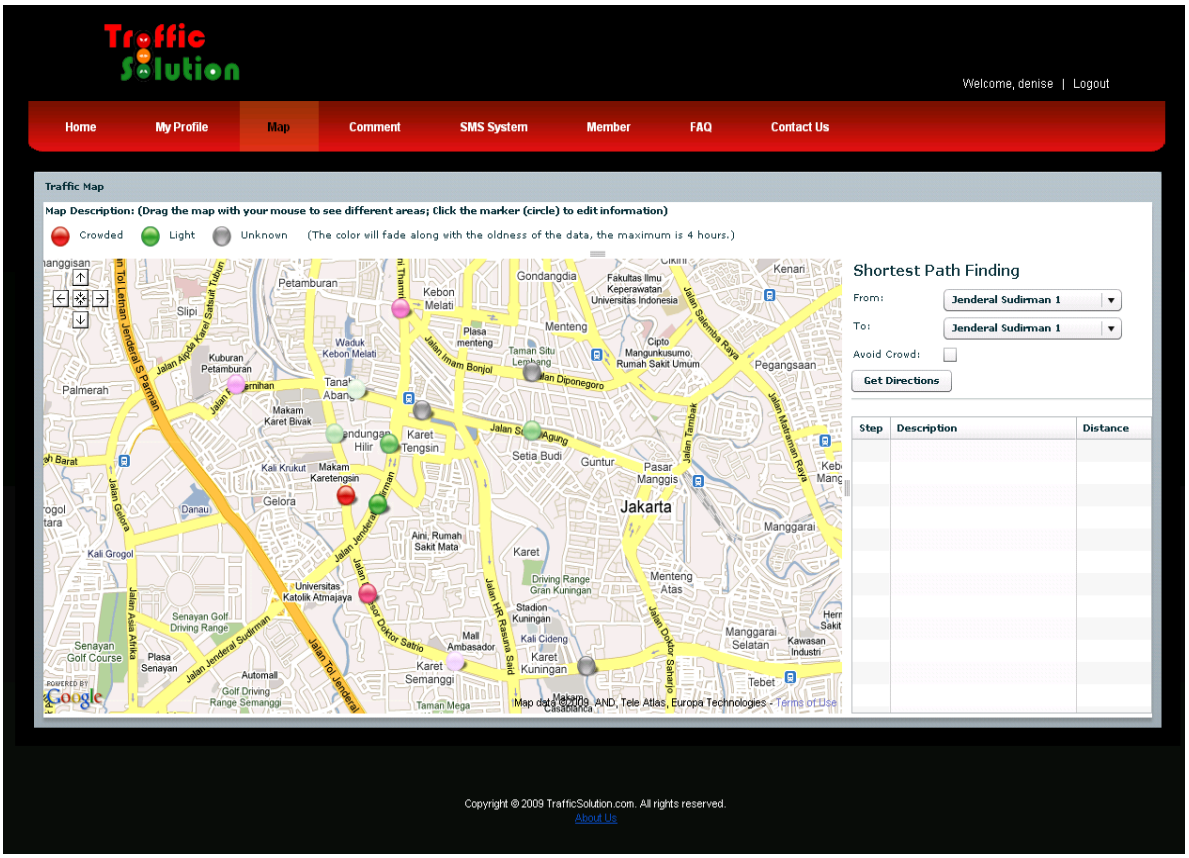

Figure 5.1 The Map

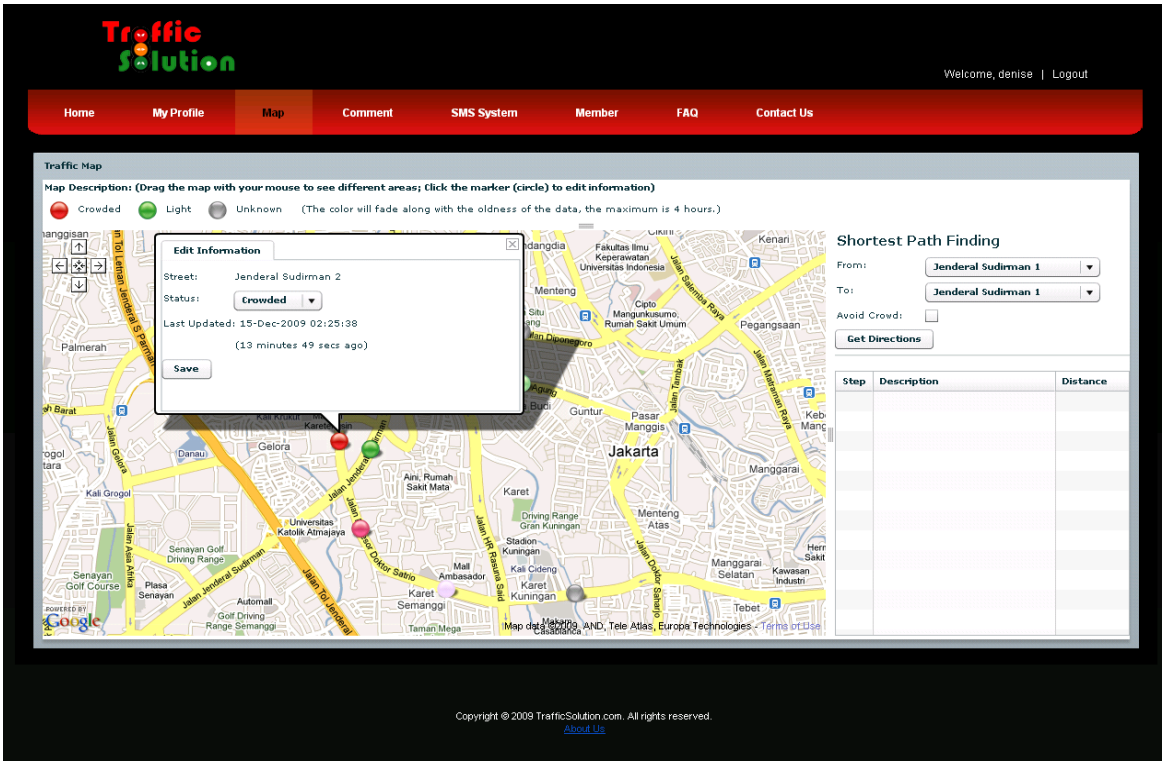

Figure 5.2 Change Street/Marker Status on The Map

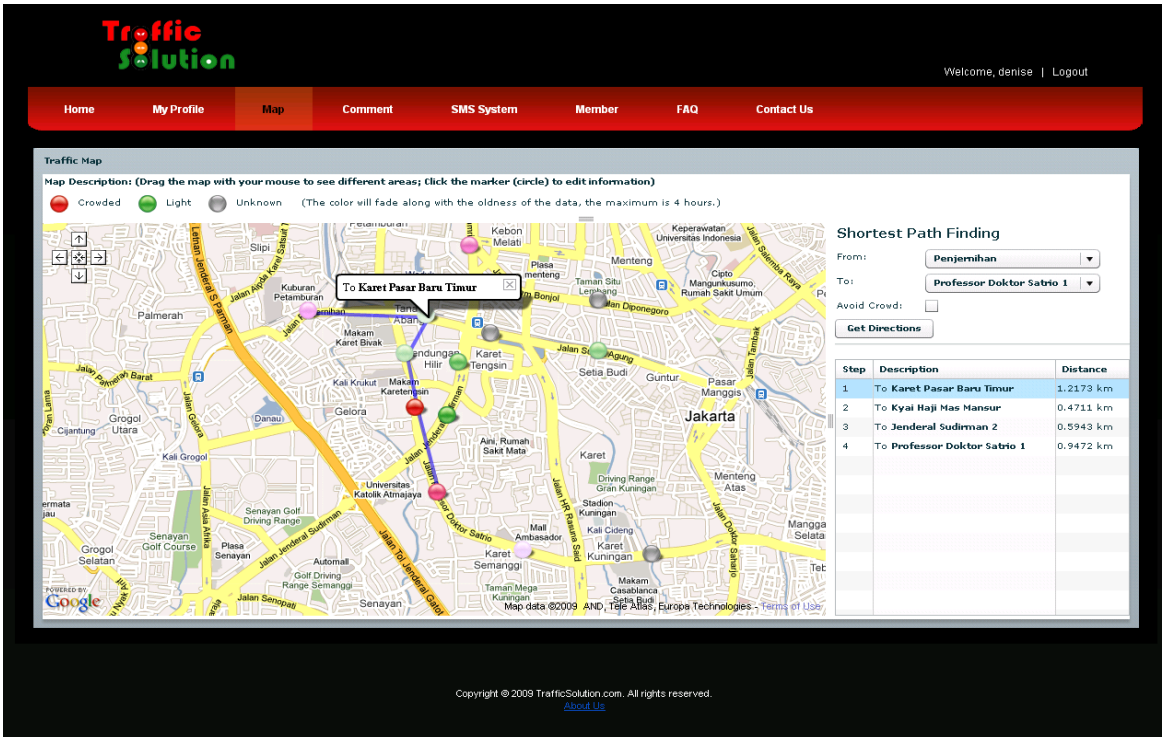

Figure 5.3 Shortest Path Finding on The Map without Avoid Crowd

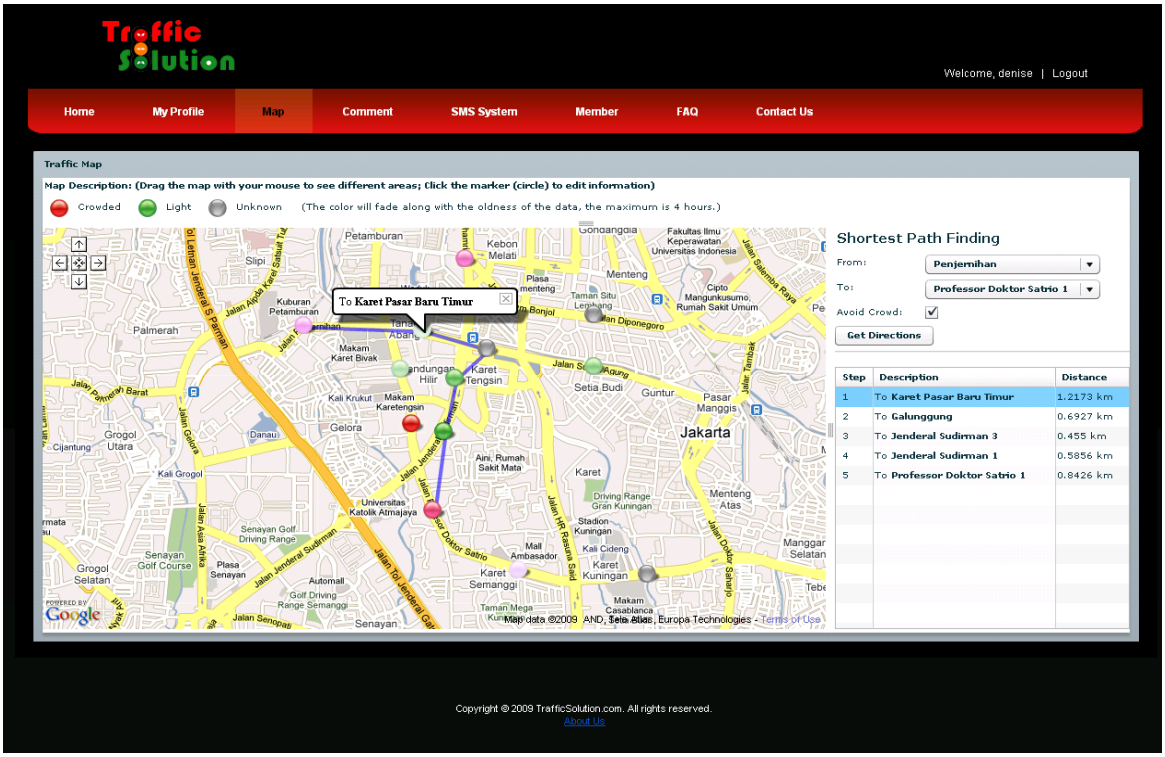

Figure 5.4 Shortest Path Finding on The Map with Avoid Crowd

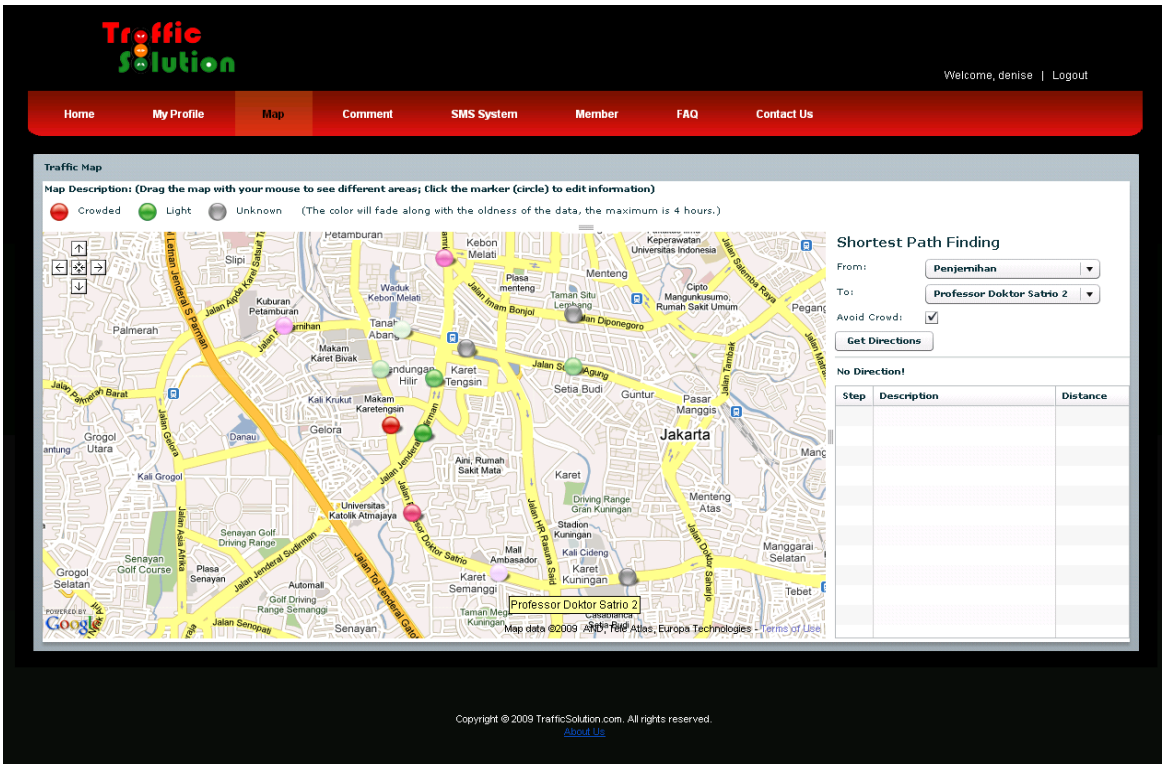

Figure 5.5 Shortest Path Finding on The Map resulting in No Direction

Figure 5.1 is the map application. On the map, there are the map legend/description, the shortest path finding tools, and the markers which represent the streets. If the user wants to change the status of the street, he can click one of the desired street/marker and it will be resulted as shown in Figure 5.2. The edit information dialog box will appear with the street name, status combo box, and last updated info. The user can change the status into CROWDED, LIGHT or UNKNOWN as listed in the status combo box.

If the user wants to find shortest path between two streets, he can choose the start point by selecting the 'From' combo box and choose the destination point by selecting the 'To' combo box. If the avoid crowd check box is checked, the shortest path finding will ignore the crowded streets except the start and the destination streets. Figure 5.3 is the example of shortest path finding result without checking the avoid crowd check box. While Figure 5.4 is the example of shortest path finding result with checking the avoid crowd check box. The shortest route which represents by blue color line can be seen on the map. The description of the route and the distance also can be seen on the shortest path table. Each description can be clicked and information box will appear on the map. If there is no path/direction, the view such in Figure 5.5 will be shown.

Table 5.8 Member System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	View member	The user must have already logged in to the system.	1. User clicks member menu.	The system responds by providing the member list.	OK
2	Search member	The user must have already logged in to the system.	1. User fills the search form.	The system responds by showing the members that are queried from the	OK

				database based on the search keyword.	
3	Advance search member	The user must have already logged in to the system.	1. User clicks the advance search link. 2. User fills in the form.	The system responds by showing the members that are queried from the database based on the advance search keywords.	OK

Table 5.9 Admin Login Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Admin login with correct username and password	The user must be an administrator and have already registered to the administrator system.	1. User goes to the Traffic Solution administrator website. 2. User fills the correct username and password on administrator login form.	The system validates the username and password and logs the user into the administrator website.	OK
2	Admin login with incorrect username and password	-	1. User goes to the Traffic Solution administrator website. 2. User fills the incorrect username and password on administrator login form.	The system validates the form and returns the notification message to user to re-enter the correct username and password.	OK
3	Admin logout	The user must have already logged in to the administrator system.	1. User clicks the logout link.	The system responds by logging the user out from the administrator system.	OK

Table 5.10 Admin Profile System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Admin view my profile	The user must have already logged in to the administrator system.	1. User clicks home menu.	The system responds by showing the profile of the user.	OK
2	Admin edit profile with valid data	The user must have already logged in to the administrator system.	1. User clicks edit profile link. 2. User changes his data and save the form.	The system updates the database.	OK
3	Admin edit profile with invalid data	The user must have already logged in to the administrator system.	1. User clicks edit profile link. 2. User changes the data with invalid information.	The system returns the notification message to user to change the data with the valid information.	OK
4	Admin change password with correct old password and new password	The user must have already logged in to the administrator system.	1. User clicks change password link. 2. User fills the form with correct old password and new password.	1. The system updates the database. 2. User can log in with the new password.	OK
5	Admin change password with incorrect old password and new password	The user must have already logged in to the administrator system.	1. User clicks change password link. 2. User fills the form with incorrect old password and new password.	The system returns the notification message to user to fill the form with the correct information.	OK

Table 5.11 Admin Map System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Admin view	The user must	1. User clicks	The system	OK

	map	have already logged in to the administrator system.	map menu.	responds by showing map feature.	
2	Add marker on map	The user must have already logged in to the administrator system and finished loading the map.	1. User right clicks at certain location on the map. 2. User clicks 'Yes' on the confirmation dialog.	The system responds by adding the marker into database and.	OK
3	Cancel to add marker on map	The user must have already logged in to the administrator system and finished loading the map.	1. User right clicks at certain location on the map. 2. User clicks 'No' on the confirmation dialog.	The system cancels the add.	OK
4	Edit street/marker information on map	The user must have already logged in to the administrator system and finished loading the map.	1. User clicks one of the markers on the map. 2. User chooses the 'Edit Information' tab and changes the street name and the combo box of status into Unknown, Crowded, or Light. 3. User clicks 'Yes' on the confirmation dialog.	The system updates the database and reloads the map.	OK
5	Cancel to edit street/marker information on map	The user must have already logged in to the administrator	1. User clicks one of the markers on the map. 2. User chooses the 'Edit	The system cancels the update.	OK

		system and finished loading the map.	Information' tab and changes the street name and the combo box of status into Unknown, Crowded, or Light. 3. User clicks 'No on the confirmation dialog.		
6	Delete marker on map	The user must have already logged in to the administrator system and finished loading the map.	1. User clicks one of the markers on the map. 2. User chooses the 'Delete Marker' tab and presses the delete button. 3. User clicks 'Yes' on the confirmation dialog.	The system deletes the marker from database and reloads the map.	OK
7	Cancel to delete marker on map	The user must have already logged in to the administrator system and finished loading the map.	1. User clicks one of the markers on the map. 2. User chooses the 'Delete Marker' tab and presses the delete button. 3. User clicks 'No on the confirmation dialog.	The system cancels the delete.	OK
8	Add connection between streets/ markers	The user must have already logged in to the administrator system and finished loading the map.	1. User clicks one of the markers on the map. 2. User chooses the 'Manage Connection' tab, chooses the street from the 'Add	The system adds the connection into database.	OK

			Connection With' combo box, and presses the add button. 3. User clicks 'Yes' on the confirmation dialog.		
9	Cancel to add connection between streets/ markers	The user must have already logged in to the administrator system and finished loading the map.	1. User clicks one of the markers on the map. 2. User chooses the 'Manage Connection' tab, chooses the street from the 'Add Connection With' combo box, and presses the add button. 3. User clicks 'Yes' on the confirmation dialog.	The system cancels the add connection.	OK
10	Admin search shortest path	The user must have already logged in to the administrator system and finished loading the map.	1. User chooses the street from the 'From' combo box to initiate the start street. 2. User chooses the street from the 'To' combo box to initiate the destination street. 3. User can check or uncheck the 'Avoid Crowd' check box. 4. User clicks the 'Get Direction' button.	If there is a path, the system will respond by providing the direction on the map and the explanation on the table. If there is no path, the system will respond by showing 'No Direction' message.	OK

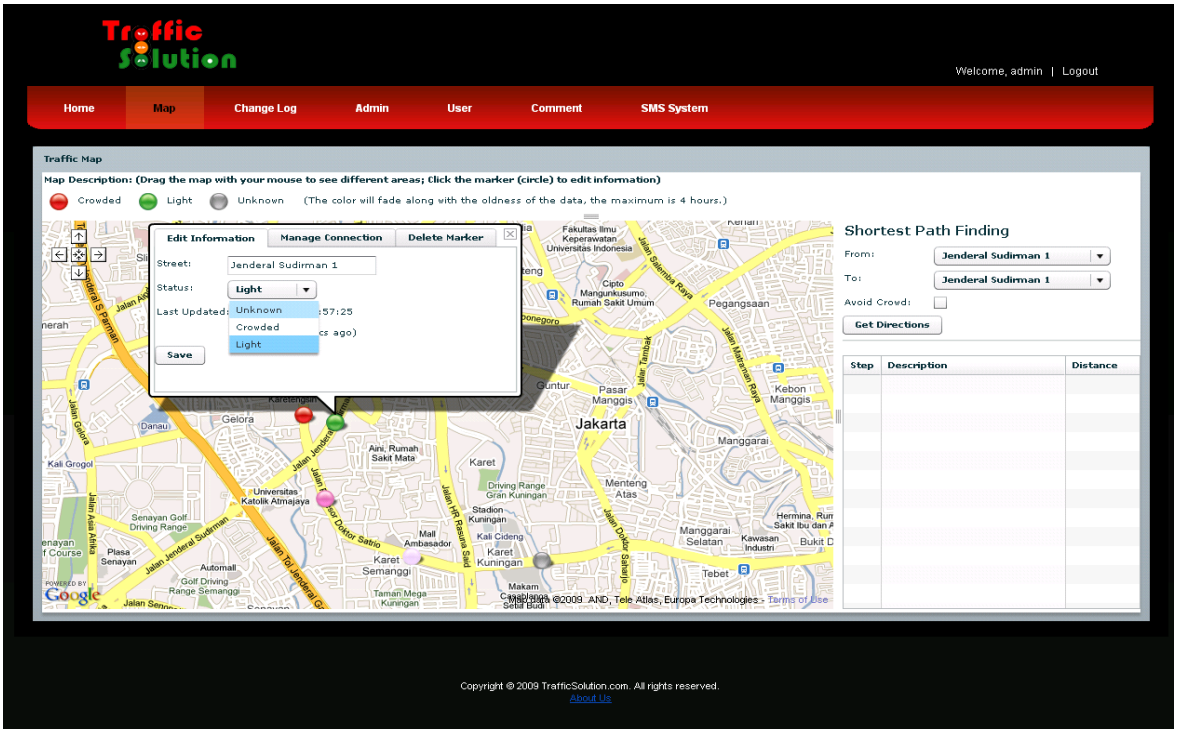

Figure 5.6 Administrator Edit Information on Map

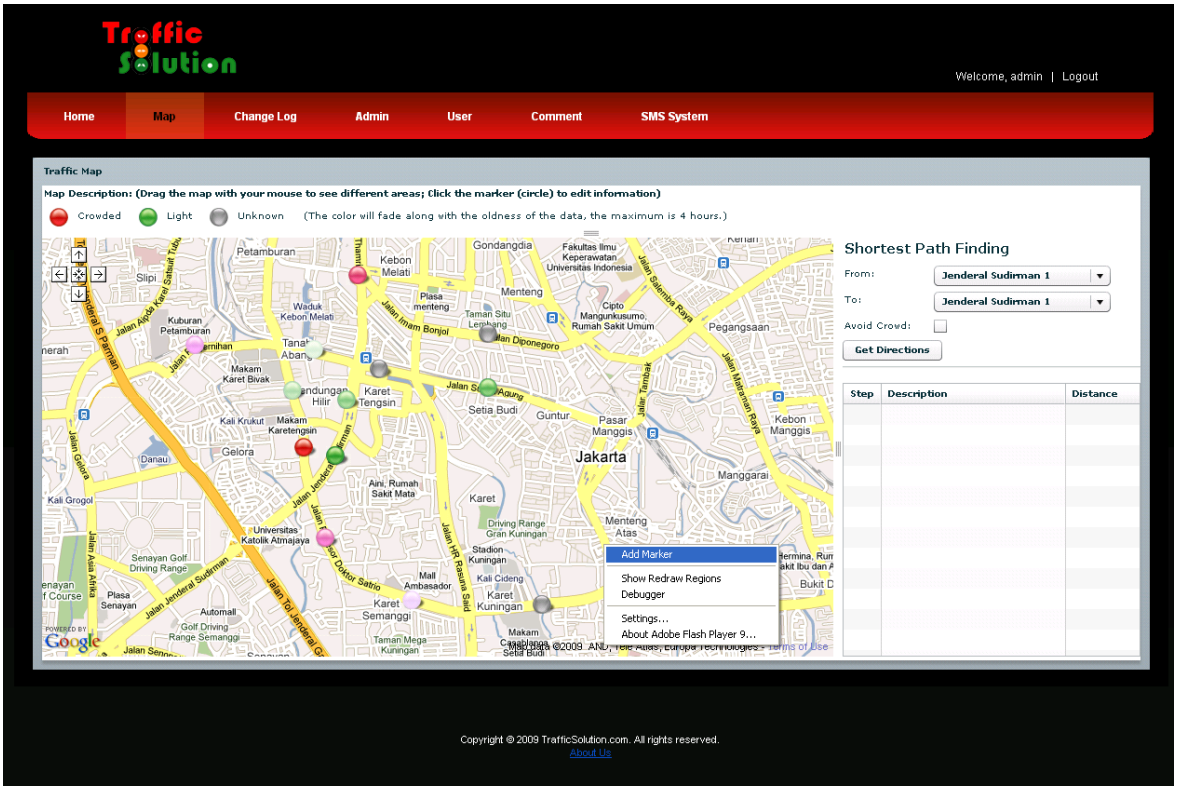

Figure 5.7 Administrator Add Marker on Map

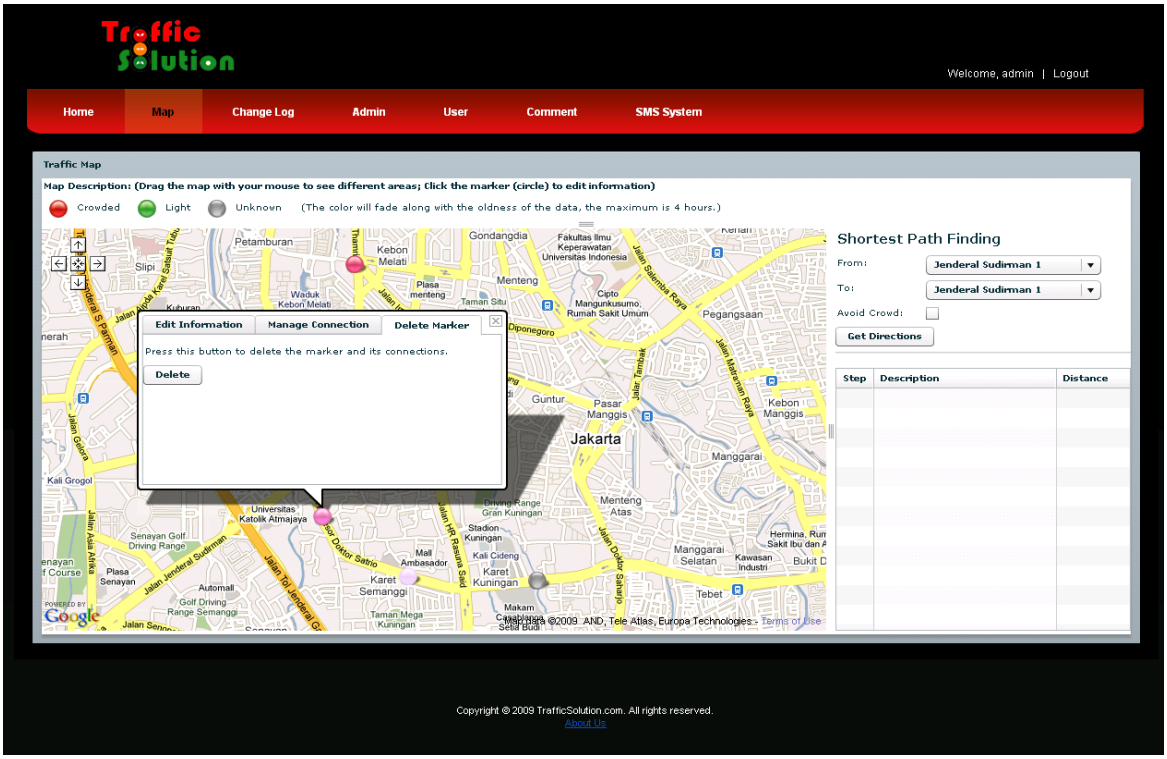

Figure 5.8 Administrator Delete Marker on Map

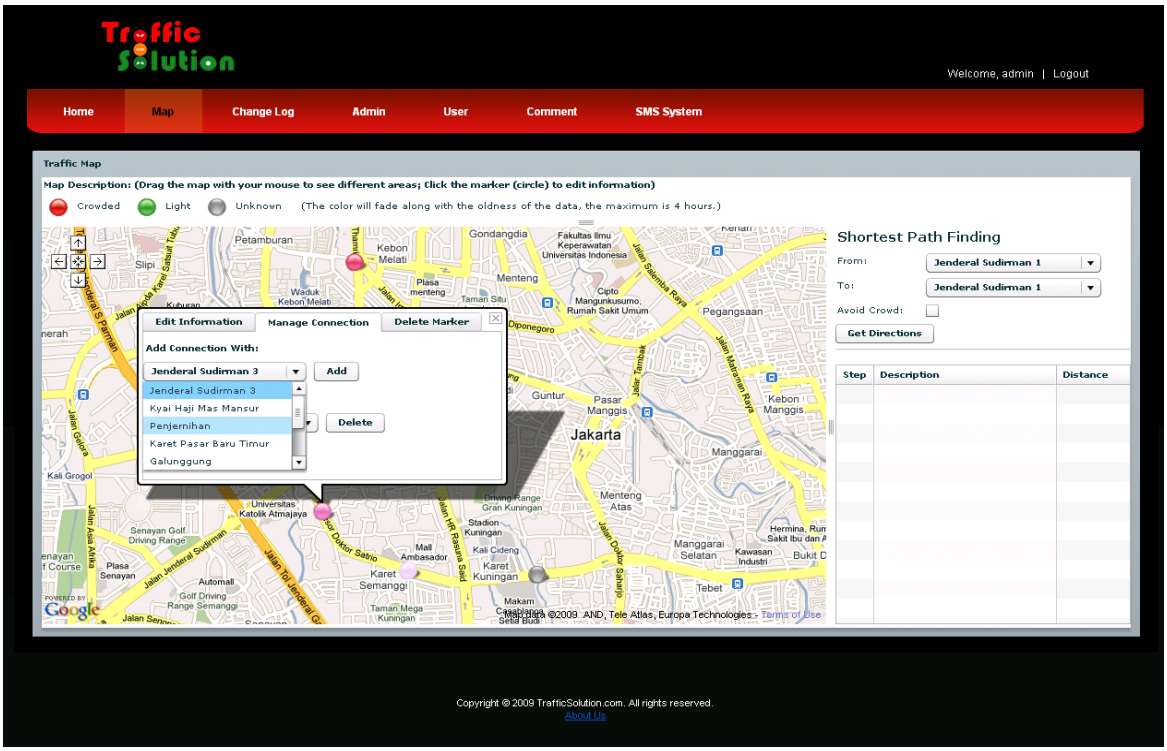

Figure 5.9 Administrator Add Connection on Map

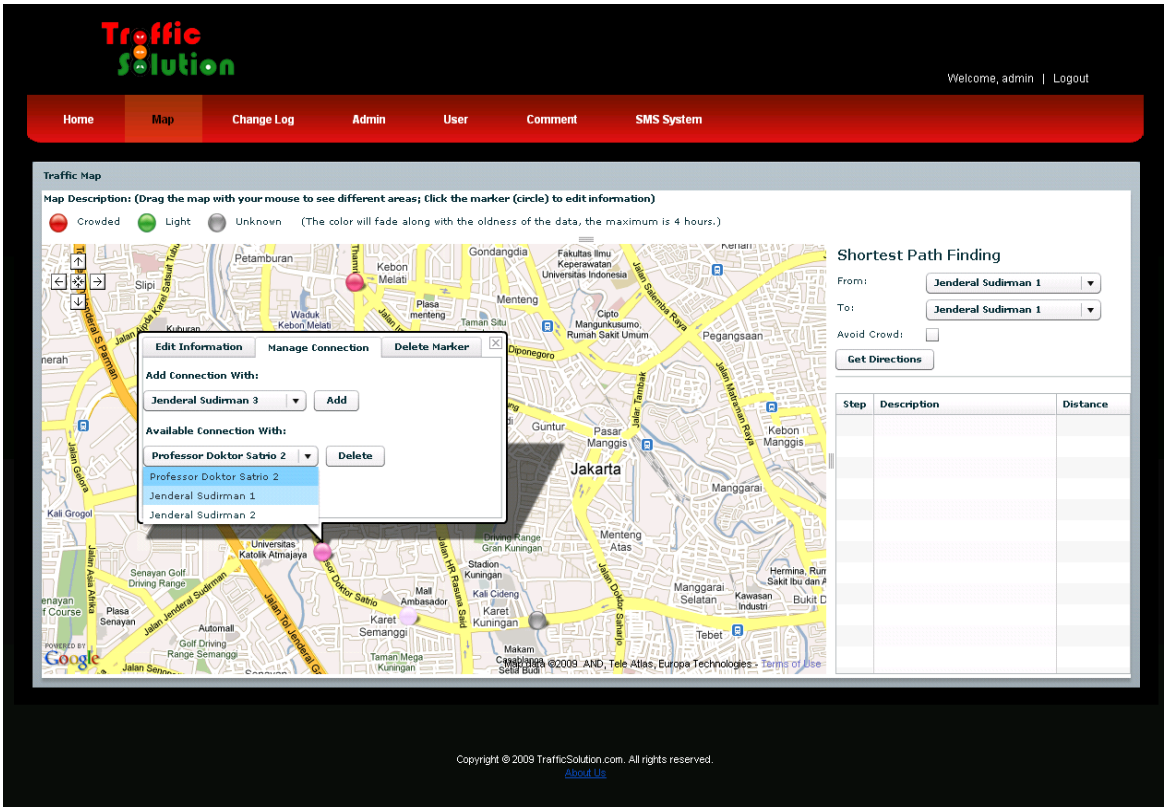

Figure 5.10 Administrator Delete Connection on Map

Administrator map system is more powerful than user map system. In Figure 5.6, the edit information dialog box of administrator map system is more complete. Not only changing the street status, admin can also change the street name. Besides edit information dialog box, there are ‘manage connection’ and ‘delete marker’ tab. Admin can add marker by right clicking on the map and choose the ‘add marker’ menu such can be seen in Figure 5.7. To delete the marker, admin can go to the ‘delete marker’ tab on the dialog box and press the delete marker button (Figure 5.8). Admin can add connection on ‘manage connection’ tab on the dialog box such can be seen in Figure 5.9. To delete the connection, admin also can go to ‘manage connection’ tab on the dialog box (Figure 5.10).

Table 5.12 Admin Change Log System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	View change log	The user must have already logged in to the administrator system.	1. User clicks change log menu.	The system responds by showing the change log history.	OK

Table 5.13 Admin System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Add new admin with valid data	The user must have already logged in to the administrator system.	1. User clicks the add new admin link on the admin menu. 2. User fills the add admin form with valid data and submits it.	The system stores the information into database.	OK
2	Add new admin with invalid data	The user must have already logged in to the administrator system.	1. User clicks the add new admin link on the admin menu. 2. User fills the add admin form with invalid data and submits it.	The system returns the notification message to user to complete the form.	OK
3	View admin	The user must have already logged in to the administrator system.	1. User clicks the admin menu.	The system responds by showing the admin list.	OK
4	Delete admin	The user must have already logged in to the administrator system.	1. User views the admin and clicks the delete link. 2. User clicks ‘OK’ on the	The system responds by deleting the admin from database.	OK

			confirmation dialog.		
5	Cancel delete admin	The user must have already logged in to the administrator system.	1. User views the admin and clicks the delete link. 2. User clicks ‘Cancel on the confirmation dialog.	The system cancels the delete.	OK
6	Edit admin with valid data	The user must have already logged in to the administrator system.	1. User views the admin and clicks the edit link. 2. User changes the data on the form with valid information.	The system validates the form and updates the database.	OK
7	Edit admin with invalid data	The user must have already logged in to the administrator system.	1. User views the admin and clicks the edit link. 2. User changes the data on the form with invalid information.	The system validates the form and returns the notification message to user to change the information with valid data.	OK

Table 5.14 Admin User System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Add new user with valid data	The user must have already logged in to the administrator system.	1. User clicks the add new user link on the user menu. 2. User fills the add user form with valid data and submits it.	The system stores the information into database.	OK
2	Add new user with invalid data	The user must have already logged in to the administrator	1. User clicks the add new user link on the user menu. 2. User fills the	The system returns the notification message to user to complete the	OK

		system.	add user form with invalid data and submits it.	form.	
3	View user	The user must have already logged in to the administrator system.	1. User clicks user menu.	The system responds by showing the user list.	OK
4	Delete user	The user must have already logged in to the administrator system.	1. User views the user and clicks the delete link. 2. User clicks 'OK' on the confirmation dialog.	The system responds by deleting the user from database.	OK
5	Cancel delete user	The user must have already logged in to the administrator system.	1. User views the user and clicks the delete link. 2. User clicks 'Cancel' on the confirmation dialog.	The system cancels the delete.	OK
6	Edit user with valid data	The user must have already logged in to the administrator system.	1. User views the user and clicks the edit link. 2. User changes the data with valid information on the form.	The system updates the database.	OK
7	Edit user with invalid data	The user must have already logged in to the administrator system.	1. User views the user and clicks the edit link. 2. User changes the data with invalid information on the form.	The system returns the notification message to user to change the information with valid data.	OK

Table 5.15 Admin Comment System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Admin add comment by filling all required field	The user must have already logged in to the administrator system.	1. User clicks the add comment link on the comment system. 2. User fills all required field in the add comment form and submits it.	The system stores the information into database.	OK
2	Admin add comment by not filling all required field	The user must have already logged in to the administrator system.	1. User clicks the add comment link on the comment system. 2. User does not fill all required field in the form and submits it.	The system returns the notification message to user to complete the form.	OK
3	Admin view comment	The user must have already logged in to the administrator system.	1. User clicks the comment menu.	The system responds by providing the comment list.	OK
4	Admin delete comment	The user must have already logged in to the administrator system.	1. User views the comment and clicks the delete link. 2. User clicks ‘OK’ on the confirmation dialog.	The system responds by deleting the comment from database.	OK
5	Admin cancel to delete comment	The user must have already logged in to the administrator system.	1. User views the comment and clicks the delete link. 2. User clicks ‘Cancel’ on the confirmation dialog.	The system cancels the delete.	OK

Table 5.16 Admin SMS System Module Testing

No	Test Case	Precondition	Test Steps	Expected Results	Status
1	Add SMS street group with valid data	The user must have already logged in to the administrator system.	1. User clicks the add SMS street group link on the SMS system menu. 2. User fills the add SMS street group form with valid data and submits it.	The system stores the information into database.	OK
2	Add SMS street group with invalid data	The user must have already logged in to the administrator system.	1. User clicks the add SMS street group link on the SMS system menu. 2. User fills the add SMS street group form with invalid data and submits it.	The system returns the notification message to user to complete the form.	OK
3	View SMS street group	The user must have already logged in to the administrator system.	1. User clicks view SMS street group link on the SMS system menu.	The system responds by showing the SMS street group list.	OK
4	Delete SMS Street Group	The user must have already logged in to the administrator system.	1. User views the SMS street group and clicks the delete link. 2. User clicks 'OK' on the confirmation dialog.	The system responds by deleting the SMS street group from database.	OK
5	Cancel delete SMS Street Group	The user must have already logged in to the administrator system.	1. User views the SMS street group and clicks the delete link. 2. User clicks 'Cancel' on the	The system cancels the delete.	OK

			confirmation dialog.		
6	Edit SMS street group with valid data	The user must have already logged in to the administrator system.	1. User views the SMS street group and clicks the edit link. 2. User changes the data with valid information on the form.	The system updates the database.	OK
7	Edit SMS street group with invalid data	The user must have already logged in to the administrator system.	1. User views the SMS street group and clicks the edit link. 2. User changes the data with invalid information on the form.	The system returns the notification message to user to change the information with valid data.	OK
8	View all street	The user must have already logged in to the administrator system.	1. User clicks manage SMS street link on the SMS system menu.	The system responds by showing all street list.	OK
9	Edit SMS street	The user must have already logged in to the administrator system.	1. User views all street and clicks the edit link. 2. User changes the data on the form.	The system updates the database.	OK