

# **City Traffic and Public Transportation Improvement Program**

**New Mexico Adventures in  
Supercomputing Challenge  
Final Report  
April 2, 2003**

**011**

**Albuquerque Academy**

## **Team Members**

- Punit Shah

## **Teacher**

- Jim Mims

## **Project Mentor**

- Jim Mims

# Contents

- Executive Summary
- Introduction
- Project Description
- Math Model
- Results
- Conclusions
- Acknowledgments
- References
- Visuals

## Executive Summary

Traffic has been a problem for big cities almost since the car became popular. Cities have tried for years in many different ways to improve traffic flow, but the problem still plagues them. I have decided to try to create a program that would ultimately decrease and improve traffic. It would also incorporate some of the successful attempts from the past into it.

One of the most successful traffic solvers has and probably will be for a long time, public transportation. If an effective public transportation system is set up, then the citizens of the city will use it. The program I have tried to develop would show the city planner where to place effective public transportation routes. Another great solution to traffic is the traffic light. But traffic lights can only be effective if they are times correctly and take into account the many things that could help its performance, like queue size.

My project addresses these issues. There will be a drawing board, kind of like in popular game, *Sim City*. The user can draw in his or her city. When the drawing of the city, which should only take a few days for major cities even, the user can ask the program for a report on what can be improved at specific traffic lights, specific public transportation routes, or what in general could improve traffic flow for the city.

I planed to use Visual Basic (a programming language) because this program involves a highly visual interface and Visual Basic is good with visual programs.

- **Introduction**

My project is about traffic and how it can be improved through a program in cities. I decided to do this project because many cities these days have major traffic problems and there doesn't look like many solutions in store for them. For the project, I decided to use Visual Basic because it is a visually oriented programming language, just like my program will be.

- **Project Description**

The program will be composed of a visual drawing board where the user will input parts of his city like in the popular game *Sim City*. The program will also allow parts like un-editable commercial and residential so that the user won't have to input every little road because that would take months to do. It will though, show how to improve traffic light patterns for each intersection through better timing, how many cars are in the queue, what time of day, and many other factors.

There will also be a tool to improve public transportation by advising better placement of public transportation stops and also when the city budget is high, which type of public transportation could be introduced to the city.

- **Math Model**

I have a relatively simple math model for this project. I am only in algebra and this project involves linear algebra and linear programming, college level subjects. I there fore I did a lot of research through my mentor and teacher, Jim Mims. From that research, I found out that I should reduce the problem to a smaller grid than a city really would be. (See Visual 1) I would have fewer variables to work with, even though a two by two grid would still have almost 50 variables. With the help of my teacher, I created some equations using the little linear algebra I knew.

Ultimately, a lot of work still needs to be done to make the model more usable, but it is a good start. Some of the things that would need to be done: more equations for all the variables and making the traffic light performance only effected by the few close traffic lights.

- **Results**

Overall on the program, I didn't get very far. I was trying to learn Visual Basic and do the project at the same time and that ultimately made it so I couldn't actually start programming the program until the last few days.

I did learn a lot from this experience, even some stuff that is not totally related to the project, like not putting off everything to the morning of the due date. With regards to what I learned about traffic and programming, I learned some Visual Basic, a very powerful language. I learned how modern day traffic is controlled and what the major traffic problems are. I learned what some of the creative solutions have been in the past.

- **Conclusions**

The problem of traffic is a very complex problem. To make a program that will actively control traffic like mine might, it would indefinitely require a super computer. Linear programming will probably be the way to solve this problem because there will be literally thousands and thousands of variables to work with. I believe the biggest achievement that I have made on this project is probably the planning. I have everything in place, now all that needs to be done is the actual programming.

- **Acknowledgements**

I have to thank Jim Mims, my mentor and teacher for the project. Meeting the deadlines and trying to tackle this huge problem was a really big job. Also my knowledge on programming is very small. Mr. Mims's knowledge on the other hand is vast and was very useful for me. I probably would've had to quit this project had he not been there for me. Thanks!

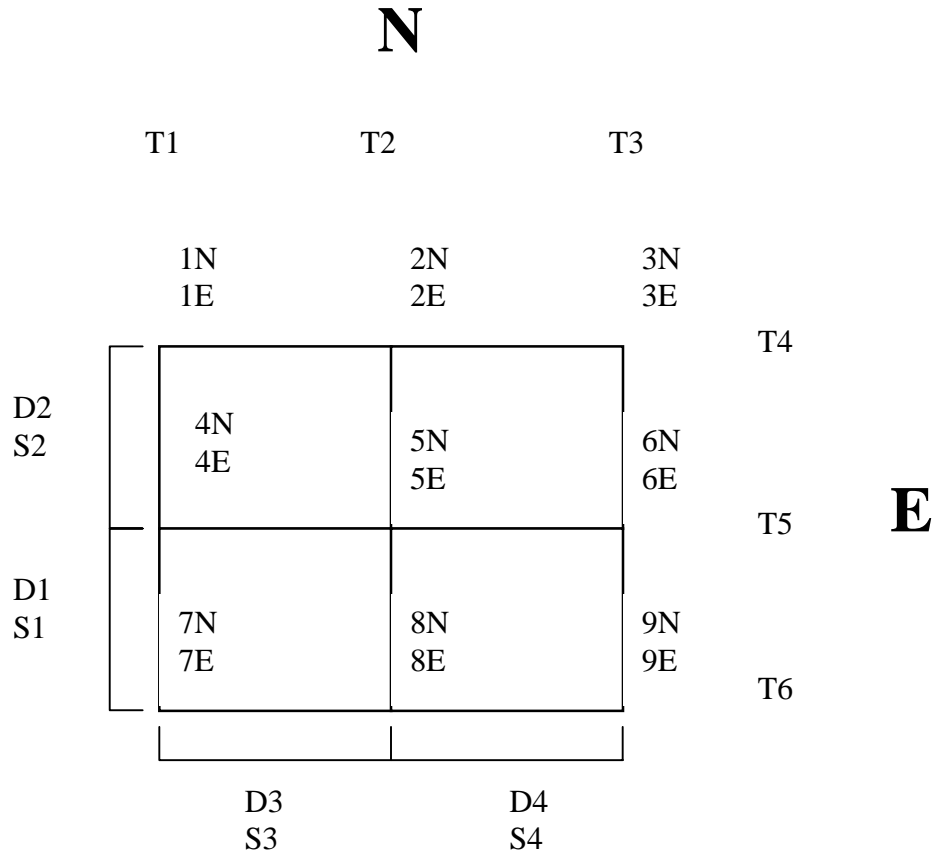
I'd also like to thank all the people who made this contest possible including Los Alamos National Labs, NM TechNet, The Department of Energy, and last but certainly not least, NASA Ames Research Center. I also need to thank all the people who have volunteered their time for this contest. It was a great experience.

- **References**

- Alley, Tim. Ecological City [Video Recording]. Berkeley, California: University of California, 2000.
- [www.broomhillonline.org.uk](http://www.broomhillonline.org.uk)
- [www.eastlothiancourier.com](http://www.eastlothiancourier.com)

- [www.globalideasbank.com](http://www.globalideasbank.com)
- Jim Mims
- Albuquerque Journal

• **Visuals**



**Visual 1**