Design Decisions:

Following are the main design decision i took while writing codes for this assignment.

1. **Graph:** For Graph i used the Adjacency list structure. I have created two structures namely Vertices and Edges. I am taking count of vertices from the top of the location file and building a vector of size equal to that count. Also i am keeping information about index of each vertices as its id. I am keeping the information of all the adjacent vertices with the help of a vector of the all the edges as a part of vertices struct. Edges struct contains the information about ids of both connecting vertices. Speed and distance information on that edge. There are standard methods for formation of graph. Dijkstra's algorithm and printing the resulting output.
2. **Priority Queue:** i am using the standard priority queue implementation which is described in the text book. I have used array for the implementation of the priority queue. There are standard methods for inserting and deleting minimum values. Insert takes id and weight of the vertices as its argument. while delete minimum gives the id of the minimum element in the queue.
3. In main.c file i am reading all the files which contains information. I am reading and accumulating the values one by one and sending to the graph functions to build a graph. i am reading the input file and taking out the information about number of inputs to be processed on. after that i am running a while loop to print the output one by one as required by the program. While this time i am also considering the type of output program demands. As for "D" the output is in miles while for type "T" output is shown in time durations.

Algorithm used is standard Dijkstra's algorithm to find the shortest path. i do not think a need to describe the algorithm here as it is obvious. and i have to finish the report in one page. following is the output i got for the input file provided to us.

here i am showing just the 1 out of the 4 parts of the output due to space constraints.

follow this command for output after getting executables from make file.

```
./proj4.out Program4Fall2013locations.txt Program4Fall2013segments.txt
Program4Fall2014trips.txt
```

Output is:

```
Shortest distance from 1st St & 101st Ave to 3rd St & 103rd Ave:

Start at 1st St & 101st Ave
Continue to I-94 South @ 101st Ave(0.06 miles)
Continue to I-94 South @ 102nd Ave(2.75 miles)
Continue to I-94 South @ 103rd Ave(3.2 miles)
Continue to 3rd St & 103rd Ave(0.0799999 miles)

Total Distance: 6.09 miles
```