

2008

The Dallas Application of Responsible Transportation: How can public transportation systems work effectively for a city subject to urban sprawl? DART as a case study.

Christina Chermak
Southern Methodist University

Kent Spenner
Southern Methodist University

Jennifer Bell
Southern Methodist University

Juliana Jones
Southern Methodist University

Ricardo Leon
Southern Methodist University

See next page for additional authors

Follow this and additional works at: https://scholar.smu.edu/big_ideas_2008_proposals

Recommended Citation

Chermak, Christina; Spenner, Kent; Bell, Jennifer; Jones, Juliana; Leon, Ricardo; Webb, Joanna; Heydari, Tim; and Aranda, Martha, "The Dallas Application of Responsible Transportation: How can public transportation systems work effectively for a city subject to urban sprawl? DART as a case study." (2008). *Big iDeas 2008 Proposals*. 4.
https://scholar.smu.edu/big_ideas_2008_proposals/4

This document is brought to you for free and open access by the Big iDeas 2008 at SMU Scholar. It has been accepted for inclusion in Big iDeas 2008 Proposals by an authorized administrator of SMU Scholar. For more information, please visit <http://digitalrepository.smu.edu>.

Authors

Christina Chermak, Kent Spenner, Jennifer Bell, Juliana Jones, Ricardo Leon, Joanna Webb, Tim Heydari, and Martha Aranda

The Dallas Application of Responsible Transportation

How can public transportation systems work effectively for a city subject to urban sprawl?
DART as a case study.



Christina Chermak
Kent Spenner
Jennifer Bell
Juliana Jones
Ricardo Leon
Joanna Webb
Tim Heydari
Martha Aranda

Submitted January 31st 2008

Contents

List of Student Participants	3
Faculty Cooperators	5
Statement of Problem.....	6
Methodology.....	7
Current System Analysis	7
Determining Possible Solutions	8
Application of Possible Solutions	9
Project Rationale.....	9
Proposed Timeline	9
Anticipated Budget	11
Appendix A-Proposed Timeline	12
Appendix B- Works Cited	16

List of Student Participants



Christina Chermak

Team Lead

Email: cchermak@smu.edu

Major(s): Civil Engineering

Year of Study: Senior



Kent Spenner

Team Lead

Email: kspenner@smu.edu

Major(s): Computer Engineering

Year of Study: Senior



Jennifer Bell

Email: jbell@smu.edu

Major(s): Psychology and Education

Year of Study: Junior



Juliana Jones

Email: julianaj@smu.edu

Major(s): Business and CCPA

Year of Study: Sophomore



Ricardo Leon

Email: rleon@smu.edu

Major(s): Civil Engineering and Art

Year of Study: Freshman



Joanna Webb

Email: joannaw@smu.edu

Major(s): Biological Sciences and Chemistry

Year of Study: Sophomore

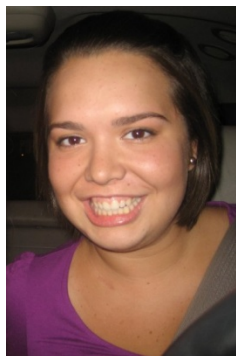


Tim Heydari

Email: trheydar@smu.edu

Major(s): Electrical Engineering and Math

Year of Study: Senior



Martha Aranda

Email: maranda@smu.edu

Major(s): Spanish and Political Science

Year of Study: Junior

Faculty Cooperators



Dr. Laura Steinberg
Professor and Department Chair
PH.D, Environmental and Civil Engineering
Email: lauras@engr.smu.edu
Department: Environmental and Civil
Engineering



Dr. Khaled Abdelghany
Assistant Professor
PH.D, Civil Engineering
Email: khaled@engr.smu.edu
Department: Environmental and Civil
Engineering



Dr. Jim Yu
Assistant Professor
E.I.T, PH.D, Environmental Engineering
Email: jty@engr.smu.edu
Department: Environmental and Civil
Engineering

Statement of Problem

How can public transportation systems work effectively for a city subject to urban sprawl? DART as a case study.

The city of Dallas, like many other American cities, is currently facing an air quality crisis. Recently, the American Lung Association qualified Dallas as one of the most dangerous metropolitan areas due to unhealthy air¹, and ranked it 7th on a list of cities known for unhealthy amounts of smog.² The question, then, is if Dallas is not a major industrial city, where is the air pollution coming from?

The problem stems from the dependence on automobiles for transportation in the Dallas Fort Worth area. Automobiles contribute to the air pollution due to the CO2 emissions created by their use. In 2005 nearly two million cars were registered in Dallas County alone.³ Between Fort Worth and Dallas over 65 million miles were driven daily in vehicles.³ These numbers are staggering, making Dallas one of the most car-dependent cities in the nation. Clearly, having this many cars on the road causes environmental concerns for the city. While technologies to lower car emissions are constantly being improved, the current answer for Dallas is to improve the public transportation system, namely the Dallas Area Rapid Transit (DART).

A case study of major European cities, New York City, or Washington D.C. would show that a large portion of the population views public transportation in a positive light and relies on express transit services to get around the city. In Dallas this is not the case. Our group believes that Dallas should begin capitalizing on the public transit system that the city currently has, while expanding their customer base.

The DART is modeled after typical public transportation and depends on mass transport of people via train and bus. While this method may be appropriate for cities such as New York and Washington D.C., it does not work for Dallas due to the layout of the city. Dallas, like many other modern cities, suffers from urban sprawl. In fact, according to a book addressing urban sprawl, Sprawl Costs: Economic Impacts of Unchecked Development, Dallas ranks 5th on a list of the cities subject to the worst cases of urban sprawl in America.⁴ In the past ten years, Dallas has been growing at a rate of 20%, adding about 250 residents a day.³

Middle and high-class families live in suburbs around the city and commute towards the city for their jobs. Therefore, these privileged families have the capability to drive into the city and even take pride in the convenience of using their own automobiles. When given the option between public transit or the convenience and comfort of their own automobile, most choose to travel on their own. In a study done by Clear Channel Outdoor, it was determined that up to 79% of Dallas drivers commute to work alone in personal vehicles.³ Therefore, the DART system does little to stop the magnitude of cars on the road. In many European countries, the wealthier classes live inside the city as opposed to surrounding suburbs. Therefore, most don't even own personal automobiles and rely entirely on public transportation. Even tourists are more dependent upon Metro systems or Subways to travel. In these cases the typical public transportation infrastructure is used much more successfully.

This study will utilize the DART system as a case example in the process of determining how a public transit system can be successfully applied in cities subject to urban sprawl situations similar to Dallas'. Possible alternatives, adjustments and improvements to the DART system will be considered and

analyzed. Social implications and logistical adjustments will be central to the study. The final goal is to find changes that will increase the percentage of commuters who choose to use public transportation. Hopefully, the successful result determined for Dallas will be applicable to other cities that are subject to urban sprawl.

Methodology

In order to accurately assess and approach Dallas' problem with effective transportation our team must analyze the current system, study possible solutions, predict the success of these solutions, and choose the most valuable adjustments.

Current System Analysis

To determine the baseline problems of the current DART system a thorough analysis must first be performed. To get the big picture of why DART does not work to its full potential we will be relying most on surveys administered to the general public. Stage one of these surveys will be written to determine the social and logistical reasons behind low DART efficiency. The questions will be developed with the help of a psychology major to ensure that they are not biased or leading. Some of the surveys will be administered to current DART riders by passing them out on trains, but the majority will be used for current non-riders. By focusing on non-riders we will hopefully be able to determine which alterations will increase the number of transit users.

In Dallas a large part of the general public are classified as non-riders, meaning that they do not use the DART system on a regular basis. Some of these non-riders will never use the DART, so our research will closely focus on groups we feel to be *potential* riders. These riders may choose to use the DART in the future for economical reasons, convenience or social responsibility.

Our main group of potential riders includes business men and women who commute from suburbs or the outskirts of the city toward the city center (or the opposite). We will find these commuters by going to businesses downtown (that are within walking distance of DART stations) and survey employees there to determine where they commute from and how they choose to do so. Other potential riders include underprivileged families that could use the DART as an alternative to purchasing an automobile. We will access these families through city schools, churches, and grocery stores. Our third class of potential riders includes students and young professionals that would choose public transit for its environmental advantages. This target audience will be surveyed via our connections at the SMU campus, as well as talking to people in high class shopping centers. Finally, we will look at ways that DART can improve its capabilities for disabled passengers. Once again this information will come from firsthand experience of our team members as well as survey results. All surveys will be collected in a random format to maintain a simple random sample of the general population of potential users.

It is expected that a majority of the responses on surveys will claim that the DART commute is longer than actually making a commute in a personal vehicle. Because of this, we plan to include commute timing as a part of our original analysis. This will be done by actually traveling from certain locations, both using the DART and a personal vehicle. As was previously mentioned, our largest group of potential users are business men and women, and as such these real-time commutes will be done during rush hour. Multiple samplings will be taken for each route and

both types of transportation to eliminate anomalies in commute time (i.e. accidents or power outages). During this portion of the analysis, transportation modeling software will also be used to determine the effects of commute times and congestions. This analysis will allow us to determine if one of our proposed changes should be made to actually respond to the length of a commute.

Determining Possible Solutions

After compiling the original Dallas survey information, possible solutions will be determined. Some of these will be developed using our team's diverse background and knowledge of the DFW area. Others will be acquired from existing transit systems around the world.

As was mentioned in the problem statement section of this report, Dallas has issues with public transportation due to its urban sprawl. London, England is another metropolis city that has been the victim of urban sprawl. In addition, London is home to the Underground- one of the world's most well known public transit systems. Although the London Underground was the first mass public transportation system developed and is set in a city subject to urban sprawl, the system is still widely successful. Business men and women (our primary interest group) use the system for everyday commutes and in addition the system is ranked number one on numerous tourism websites.⁵ It should be noted that the system is called the Underground, but in reality over half of the transit is done by busses. Therefore, there are aspects of the Underground that can be applied to Dallas.

By making a trip to London to gain a firsthand view of the London Underground, possible solutions to Dallas' problem will be developed. Surveys will also be administered in London to Underground users, to determine what aspects of the system attract them to public transit. London is the best possible case to study for comparison to Dallas because it is home to a western culture, suffers from urban sprawl and still maintains a public transit system that has an extremely positive public image. Hopefully, the London perspective will translate into feasible and successful solutions for Dallas.

Our group has also looked at the benefits of visiting various other cities that are geographically closer to Dallas in order to cut down on the expenses allotted to travel. Atlanta and Los Angeles were viewed as possible locations due to the fact that both cities suffer from urban sprawl similar to the manner in which Dallas does. Unfortunately, both Los Angeles and Atlanta have public transit systems that do not work to the best of their abilities and are generally viewed in a negative light. Therefore, visiting these cities would only be valuable in the aspect that they would be another "bad" example of public transit in a city with urban sprawl. Our group also considered visiting New York City, Portland, or Washington DC because of the positive light in which each of these transit systems are viewed. However, these cities do not suffer from urban sprawl to the degree that Dallas does, so a majority of the ideas gathered there may not be applicable to Dallas' condition.

A trip to any of these alternative cities would give the team a new perspective on the topic, but based upon preliminary research it seems that the city that would be most beneficial to visit would be London. This is due to the fact that London is similar to Dallas in the category of urban sprawl, but still has a successful transit system. It is possible that more research into each of the possible cities will lead us to do our visit to a different location. For the purpose of this proposal,

budgeting and timeline information was based upon a trip to London since this would be the most expensive and difficult trip to plan. Other closer cities could easily replace London, but London could not easily replace another city.

Application of Possible Solutions

The final stage of our project is to analyze the most applicable solutions determined from our team's creativity and the examples of London's Underground and make a coherent list of suggestions for implementing change on the DART system.

The analysis of these possible solutions will be done by a third round of surveys. These surveys will be developed to determine if the groups of potential riders would chose to use the DART if our suggested changes were implemented. Once again, the surveys will be developed in a non-biased manner to ensure accuracy in results. They will be administered in a similar fashion to the original round of surveys. We will be sure to once again include all of our potential riders- business persons, underprivileged families, students, persons with disabilities, and environmentally conscious consumers. The responses we get from potential riders will determine which modifications are further developed and presented in our final report.

Possible changes can include image improvements (cleaner, more attractive transit), logistical changes (increasing frequencies of busses or adding lines), and convenience developments (incentives for potential riders to use the system). All of these varying improvements will be fully analyzed and based on the results from this round of surveys, our conclusions will be developed.

All findings will be presented in a professional final report. All solutions will be fully developed and prototypes will be made available.

Project Rationale

The results of this study will be numerous. Our analysis and findings will result in some possible solutions to Dallas' poor implementation of public transit. The application of these solutions will increase ridership on the transit lines and therefore diminish the amount of cars on Dallas roads. This will help with congestion, environmental concerns, and increase economic possibilities for the city. All aspects of the problem will be looked at during our analysis- from social reasons to logistical ones. Our solutions will therefore respond to all of these reasons.

The city of Dallas has a major problem with regards to the amount of traffic on roads. Not only are the current systems clogged, but the large amounts of cars cause air quality problems for the city. By increasing the use and effectiveness of the public transit systems, both of these issues will be alleviated. Our study will successfully accomplish this task.

Proposed Timeline

It is expected that a significant amount of time will be needed to survey the Dallas community. In order to accomplish the objectives outlined in the problem statement and methodology, a detailed timeline has been determined.

In February, after the announcement of the Big iDeas grants, we plan to develop the stage one surveys regarding Dallas Public Transportation. We will set up meetings with DART officials to obtain an inside perspective and any needed information. At the beginning of March we plan to review and finalize the survey questions and methods. The surveys will be included in the Big iDea's Symposium presentation that will be held in March.

After the Symposium, we will begin surveying the Dallas community. In March and April we will continue administering surveys and run the time trials for DART and street commutes. At the end of April we will have all the results and will be able to compile the results. Based on the findings of our research in Dallas we will develop surveys for London and prepare questions for meetings with public transportation officials while there.

In June we plan to investigate the London Public Transit System and compile the results of the investigation. The results and new perspectives gained from the London investigation will be used to help develop possible improvements to DART and the stage two surveys. The stage two surveys will help determine which qualities of the London system will have the most effective impacts on the DART. During July, we plan to distribute the stage two surveys. By August all surveying and information will be gathered. The final stages of the project will be compiled into a formal report and presentation. See attached calendar in Appendix A for a visual representation of the project timeline.

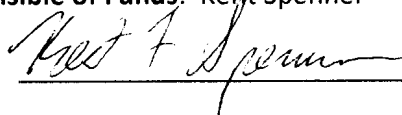
Anticipated Budget

Budget:

Supplies and Equipment	Total: \$1,140
Surveys (approximately 10 cents per page, 5000 pages)	\$500
Stopwatches	\$30
Communications (pens/pencils/mailling supplies)	\$70
Gasoline (for real time car commutes for comparison to DART time Multiple iterations will be made to eliminate error)	\$500
DART Passes (five dollars each for 8 members)	\$40
Travel	Total: \$3,860
London, England	
Airfare for 2	\$2,500
Hotel Room (for 5 business days)	\$1,000
Expenses (Tube Passes/Cab Fare)	\$360
	TOTAL: \$5,000

Person Responsible of Funds: Kent Spenner

Signature:



Appendix A-Proposed Timeline

February 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	
Write Surveys for Dallas Area, 10 days Project Symposium Preparation, 10 days						

**Announcement of
Research Grant**

March 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1
Write Surveys for Dallas Area, 10 days Project Symposium Preparation, 10 days						
2	3	4	5	6	7	8
Write Surveys for Dallas Area, 10 days Project Symposium Preparation, 10 days						
9	10	11	12	13	14	15
Dallas Area Survey Distribution, 30 days Real-Time Travel Investigation, 30 days						
16	17	18	19	20	21	22
Dallas Area Survey Distribution, 30 days Real-Time Travel Investigation, 30 days						
23	24	25	26	27	28	29
Dallas Area Survey Distribution, 30 days Real-Time Travel Investigation, 30 days						
30	31					
Dallas Area Survey Distribution, 30 days Real-Time Travel Investigation, 30 days						

April 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
Dallas Area Survey Distribution, 30 days						
Real-Time Travel Investigation, 30 days						
6	7	8	9	10	11	12
Dallas Area Survey Distribution, 30 days						
Real-Time Travel Investigation, 30 days						
13	14	15	16	17	18	19
Dallas Area Survey Distribution, 30 days						
Real-Time Travel Investigation, 30 days						
20	21	22	23	24	25	26
Compile Stage 1 Surveys, 10 days						
27	28	29	30			
Compile Stage 1 Surveys, 10 days						

May 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
				1	2	3
Compile Stage 1 Surveys, 10 days						
4	5	6	7	8	9	10
Develop Questionnaires For London, 10 days						
11	12	13	14	15	16	17
Develop Questionnaires For London, 10 days						
18	19	20	21	22	23	24
25	26	27	28	29	30	31

June 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1	2	3	4	5	6	7
London Research Trip, 7 days						
8	9	10	11	12	13	14
London Research Trip, 7 days						
15	16	17	18	19	20	21
London Research Trip	Compile Results From London Research, 10 days					
22	23	24	25	26	27	28
Compile Results From London Research, 10 days						
29	30					
Create Surveys Based on London and Dallas Research, 5 days						

July 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
		1	2	3	4	5
Create Surveys Based on London and Dallas Research, 5 days						
6	7	8	9	10	11	12
Distribute Stage 2 Surveys, 20 days						
13	14	15	16	17	18	19
Distribute Stage 2 Surveys, 20 days						
20	21	22	23	24	25	26
Distribute Stage 2 Surveys, 20 days						
27	28	29	30	31		
Distribute Stage 2 Surveys, 20 days						

August 2008

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1	2
Distribute Stage 2 Surveys, 20 days						
3	4	5	6	7	8	9
Compile stage 2 Survey Results, 10 days						
10	11	12	13	14	15	16
Compile stage 2 Survey Results, 10 days						
17	18	19	20	21	22	23
Compile Final Report, 10 days						
24	25	26	27	28	29	30
Compile Final Report, 10 days						Last day to extend Funds for Grant, 1 day
31						

Appendix B- Works Cited

- [1] "American Lung Association Fights Roll-Backs of Clean Air Act That Would Increase Pollution", April, 29th 2004 <http://www.lungusa.org/site/apps/s/content.asp?c=dvLUK9O0E&b=34706&ct=66972>
- [2] "Los Angeles remains most polluted US city", May, 1st 2007
http://www.citymayors.com/environment/polluted_uscities.html
- [3] Clear Channel Outdoor, 2006, <http://www.clearchanneloutdoor.com/markets/dallas.htm>
- [4] "Dallas-Fort Worth among top cities for urban sprawl", Dallas Business Journal, November, 5th 2005
https://webmail.smu.edu/exchweb/bin/redirect.asp?URL=http://www.bizjournals.com/dallas/stories/2005/11/14/daily19.html?jst=s_cn_hl
- [5] "Top 11 Transit Systems throughout the World", Virgin Vacations, January 2008
http://www.virgin-vacations.com/site_vv/11-top-underground-transit-systems-in-the-world.asp