REGIONAL PRIORITIZATION OF CORRIDORS FOR

TRAFFIC SIGNAL RETIMING

by

SASANKA BHUSHAN PULIPATI

Presented to the Faculty of the Graduate School of

The University of Texas Arlington in Partial Fulfillment

of the Requirements

for the Degree of

MASTER OF SCIENCE IN CIVIL ENGINEERING

THE UNIVERSITY OF TEXAS ARLINGTON

May 2006

Dedicated to my parents

Mrs. Lakshmi Devi and Mr. Markandeya

and to my country India.

ACKNOWLEDGEMENTS

It was a great pleasure working on my thesis with Dr. Stephen P. Mattingly. I sincerely acknowledge his guidance and encouragement throughout this thesis. I am grateful to Dr. James Williams and Dr. Melanie Sattler for helping me with their valuable suggestions during this effort. I am obliged to Prof. Sia Ardekani for his advice throughout my graduate studies at UT Arlington. I thank Dr. D.L.Hawkins for his guidance in statistical analysis.

I express my gratitude towards Mr. Alauddin Khan and Ms. Natalie Bettger, the NCTCOG officials who informed me about the current methodology and suggestions for improvement. I am thankful to Mr. Khan for providing the necessary data for this research. My special thanks go to Mr. Mike Blake, Traffic Engineer, City of Arlington, for providing me required information on signal retiming projects in Arlington.

I thank the Department of Civil and Environmental Engineering, UTA, for providing me the required software and computing facilities. I appreciate Mr. Lewis Crow, Computer Services Specialist, for help related to software.

I thank all the officials from various transportation departments who participated in my survey.

I thank all my colleagues who provided me with great support, both technical and moral, all through my research.

Finally, I would like to convey my sincere gratitude to my parents and family members whose support provided me the confidence to achieve this task.

April 17, 2006

ABSTRACT

REGIONAL PRIORITIZATION OF CORRIDORS FOR TRAFFIC SIGNAL RETIMING

Publication No.

Sasanka Bhushan Pulipati, M.S.

The University of Texas Arlington, 2006

Supervising Professor: Dr. Stephen P. Mattingly

Every three to four years, the North Central Texas Council of Governments (NCTCOG) funds signal retiming projects to improve air quality in the Dallas-Fort Worth region. As sufficient funds are not available to retime all the signals in the region at the same time, the retiming must be completed in phases. To optimize the impact of the retiming projects, the candidate corridors must be rank ordered or prioritized. NCTCOG applies a ranking model, which uses variables such as delay, number of stops and system type, a dummy variable indicating the interconnection among the intersections. The weighting for each factor is assigned by an expert group.

This thesis proposes a new, improved methodology based on signal retiming benefits rather than the severity of existing traffic conditions. Benefits are estimated from the before and after studies conducted along the corridors where retiming has been executed recently. Benefits in delay, fuel consumption and emissions are to be modeled in terms of various physical characteristics and traffic flow characteristics of the corridors. This model helps in estimating benefits beforehand and prioritizing the retiming projects based on these benefits. Appropriate conversion rates are identified to convert all benefits into dollars.

TABLE OF CONTENTS

ACKNOWLEDGEMENTS	iii
ABSTRACT	v
LIST OF ILLUSTRATIONS	xi
LIST OF TABLES	xiii
Chapter	
1. INTRODUCTION	1
2. TRAFFIC SIGNAL RETIMING	4
2.1 Corridor-Based Signal Retiming	5
2.2 Benefits of Signal Retiming	6
2.3 The Process of Signal Retiming	7
2.3.1 Existing data collection	8
2.3.2 Signal optimization	8
2.3.3 Implementation	9
2.3.4 Documentation	9
3. PROBLEM STATEMENT	10
4. PRIORITIZATION OF PROJECTS – A REVIEW	12
5. PRIORITIZATION OF SIGNAL RETIMING PROJECTS	14
5.1 Need for Prioritization of Signal Retiming Projects	14

5.2 Existing Procedures in Dallas-Fort Worth Region	16
5.3 Factors Affecting the Prioritization of Retiming Projects	17
5.3.1 Delay	17
5.3.2 Number of stops	18
5.3.3 Fuel consumption	18
5.3.4 Emissions	19
5.3.5 Safety	19
6. NCTCOG'S RANKING METHODOLOGY	21
6.1 Corridor Data	21
6.2 The Model Used by NCTCOG	22
6.2.1 Variables	22
6.2.1.1 Total delay	22
6.2.1.2 Number of stops	23
6.2.1.3 System type	23
6.2.2 Weightings	23
6.3 Calculation of Rank Order	24
7. ESTIMATION OF BENEFITS	27
7.1 Case Study from the City of Arlington	27
7.2 Before and After Studies	28
7.2.1 Before and after studies for signal retiming projects	28
7.2.2 PC-Travel software – an overview	29

7.2.3 Estimation of emissions and fuel consumption using	22
PC-Travel	32
7.3 Studies for the Recent Projects	33
7.3.1 Great Southwest Parkway	34
7.3.2 Pioneer Parkway	37
7.4 Total Corridor Benefits	38
7.5 Comparison of Benefits with Estimates from SimTraffic	41
8. PROPOSED METHODOLOGY	43
8.1 Modeling Benefits	43
8.1.1 Dependents and predictors in the model	43
8.1.2 Discussion of predictors	45
8.1.3 Model development	47
8.1.3.1 Uni-variate analysis - Qualitative variables	48
8.1.3.2 Uni-variate analysis - Quantitative variables	49
8.1.3.3 Correlation matrix	54
8.2 Monetary Benefits	56
8.2.1 Value of time	56
8.2.2 Fuel price	56
8.2.3 Value of NO _x emissions	56
8.3 Application of Methodology	57
9. CONCLUSIONS AND RECOMMENDATIONS	59
9.1 Conclusions	59
9.2 Recommendations for Further Research	60

Appendix

A. RESPONSES OF VARIOUS TRANSPORTATION	
ORGANIZATIONS ON SIGNAL RETIMING PROJECTS	
AND THEIR PRIORITIZATION	62
B. ORIGINAL DATA OBTAINED FROM NCTCOG	66
C. DETAILED STUDY STATISTICS FROM BEFORE AND AFTER	
TRAVEL TIME STUDIES	81
D. DATA COMPILED FOR INDEPENDENT VARIABLES	100
REFERENCES	105
BIOGRAPHICAL INFORMATION	107

LIST OF ILLUSTRATIONS

Figure	Pag	e
1.1	Map showing Dallas-Fort Worth region in the U.S 2	
2.1	User costs vs. number of years for two different signal retiming scenarios	
7.1	Jamar TDC-12 instrument	
7.2	PC-Travel window showing the details for AM NB runs on Great Southwest Pkwy	
7.3	PC-Travel window showing study statistics	
7.4	Great Southwest Parkway corridor	
7.5	Pioneer Parkway corridor	
8.1	Histogram for Number of lanes (NL)	
8.2	Histogram for System type (Z) 48	
8.3	Density histogram for Length 50	
8.4	Density histogram for No. of signals 50	
8.5	Density histogram for Signal density 50	
8.6	Density histogram for Log (Signal density) 51	
8.7	Density histogram for St. dev of spacing 51	
8.8	Density histogram for Average daily traffic 51	
8.9	Density histogram for Free flow travel time	
8.10	Density histogram for Measured travel time	

8.11	Density histogram for Total delay/vehicle	52
8.12	Density histogram for Delay/veh/signal	53
8.13	Density histogram for Delay/veh/mile	53
8.14	Density histogram for Number of stops/veh	53
8.15	Density histogram for Number of stops/veh/mile	54
8.16	Density histogram for Number of stops/veh/signal	54

LIST OF TABLES

Table		Page
6.1	Variables Used in NCTCOG's Ranking Model and Their Weightings	23
6.2	Results of the NCTCOG Ranking Model	25
7.1	Corridor Details for Great Southwest Parkway	34
7.2	Estimated Benefits per Vehicle for Great Southwest Parkway	36
7.3	Corridor Details for Pioneer Parkway	37
7.4	Estimated Benefits per Vehicle for Pioneer Parkway	38
7.5	Traffic Volumes for Great Southwest Parkway	39
7.6	Traffic Volumes for Pioneer Parkway	39
7.7	Recommended Signal Timing Operating Schedule for Weekday	39
7.8	Savings in Three Years from Signal Retiming along Great Southwest Parkway	40
7.9	Savings in Three Years from Signal Retiming along Pioneer Parkway	40
7.10	0 Total Weekday Daytime Corridor Savings	41
7.11	1 Comparison of Delays for Great Southwest Parkway	42
7.12	2 Comparison of Delays for Pioneer Parkway	42
8.1	Predictors Considered in Modeling Benefits	45
8.2	Uni-variate Analysis of Quantitative Variables	49
8.3	Correlation Matrix for the Independent Variables	55

CHAPTER 1

INTRODUCTION

According to the Institute of Transportation Engineers (2004), there are about 300,000 traffic signals in the United States. Delay at signalized intersections is a major part of total vehicular traffic delay. Traffic signal retiming is one of the most cost effective ways to reduce delays and is one of the most basic strategies to help mitigate congestion. Signal retiming can reduce variations in vehicle-speeds, which reduces vehicle emissions and improves the air quality of a region. After three to four years, traffic signals may need to be retimed, where new timing plans are established to match the current demand.

This research is concerned with the signal retiming projects proposed in the Dallas-Fort Worth (DFW) region. Figure 1.1 shows the DFW area in the United States map. DFW is a moderate non-attainment zone for Ozone with respect to air quality requirements. The North Central Texas Council of Governments (NCTCOG), the metropolitan planning organization for this region, funds signal retiming projects in this region. NCTCOG works with an aim of improving air quality as well as congestion through these projects.

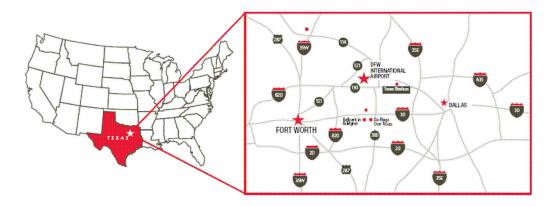


Figure 1.1 Map showing Dallas-Fort Worth region in the U.S. (source: www.fortworth.com)

As sufficient funds are not available to retime all the signals in the region at the same time, the retiming must be completed in phases. For each phase, candidate corridors must be prioritized to make sure the funds are efficiently used. NCTCOG has its own ranking model, which uses delay, number of stops and a dummy variable, system type. Here, system type indicates whether or not the signals along a corridor are connected to a coordinated system. Delay and number of stops are used to indicate the severity of the existing traffic conditions.

This thesis presents a new methodology for prioritization, which models expected benefits based on both the system's physical characteristics and traffic conditions before signal retiming. In this methodology, all benefits such as reduction in delay, fuel consumption and emissions are converted into monetary terms using a reasonable dollar rate. While this thesis proposes the structure for this model, the model itself is not estimated because the before and after studies associated with the recent traffic signal retiming projects in this region have not been completed. This thesis first introduces traffic signal retiming and then talks about the need for prioritization of signal retiming projects. Existing methodology used by the NCTCOG is discussed before proposing a new methodology.

The second chapter defines traffic signal retiming and thoroughly discusses how it is implemented. The problem statement is given in chapter three. Chapter four reviews some earlier research on prioritization of projects, while the need for prioritization of signal retiming projects and various factors involved in such an effort are discussed in chapter five. NCTCOG's ranking methodology for prioritizing signal retiming projects is explained in chapter six. Chapter seven demonstrates how corridor benefits from signal retiming are estimated. The proposed methodology is explained in chapter eight. Chapter nine concludes this thesis with some recommendations for future research.

CHAPTER 2

TRAFFIC SIGNAL RETIMING

According to the Institute of Transportation Engineers (ITE), traffic signal retiming is one of the most cost efficient methods to solve traffic congestion problems and to improve air quality (ITE, 2006). Every time signals at an intersection are adjusted or new signals are installed, a traffic engineer's aim is to make them operate at the most efficient timing. A traffic signal system is efficient when it produces the least possible delays and number of stops at that intersection with some limitations such as any delays caused due to pedestrian crossing time.

Because of continuous growth in traffic and variation in travel patterns, the efficiency of a traffic signal system may deteriorate. Hence, retiming the signals may be necessary once every three to four years or when traffic patterns change considerably. Sunkari (2004) encourages retiming signals every three years to reduce growth in user costs. Figure 2.1 shows how user costs decrease in a case where signal retiming is done after 3 years and 6 years.

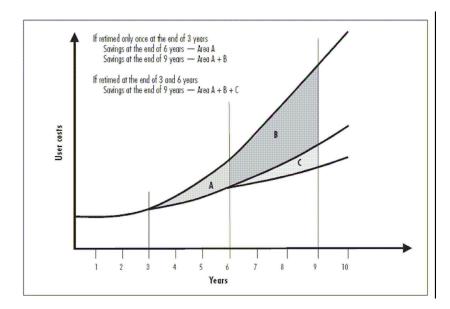


Figure 2.1 User costs vs. number of years for two different signal retiming scenarios (source: Sunkari (2004))

Signal retiming is defined by Sunkari (2004) as:

Traffic signal retiming is a process that optimizes the operation of signalized intersections through a variety of low-cost improvements, including the development and implementation of new signal timing parameters, phasing sequences, improved control strategies and, occasionally, minor roadway improvements.

2.1 Corridor-Based Signal Retiming

Traffic signal retiming can be implemented at a single intersection, or a group of intersections can be retimed at the same time. In deciding whether to retime a single intersection or a group of intersections, both operational and funding issues should be taken into account.

When an intersection is isolated, where operation at this intersection does not affect any subsequent intersections, it is usually retimed individually. When a group of intersections have a short spacing, operation at one intersection affects operations at other intersections. In this case, all interrelated intersections should be coordinated to obtain the highest efficiency. The starting of green time at any intersection depends on the time taken for a vehicle to reach the intersection.

Coordinatability is the desirability of coordinating intersections. Synchro 6 (Husch and Albeck, 2004) develops a Coordinatability Factor (CF), which is an indicator for the need for coordinating signals. The CF is based on numerous input variables: volume, travel time, distance, vehicle platoons, vehicle queuing and natural cycle length.

Generally when allocating funds, retiming signals along a street or a part of it is considered as a single corridor. A group of such corridors can be combined into one project when awarding it to a consultant. As similar traffic is flowing through all the intersections, retiming of a signal separately may cause major delays at subsequent intersections. If the street is so long that traffic patterns change considerably at some points, these points may be taken as break points. For example, a major highway crossing the arterial street or a jurisdictional boundary can become a break line.

Also, travel time studies along a corridor give more meaningful results than at a single intersection. Cost of data collection and analysis along the whole corridor will be less than that of each intersection separately. A whole corridor or group of corridors that are part of a single project can be retimed for a lower price than individually.

2.2 Benefits of Signal Retiming

Traffic signal retiming improves traffic flow conditions with a low cost. One should clearly understand the benefits of signal retiming to decide whether or not to

retime a set of intersections. Sunkari (2004) discusses many benefits, both direct and indirect, associated with signal retiming; these include:

- Reduced delay experienced by motorists, which is more apparent to users traveling along a street with a coordinated system of signals.
- Fewer stops at red lights and reduced fuel consumption.
- Less motorists' frustration caused by less delays and stops, which improves safety.
- Reduced numbers of accelerations after stopping at red lights also reduces emissions. Emissions during acceleration are often an order of magnitude higher than when a vehicle traveling at a constant speed.
- Reduced fuel consumption reduces emissions and improves air quality.
- Less diversion of traffic to local and residential neighborhoods, potentially improving safety and traffic conditions in those areas.
- An opportunity for operating agencies to conduct quality control checks on controller settings for pedestrian, preemption and priority requirements.

Because of their lower costs, traffic signal retiming projects have a benefit to cost ratio of about 40:1 (Sunkari, 2004). Sunkari (2004) describes some of the successes associated with traffic signal retiming projects all over the United States.

2.3 The Process of Signal Retiming

The Federal Highway Administration (FHWA) and ITE have been championing the benefits of signal retiming and encouraging cities and road authorities to implement this low cost alternative to improve roadway conditions. Their video, "It's About Time, Traffic Signal Management: Cost-Effective Street Capacity and Safety" on signal retiming briefly explains the process of retiming. Sunkari (2004) discusses a detailed method for conducting signal retiming, which is summarized in the rest of section 2.3.

2.3.1 Existing data collection

- Existing geometric conditions and other pertinent information about the corridor are gathered.
- Current traffic conditions during peak traffic periods, as well as traffic counts including through and all turning movements at intersections, are collected.
 Pedestrian volumes on all the crosswalks are also collected simultaneously.
- Travel time data between the two ends of the corridor are also collected to assess the present operating conditions.
- Crash data along the corridor for the last three years are obtained and analyzed to determine whether or not a change in the signal operation would provide safer conditions.

2.3.2 Signal optimization

Signal optimization can be achieved using a software although manual methods also are available.

• The existing network is coded in signal optimization software using the data collected. Existing timing and turning movements are applied and capacity and LOS are determined.

• Software such as Synchro or Passer II is used to optimize the timing splits and determine the offsets for the coordination. Synchro has a factor called coordinatability factor, which gives an idea whether to go forward with coordination. The coordinatability factor is a measure of the desirability of coordinating the intersections. Later, simulation software such as CORSIM can be used to test the effectiveness of a proposed timing plan.

2.3.3 Implementation

The new timing is implemented at the intersection(s). It is evaluated in the field during various critical time periods and final adjustments are made. Sometimes, travelers' complaints are also taken as guidance.

2.3.4 Documentation

Before and after studies are conducted to document the improvements resultant of the signal retiming. Travel time and delay studies are conducted just before implementing the new timing. When the final timing plans are in place, travel time and delay studies are conducted again. These are called 'after' studies. Results are compared with 'before' studies and benefits are documented.

The next chapter describes the objectives of this thesis.

CHAPTER 3

PROBLEM STATEMENT

NCTCOG is conducting retiming projects for many of the corridors in the DFW area. This is being done in various phases. This thesis considers the selection of these projects among all candidate corridors in the Metroplex. NCTCOG officials indicate that they have more than one method for selecting these corridors. One of them is a sophisticated strategy where a ranking model is used to prioritize the corridors. As a baseline scenario, this serves as starting point of this thesis. This research develops a methodology to critically analyze this model and measure its effectiveness in project selection. In the process, the author proposes a modified and more efficient methodology, which can be used for prioritization of signal retiming projects.

The objectives of this thesis are summarized below:

- To understand the importance of traffic signal retiming and the process of signal retiming,
- To comprehend the need for prioritization of signal retiming projects,
- To study current methods in selecting retiming projects,
- To know how the NCTCOG's ranking model methodology works and determine any disadvantages in using the model,
- To gain knowledge about the before and after studies for signal retiming and identify a method for calculation of benefits,

• To propose a new and more efficient methodology for prioritizing the corridors, and

A review of research on prioritization of transportation related projects is discussed in the next chapter.

CHAPTER 4

PRIORITIZATION OF PROJECTS – A REVIEW

Various MPOs and cities have well-documented procedures for selection of major development projects. Developments related to such things as roadway alignment, addition of lanes, building a new highway alignment come under major developments. These require a higher range of funds than signal retiming. Turochy (2001) discusses methods used by various states throughout the United States to prioritize transportation improvement projects. There are methods documented by various departments for particular improvement projects. Unfortunately, low cost developments, such as signal retiming, are not well documented, and little to no research is found on prioritization of signal retiming projects.

Witkowski (1992) developed a method for prioritizing signalized intersection operational deficiencies in the City of Tucson, Arizona. He described a two-level screening process for evaluating short to medium term improvements for signalized intersections. These improvements also cost significantly more than signal retiming.

Accident history at an intersection used to be the basis for initial screening of signalized intersections in the City of Tucson. Witkowski (1992) proposed a parallel screening of the intersections for operational and safety deficiencies. A Deficiency Index (DI) was proposed for ranking the operational deficiencies, and the priority order would be based on the decreasing order of DI.

Witkowski studied twenty-one independent variables, which fall into five basic categories: traffic volume, present peak hour traffic operations, safety, air quality and transit operations. He developed a linear utility function for DI, which takes the form:

$$DI = W_1 X_1 + W_2 X_2 + \dots + W_n X_n$$
(4.1)

where X_i is the normalized value of criterion i and W_i is the weighting applied to criterion i. He judged the interdependence of criteria using linear regression analysis techniques. The impact of the criteria and their weighting on the ranking was based on a sensitivity analysis.

He used accident rates for the last three years before present date, but the accident rate did not significantly affect the ranking and was ignored. In his sensitivity analysis, he examined the variation in ranks, when removing one variable at a time. As a second step of ranking, different weightings were used for different variables and the sensitivity each time was examined. Witkowski tries to prioritize the intersections with operational deficiencies, while this thesis prioritizes various corridors in need of retiming.

When data cannot be quantified for use in the ranking process, a multiple criteria decision making tool, such as the Analytic Hierarchy Process, can be used for prioritizing alternatives (Guegan, 2000). Guegan et al. (2000) applied this tool to prioritize traffic calming projects. They used traffic volumes, vehicle speeds, emergency vehicle access and pedestrian facilities and safety as the criteria for evaluation of each alternative. Need for prioritization of signal retiming projects and some of the existing procedures followed in the DFW area are given in next chapter.

CHAPTER 5

PRIORITIZATION OF SIGNAL RETIMING PROJECTS

5.1 Need for Prioritization of Signal Retiming Projects

ITE and the FHWA recommend that every three to four years or whenever traffic patterns change significantly, signals should be retimed. Retiming each intersection takes less than three thousand dollars and is considered a minor project. Unfortunately, many cities and MPOs neither have funding nor staff and expertise to achieve this task, which may increase this cost. As cities face recurring congestion on roads and poor air quality, they may begin to realize the importance of undertaking retiming projects.

Normally, transportation planning organizations organize the funding for these projects just as they do for other projects. When there are a number of corridors to be retimed, there may not be sufficient funds to complete all the projects.

This research examines strategies for retiming projects throughout the United States through an informal e-mail survey of transportation departments. Survey recipients were selected randomly form the FHWA Directory of MPOs. The following is the survey question:

"Suppose if you have a list of corridors to be retimed and there is not enough money, how do you pick the most important projects?" The list of nineteen organizations to which the survey was sent is given in Appendix A. The following seven organizations replied for the survey.

- City of Indianapolis
- Knoxville Regional Transportation Planning Organization
- Miami-Dade Public Works
- S. California Association of Governments –Ventura County
- S. California Association of Governments Riverside County
- Metropolitan Orlando, Florida
- Michigan Department of Transportation

None of the organizations that responded has a prioritization method for signal retiming projects. In fact, two of the seven respondents indicate that they did not have funds or staff to conduct retiming on regular basis. They only conduct retiming when the signals are upgraded or a significant number of complaints are lodged about the signals. One of them uses their congestion management system plan to identify the corridors and another uses a Congestion Mitigation and Air Quality Improvement Program (CMAQ) selection process. All the seven responses from various departments for this query are given in Appendix A.

This research is concerned with the signal retiming projects proposed in the DFW region, which is a moderate non-attainment zone with respect to Ozone air quality requirements. The NCTCOG funds signal retiming projects in this region. As mentioned in the NCTCOG's public meeting in March 2006, apart from implementing new signal timing, a traffic signal retiming project may include:

- Installation of new traffic signal controllers,
- Replacement of existing traffic signal controllers,
- Replacement of vehicle detectors (loop, video, etc.),
- Installation of communication equipment, and
- Installation of communication software.

An effort is being made to retime all the traffic signals in DFW area which have not been retimed in the last three years. NCTCOG works with an objective of improving air quality as well as reducing congestion through these projects.

For a region such as DFW, the number of corridors to be retimed is too high to be completed at one time due to insufficient funds and limited staff availability. Hence, retiming of signals is completed in phases. For each phase, candidate corridors must be prioritized to make sure the funds are efficiently spent.

5.2 Existing Procedures in Dallas-Fort Worth Region

In the DFW region, NCTCOG, Texas Department of Transportation (TxDOT) and the member cities are involved in the retiming of traffic signals. NCTCOG does the programming to get funds allocated from the FHWA and the Federal Transit Administration (FTA). In 2002, NCTCOG conducted the most recent regional signal retiming effort. NCTCOG tries to retime signals every three years. At present, signal retiming projects come under the Thoroughfare Assessment Program.

Cities provide an initial set of candidate corridors, because they know the corridors that have severe problems. Each city may have any number of corridors in its jurisdiction where they think travel times are adversely affected and signals should be

retimed, but on some corridors, there may not be enough capacity to satisfy demand. In some circumstances, other roadway improvements may be occurring which may increase capacity. NCTCOG examines these corridors for such issues and removes them from the list. In 2004, NCTCOG came up with about 200 corridors around the metropolis. Retiming of some corridors may affect other corridors significantly. For example, performance on downtown streets is very much interlinked. In such cases, a group of corridors will be considered as a single project and retiming will be done all at once.

Due to limited funds, not all proposed corridors can be retimed at the same time. Corridors should be selected in such a way that funds are used most efficiently. One of the approaches that the NCTCOG uses to come up with a priority list of projects is a ranking model. In another strategy, a group forum approach, each city gives a list of corridors ordered with respect to importance. A group of experts discusses each one and comes up with a priority list. The ranking model method is explained in detail in the next chapter.

5.3 Factors Affecting the Prioritization of Retiming Projects

Various factors that make signal retiming necessary should be considered when prioritizing these projects.

5.3.1 Delay

The reduction of travel time along a corridor is one of the major benefits of signal retiming. Vehicle delay along a corridor occurs when a vehicle's travel time increases above the desired travel time. The desired travel time is the time taken to travel along a corridor at the desired speed, which is normally free flow speed. If the free flow speed is not available, the speed limit can be used as a surrogate. Total corridor delay is the delay of an individual vehicle multiplied by the traffic volume along that corridor. When ranking retiming projects, a project with the potential for a higher reduction in delay should be given more priority.

5.3.2 Number of stops

The number of stops along a corridor is counted as the total number of occasions where the vehicle speed drops below a specified speed, typically five to ten mph. It is represented as number of stops per vehicle-mile. One can multiply this by the total traffic volume along a corridor to get the total number of stops per mile. The number of stops increases the fuel consumption and the emissions because there are accelerations and decelerations associated with the stops. Stopping at more intersections also increases driver frustration. The number of stops along a corridor may be measured by performing travel time runs along the corridor. Projects that are going to have a greater reduction in the number of stops should receive priority.

5.3.3 Fuel consumption

When the variation in speeds after retiming decreases, fuel consumption is expected to decrease. Sunkari (2004) gives examples where fuel consumption reduction related to signal retiming can be as high as nine percent. Fuel consumption can be estimated using travel time measuring instruments or by simulation. Fuel consumption is represented in gallons per vehicle mile. Projects which result in higher reductions in fuel consumption should receive higher priority than other similar projects.

5.3.4 Emissions

Emissions can be measured in real time or they can be estimated through simulation or from traffic signal retiming software. Some of the travel-time measuring instruments may also provide emission estimates. Since signal retiming is expected to reduce emissions and improve the air quality, a project with a greater reduction in emissions should receive higher priority.

5.3.5 Safety

Sunkari (2004) writes that signal retiming indirectly reduces driver frustration, which reduces red light running. Red light running is one of the major causes of crashes (Tindale and Hsu, 2005); therefore, a reduction in red light running improves intersection safety. In a successful example given by Sunkari (2004), adjusting the signal timing in Lexington, Kentucky reduced crashes by thirty-one percent.

However, based on a study of crashes on a coordinated one-way street in Florida, Tindale and Hsu (2005) suggest that signal coordination can be an incentive for red light running. They indicate that drivers may speed or engage in other unsafe behavior to stay in the platoon of the traffic flow. The perception is that this can ensure their passage through the corridor without stopping. Safety may have to be considered as a dis-benefit under some circumstances; its exact impact depends on each particular case.

One should study the crash reports along a corridor to come up with a measure for safety along the corridor. Often, the determination of the cause of a crash is difficult; it may be signal timing or some other reason. Many years of crashes need to be studied to get reasonable data. Every time that signals are retimed, users take a little while to adapt to the new system. Once the system starts to run smoothly, determining the need and specific time for retiming with respect to safety becomes difficult without careful monitoring.

Factors such as delays and emissions can be measured immediately before and after signal retiming, but this is not the case with crashes, unless there is a sudden and statistically significant change in number of accidents. For all of these reasons, safety is not considered in this research.

The ranking model used by NCTCOG is explained in detail in the next chapter.

CHAPTER 6

NCTCOG'S RANKING METHODOLOGY

When arranging the projects in a priority order, the first question that arises is that what should be the basis for ranking. The corridors are being retimed because the traffic conditions have worsened along the corridor. Some preliminary data should be collected to estimate the severity of traffic conditions along each corridor.

6.1 Corridor Data

NCTCOG asked a consultant to perform travel time studies on each of the corridors on the initial list. Because this is only for a preliminary analysis, only one travel time run per direction on each of the corridors was performed. For each run, travel time from one end to the other end of the corridor and the number of stops were measured.

Besides the travel time information, other related data for all the corridors was compiled. This data included the following:

- Length of corridor and the number of signalized intersections to be retimed along the corridor.
- Speed limits and travel time at speed limit.
- Average daily traffic for the current year this is calculated after applying growth factor to the latest available average daily traffic value.

• System type – whether or not the traffic signals are part of an existing interconnected system.

The entire set of data obtained from the NCTCOG is inserted in Appendix B.

6.2 The Model Used by NCTCOG

The NCTCOG ranking model is based on the existing traffic conditions. The variables used in the model and their weights are discussed in this section.

6.2.1 Variables

6.2.1.1 Total delay

Delay is the most frequently used measure of effectiveness for signalized intersections. Delay can be quantified in many different ways: stopped time delay, approach delay, travel time delay and time-in-queue delay (McShane and Roess, 1998). Travel time delay is used in this research. Travel time delay of an individual vehicle is the difference between the measured travel time and the travel time at the desired speed. Measured travel time is taken as an average of travel time in both directions of travel. The desired speed is taken as the posted speed. In this model, delay is used on an aggregate basis, and it is calculated below:

DPV = delay/vehicle/intersection

= (measured travel time – desired travel time)/ (number of intersections)

(6.1)

Total delay/ intersection = DPV x ADT (6.2) Where ADT is the average daily traffic.

6.2.1.2 Number of stops

The number of stops is taken as the average of the number of stops counted in both directions of travel along the corridor. To get the aggregate value, this average value per intersection is multiplied by the ADT.

Number of stops per intersection =

6.2.1.3 System type

There are three types of existing systems. A value of one indicates that all intersections are part of an existing interconnected system with communications. A value of two indicates that some but not all intersections are part of an existing interconnected system with communications. A value of three indicates that there is no system (currently an isolated operation).

6.2.2 Weightings

The weighting for each factor is allocated by an expert group. The weightings are presented in Table 6.1.

Table 6.1 Variables Used in NCTCOG's Ranking Model and Their Weightings

Variable	Weighting
Total Delay (DELAY)	50%
# of stops (STOPS)	30%
System type (SYSTEM_TYPE)	20%

6.3 Calculation of Rank Order

Using the weightings applied by the NCTCOG, the following equation is developed.

$$Total Score(S) = \frac{DELAY}{Max(DELAY)} \times 50 + \frac{STOPS}{Max(STOPS)} \times 30 + SYSTEM_TYPE \times 20 \quad (6.4)$$

Where SYSTEM_TYPE = 1.0 for type 1 (all signals interconnected)

0.5 for type 2 (some signals interconnected)

0 for type 3 (all signals isolated)

Quantitative variables DELAY and STOPS are normalized by dividing by the maximum value from all of the candidate corridors, which precludes any single variable dominating the total score because of its magnitude relative to the other variables. After normalization, each variable is expressed on a zero-to-one scale and the weights are an expression of the relative importance of each criterion. Witkowski (1992) discusses two basic normalization methods and pros and cons of each. For this research, the maximum value of a variable in the given data is used for normalization. The other one is, normalizing using a pre-selected threshold value.

Possible variations of this model may be by separating ADT from DELAY and STOPS. In that case, a different weighting may be applied for ADT. Equation (6.4) is evaluated to the travel time data for all the corridors and their initial ranks are calculated. As previously discussed, higher delay and higher numbers of stops should receive a higher priority. The highest priority goes to the corridor with the maximum

total score. The priority decreases with the total score. Table 6.2 shows the first twenty corridors on the priority list based on the NCTCOG ranking model.

Rank	Arterial segment	City	Numbe r of signals	Length (miles)	Score for total delay/per signal	Score for stops/ signal	System type score	Total score
	Bryant-Irvin	Fort Worth	7	3.0	50.0	30.0	10	90.00
2	Hampton	Dallas	16	4.6	40.8	28.9	20	89.74
-		Dallas	8	3.1	46.2	22.7	20	88.81
	Harry Hines	Dallas	15	5.9	41.0	25.0	20	85.98
		Dallas	16	5.9	40.5	25.4	20	85.85
6	Abram/Jefferson	Arlington	12	4.0	35.5	26.3	20	81.85
7	FM 1171	Flower Mound	16	4.2	36.5	22.9	20	79.45
8	Northwest Hwy	Dallas	19	7.6	32.6	25.1	20	77.64
9	Jupiter	Garland/Dallas	16	4.6	37.2	19.5	20	76.75
10	Coit	Dallas/Richardson/Dallas	19	5.4	32.1	23.0	20	75.18
11	Jupiter	Richardson	10	4.7	26.9	21.8	20	68.74
12	US 377	Haltom City	19	8.9	41.4	26.7	0	68.04
13	Jupiter	Plano	10	3.5	27.8	19.9	20	67.71
14	Spring Valley	Farmers Branch	8	2.7	27.8	19.1	20	66.88
15	Bryant-Irvin	Fort Worth	10	2.5	37.2	19.0	10	66.21
16	FM 3040/Hebron/ Park Blvd	Lewisville	13	2.4	29.6	26.5	10	66.09
17	Alpha	Dallas	7	2.1	29.2	16.8	20	66.04
18	Oaklawn	Dallas	11	1.5	29.3	16.2	20	65.49
19	Northwest Hwy	Dallas	28	8.9	20.1	25.3	20	65.44
20	University	Fort Worth	4	0.6	29.5	15.1	20	64.63
31	Pioneer Pkwy	Grand Prairie	9	4.2	18.1	19.2	20.0	57.28
58	Great Southwest Pkwy	Grand Prairie	15	5.1	20.4	7.6	20.0	47.99

Table 6.2 Results of the NCTCOG Ranking Model

The results indicate that almost all of the first few on the list belong to system type one; therefore, system type plays a significant role in this ranking. Depending on the available funds, NCTCOG may select the top thirty to forty corridors for executing retiming. In this work, data from before and after studies is available only for two corridors, Pioneer Parkway and Great Southwest Parkway. Their ranks are 31 and 58, respectively. Benefits are estimated for these two corridors.

NCTCOG made some modifications to the original ranking due to non-technical reasons, including overlap of locations funded in the Transportation Improvement Program, distribution of corridors in different regions of DFW metropolitan area, and local match issues.

It is important to estimate the benefits from traffic signal retiming projects to find out how efficiently the funds are spent. Next chapter deals with estimation of benefits through before and after studies.

CHAPTER 7

ESTIMATION OF BENEFITS

Benefits from signal retiming projects can be estimated through before and after studies. These studies are used to document the benefits of signal retiming. They are also used to identify any negative results so that they can be rectified. As an example, before and after studies for two corridors in the City of Arlington are presented.

7.1 Case Study from the City of Arlington

The City of Arlington is part of the DFW Metroplex and is a member of NCTCOG. The city retimed signals along its arterial corridors around three years ago in 2002. At that time, the city's traffic operations officials documented the benefits of retiming major corridors; this thesis considers two retiming case studies. Traffic signals along South Cooper Street, a major arterial, were retimed in 2001. Pioneer Parkway and Arkansas Street are parallel streets with a small distance between them; therefore, the signals along these two corridors were combined for retiming. The traffic operations officials performed ten travel time runs during each time of day in both directions before and after signal retiming. As part of retiming, some of the signals along these corridors were integrated into a coordinated operation. The city calculated travel time savings per year by summing the total reduction in travel times on each weekday. The savings are significant in both delay and number of stops.

Using a \$10/hr as the average salary, the annual economic impact of retiming signals is estimated to be \$9.8 million on South Cooper Street and \$17.3 million on Pioneer Parkway and Arkansas Street.

7.2 Before and After Studies

Usually, after any improvement in transportation infrastructure or policy, the city or the funding agency measures its effectiveness. Before and after studies are performed in such cases. These studies enable the authorities not only to determine how well the improvement solved the problems, but also to document the results for future use. This is better explained through an example.

7.2.1 Before and after studies for signal retiming projects

Before and after studies for signal retiming projects are basically travel time runs. Currently, sophisticated instruments such as the Jamar TDC-12 are available for this purpose. Figure 7.1 shows the Jamar TDC-12 instrument.

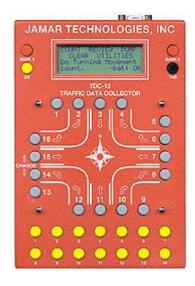


Figure 7.1 Jamar TDC-12 instrument (www.jamartech.com)

While retiming traffic signals, techniques such as signal coordination are used to enable efficient progression of vehicles along the corridor and hence reduce delays. Before doing the improvements, that is when traffic is operating under existing conditions, travel time runs are conducted. At least five runs must be performed from the start to the end of the corridor where the start and end points should be fixed. The intersections are consistently noted at a specific point, for example, the stop line. The Jamar TDC-12 instrument, when connected to an automobile, notes the speed and acceleration information along with the travel time and spacing between each intersection. Beginning and ending points and intersection location are specified.

The data is downloaded into PC-Travel software. PC-Travel estimates delays, fuel consumption and emissions (Carbon Monoxide (CO), Hydrocarbons (HC) and Nitrogen Oxides (NO_x)) from the raw data. In this way, traffic conditions before signal retiming are determined.

Once the traffic signals are retimed, a period of time must pass for the traffic to adjust to the new timing. After allowing enough time for this adjustment, typically at least two weeks, the "after" travel time runs are performed. These runs have the same start and end points and nodes as before. The new conditions are estimated after downloading the data and analyzing. Finally, comparing the conditions before and after retiming, benefits are estimated.

7.2.2 *PC*-*Travel software – an overview*

Jamar Technologies developed PC-Travel for Windows, a software program designed to process travel time and delay data. This software is also used in collecting

travel time data using a TDC instrument (see Figure 7.1). The start and end points and the nodes between them are input into the software. When a TDC instrument is attached to a vehicle and calibrated, a calibration coefficient is stored with the data file. This is used in calculating the distance between the selected intersections during data collection. At least five runs are performed in each direction along a corridor. The software calculates an average of distances between two subsequent intersections and uses it as current distance. This can also be edited by the user.

For the first run, node names are input. This is called the primary run and the subsequent runs are secondary runs. All the runs performed in one direction and during a specified time of day are stored as one study. Runs performed on a corridor before and after retiming can be stored in the same study. Each of these studies is stored as a study file. Using the "Select Study" menu of PC-Travel, each run that comprises the study is listed. Figure 7.2 shows the window with AM Northbound runs on Great Southwest Parkway before retiming.

uns Used in This Study Run Title	Start Date	Start Time	Length (ft)	Before After	Run Type	
oGreatSW (AM)-NB-001	05/05/04	07:18	28328	Before	Primary	
GreatSW (AM)-NB-002	05/05/04	07:49	28334	Before	Primary	
GreatSW (AM)-NB-004	05/06/04	07:07	28363	Before	Primary	
GreatSW (AM)-NB-005	05/06/04	07:32	28298	Before	Primary	
GreatSW (AM)-NB-006	05/06/04	08:00	28370	Before	Primary	
Show Details	Add	Run(s)	1		Remove	Run

Figure 7.2 PC-Travel window - details for AM NB runs on Great Southwest Pkwy

One can extract run statistics for each run. The software also calculates the averages of all the runs and presents them as study statistics. If both before and after runs are in a study, the software compares the statistics for before and after cases and reports the change between them. Between every two subsequent nodes, the software calculates travel time, number of stops, average speed, total delay and the time during which the speed of the vehicle falls below three different speeds. The total delay is calculated by subtracting the desired travel time, which is at the 'normal speed' specified, from the actual travel time. It also calculates the fuel consumption and emissions. Figure 7.3 shows the window with study statistics.

Name	Daroato	W Pkwy (666) AM NB	1	Click any column to see detail				
Node #	Length	Node Names	Travel Time	# of Stops	Avq Speed	Total Delay	Time <= 0 MPH	
1	0	Fairmont						
2	1166	Claremont	34.4	0.2	23.1	16.4	2.6	31.4
3	2533	Bardin	69.2	0.8	25.0	30.4	14.2	37.4
4	812	IH20 EB	53.0	0.8	10.4	40.2	27.8	50.4
5	1088	IH20 WB	25.4	0.2	29.2	8.6	3.2	14.2
6	452	Sara Jane	8.6	0.0	35.8	1.4	0.0	2.4
7	1838	Forum	78.2	1.0	16.0	50.2	28.6	59.4
8	2711	Mayfield	57.4	0.2	32.2	15.6	1.4	25.2
9	5367	Arkansas	104.6	0.6	35.0	22.8	12.2	25.8
10	2111	Pioneer Pkwy	43.8	0.2	32.9	11.4	4.2	16.4
11	3223	Marshall	74.4	0.6	29.5	25.2	12.2	29.2
12	2718	Timberlake	44.4	0.0	41.7	2.6	0.0	3.0
							·	► F
tats b	ased on 5	i BEFORE runs.	Exit	1	रा रा र	Show T	lode Nam ime <= S uel / Emi	pds

Figure 7.3 PC-Travel window showing study statistics

One can also export these statistics to Microsoft Excel for further analysis and presentation. PC-Travel also reports the speeds of the vehicle as a plot.

7.2.3 Estimation of emissions and fuel consumption using PC-Travel

PC-Travel software estimates HC, CO and NO_x emissions from the speed and acceleration data obtained from travel time studies using the TDC-12. It takes the variation in speed as a basis for the estimation. The model used in PC-Travel (Jamar, 2004) is the MICRO2 model developed by the Colorado Department of Highways. The equations used in the PC-Travel for Windows manual (Jamar, 2004) are:

In the following equations, V = velocity in ft/sec, A = acceleration in ft/sec²
Fuel (ml/sec) =
$$k_1+k_2V+k_3V^3+k_4AV+k_5A^2V$$
 (7.1)

where

$$hc_1 = 0.018$$

 $hc_2 = 0.0005266$
 $hc_3 = 0.0000061296$

Carbon Monoxide (grams/sec) = $co_1 + co_2AV + co_3AV^2$ (7.3) where $co_1 = 0.182$

$$co_2 = 0.0079776$$

 $co_3 = 0.00036227$

Nitrogen Oxides (grams/sec) = $noxa_1 + noxa_2AV$, A>0 (7.4)

or
$$noxb_1+noxb_2AV$$
, A<0

where

 $noxa_1 = 0.00386$ $noxa_2 = 0.00081446$ $noxb_1 = 0.00143$ $noxb_2 = 0.000017005$

7.3 Studies for the Recent Projects

NCTCOG hired a consultant to perform travel time (TT) studies before and after retiming for each of the corridors where signals were retimed. Five runs each were performed during the AM peak, midday and PM peaks before and after retiming. Using the study results summary for each time of day, the average reductions in travel time, delay, number of stops, fuel consumption as well as emissions were calculated by the author. This provides an estimate of the actual benefits per vehicle per mile. The following sections discuss how the benefits of retiming are estimated from the before and after studies for Great Southwest Parkway and Pioneer Parkway corridors.

7.3.1 Great Southwest Parkway

Great Southwest Parkway is an arterial in the Cities of Arlington and Grand Prairie running in north-south direction. It is a divided facility with two lanes in each direction. Maximum speed limit along the stretch is 45 mph. Figure 7.4 shows the Great Southwest Parkway corridor. More details about the corridor are presented in Table 7.1.

Arterial name	Great Southwest Parkway
Number of Lanes	4
Length	5.37 mi.
Number of signals	15
North End	E. Division Street
South End	Fairmont
Maximum Speed Limit	45 mph
Average Daily Traffic	20,328

 Table 7.1 Corridor Details for Great Southwest Parkway

It has two at-grade railway crossings, one between the E Division Street and Abrams Street and the other between Marshall and Pioneer Parkway. Railway crossing between the E Division Street and Abrams Street is more heavily used than the other.

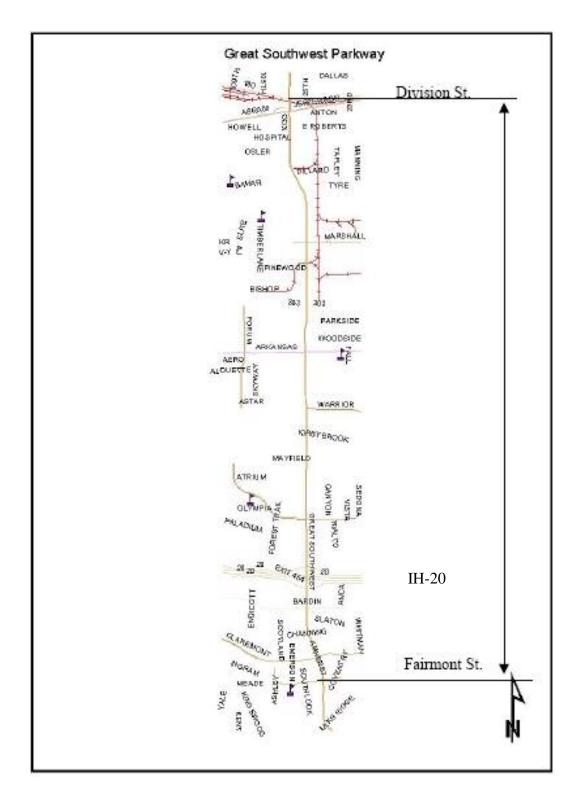


Figure 7.4 Great Southwest Parkway corridor (Source: Rupangi (2005))

Estimates of benefits are presented in Table 7.2. Percentage savings are calculated the formula below:

% Savings = ((Before – After)/Before) x 100
$$(7.5)$$

Negative savings in AM peak and PM peak on south bound Great Southwest Parkway indicate that conditions worsened. Especially in the PM peak, total delay increases by more than fifty percent. In the case of the midday period for north bound, though the number of stops decreased by 8.5%, fuel consumption and emissions slightly increased because the proportion of time traveled with speed below 35 mph increased. In the case of PM peak for south bound, the change in fuel and emissions is less than 10% while total delay and number stops increase by around 50%.

	Travel	Number	Total			Emissions			
	Time	of stops	Delay	Fuel	НС	СО	NOx		
	(sec/mi)	/mile	(sec/mile)	(gal/mile)	(gm/mile)	(gm/mile)	(gm/mile)		
	North Bound – Savings per vehicle per mile								
AM	21.5	0.11	20.9	4.1E-03	0.42	3.85	0.04		
MD	2.6	0.08	2.4	-2.8E-04	-0.15	-2.20	-0.19		
PM	18.8	0.15	18.4	3.2E-03	0.46	3.06	0.18		
	North Bound - %Savings								
AM	14.2	10.2	29.5	6.9	7.6	6.5	1.2		
MD	2.3	8.5	7.5	-0.5	-3.2	-4.4	-7.0		
PM	14.0	14.2	34.2	5.7	8.7	5.4	5.9		
		South	Bound - Sav	ings per veh	nicle per mil	e			
AM	-4.06	0.04	-3.8	-7.6E-04	-0.05	-1.26	0.04		
MD	3.5	0.08	3.3	5.7E-05	0.10	0.21	0.06		
PM	-23.92	-0.49	-24.0	-2.9E-03	-0.11	0.57	0.28		
			South Bo	und - %Savi	ings				
AM	-3.2	3.3	-8.3	-1.4	-0.9	-2.3	1.3		
MD	3.0	8.8	9.5	0.1	2.1	0.4	2.0		
PM	-19.1	-48.3	-53.8	-5.3	-2.2	1.0	9.0		

Table 7.2 Estimated Benefits per Vehicle for Great Southwest Parkway

Detailed study statistics for Great Southwest Parkway corridor are shown in Appendix C.

7.3.2 Pioneer Parkway

Pioneer Parkway is a major east-west arterial. It is a divided facility with three lanes in each direction. Maximum speed limit along the stretch is 45 mph. Figure 7.5 shows Pioneer Parkway corridor. More details about the corridor are presented in Table 7.3.

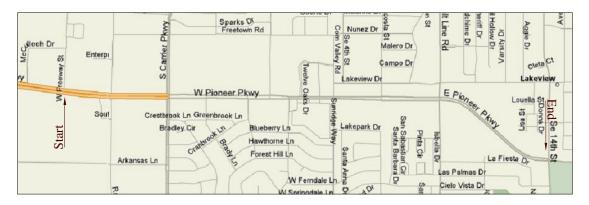


Figure 7.5 Pioneer Parkway corridor (Source: www.mapquest.com)

Arterial name	Pioneer Parkway
Number of Lanes	6
Length	2.33 mi
Number of signals	8
West End	W. Freeway
North End	SE 14th
Maximum Speed Limit	45 mph
Average Daily Traffic	35,351

Table 7.3 Corridor Details for Pioneer Parkway

Estimated benefits per vehicle-mile are presented in Table 7.4. There is a considerable improvement in conditions in all the periods of the day along east bound Pioneer Parkway. But AM peak conditions along west bound Pioneer Parkway are more severe.

	Travel	Number	Total			Emissions			
	Time	of stops	Delay	Fuel	НС	СО	NO _x		
	(sec/mile)	/mile	(sec/mile)	(gal/mile)	(gm/mile)	(gm/mile)	(gm/mile)		
	East Bound – Savings per vehicle per mile								
AM	53.8	1.4	54.0	0.02	3.03	25.31	2.37		
MD	36.4	1.0	36.5	0.01	1.69	9.16	1.34		
PM	55.0	1.5	54.0	0.01	2.86	17.36	2.32		
			East Bour	nd – %Savir	ngs				
AM	37.9	94.0	88.2	27.0	48.8	38.5	59.3		
MD	26.9	74.4	66.8	16.3	31.7	16.8	41.0		
PM	39.4	94.3	92.0	24.5	47.0	28.5	57.7		
		West I	Bound – Savi	ngs per vehi	icle per mile				
AM	-10.6	-0.3	-10.4	-4.6E-03	-0.67	-4.51	-0.56		
MD	0.9	-0.01	1.0	-3.0E-03	-0.50	-7.64	-0.48		
PM	32.0	0.85	32.0	3.3E-03	0.31	-5.51	-0.01		
			West Bou	nd – %Saviı	ngs				
AM	-10.2	-81.2	-47.2	-9.0	-14.3	-8.1	-18.8		
MD	0.7	-1.0	2.3	-5.6	-9.5	-13.5	-14.4		
PM	21.2	52.3	45.8	5.5	5.1	-8.9	-0.3		

Table 7.4 Estimated Benefits per Vehicle for Pioneer Parkway

Detailed study statistics for Pioneer Parkway are shown in Appendix C.

7.4 Total Corridor Benefits

Assuming retiming is done every three years, the total corridor benefits from a retiming project are those that are achieved in three years of time starting from the date when retiming is done. These are to be calculated and used in prioritization. Turning movements for all the intersections along the corridor are available for the AM, midday and PM cases. Traffic volumes along Great Southwest Parkway and Pioneer parkway

are calculated and are shown in Table 7.5 and Table 7.6, respectively. These are calculated from the approach volumes given in the Synchro networks prepared by the consultant while analysis.

	NB			SB			
	AM	MID	PM	AM	MID	PM	
Hourly	1151	572	629	459	556	1145	
Total Peak	2877	4573	1886	1147	4446	3435	

Table 7.5 Traffic Volumes for Great Southwest Parkway

 Table 7.6 Traffic Volumes for Pioneer Parkway

		EB		WB			
	AM	MID	PM	AM	MID	PM	
Hourly	1103	857	1261	809	888	1350	
Total Peak	2758	6856	3783	2021	7103	4049	

The final recommended operating schedule for Great Southwest Parkway and Pioneer Parkway by the consultant is given in Table 7.7. Because some time after PM peak also has same characteristics as mid day, it is also operated at mid day timing. Total savings in three years of operation for Great Southwest Parkway and Pioneer Parkway are given in Table 7.8 and Table 7.9, respectively.

Table 7.7 Recommended Signal Timing Operating Schedule for Weekday

	AM Peak	Midday	PM Peak
		11AM to 4 PM	
Monday-Thursday	7AM to 9:30AM	and	4 PM to 7 PM
		7PM to 9:30PM	
		11AM to 3 PM	
Friday	7AM to 9:30AM	and	3 PM to 7 PM
		7PM to 11PM	

	# of	Total Delay	Fuel			
	stops	(Hours)	(gal)	HC (Tons)	CO (Tons)	NOx (Tons)
		North Bo	und - Total	savings in thi	ee years	
AM	1380709	69905	49172	5.1	46.5	0.5
MD	1385555	12354	-5071	-2.7	-40.0	-3.4
PM	1251522	43114	27069	3.9	25.8	1.5
		South Bo	und - Total	savings in thr	ee years	
AM	188325	-5115	-3675	-0.2	-6.0	0.2
MD	1330829	16070	1010	1.8	3.7	1.0
PM	-7470092	-102292	-44152	-1.8	8.7	4.4

Table 7.8 Savings in Three Years from Signal Retiming along Great Southwest Parkway

Table 7.9 Savings in Three Years from Signal Retiming along Pioneer Parkway

	# of stops	Total Delay (Hours)	Fuel (gal)	HC (Tons)	CO (Tons)	NOx (Tons)
-		East Dou	iu - Totai s	avings in thre	e years	
AM	6829098	75172	81744	15.2	126.9	11.9
MD	12006250	119936	106784	20.0	108.5	15.9
PM	10656691	109995	105745	21.0	127.3	17.0
		West Bou	nd - Total s	avings in thre	e years	
AM	-1276598	-10611	-16717	-2.5	-16.6	-2.0
MD	-129280	3468	-36974	-6.2	-93.7	-5.9
PM	6681687	69659	25896	2.5	-43.3	-0.1

By adding the savings in both directions and for all the times of day, the overall weekday daytime savings for a corridor for the next three years can be obtained. Table 7.10 gives the total weekday daytime (7:00 am - 9:30 pm) corridor savings for both the corridors over the next three years.

	# of stops	Total Delay (Hours)	Fuel (gal)	HC (Tons)	CO (Tons)	NOx (Tons)
Great Southwest Pkwy	-1933152	34036	24353	6.1	38.6	4.1
Pioneer Pkwy	34767848	367620	266479	50.0	209.1	36.7

Table 7.10 Total Weekday Daytime Corridor Savings

7.5 Comparison of Benefits with Estimates from SimTraffic

Traffic simulation software, Synchro plus SimTraffic, can simulate the traffic conditions along a corridor both before and after retiming. It estimates various measures of effectiveness (MOEs) at each intersection including total delay, control delay, number of stops, fuel consumption and emissions. It also outputs arterial performance and total network performance. As part of arterial performance, SimTraffic provides travel time, delay and arterial speed between any two subsequent intersections along the arterial. This delay is comparable to the delay calculated using PC-Travel. While optimizing the timing on Great Southwest Parkway and Pioneer Parkway, the consultant used Synchro. The Synchro networks with both before and after signal timings are simulated using SimTraffic and MOEs are obtained. Table 7.11 and Table 7.12 compare delays estimated by SimTraffic and that are obtained by travel time runs.

	Delay (sec)										
	Synch	ro plus	SimTraffic	Travel Time Study							
NB	Before	After	% reduction	Before	After	% reduction					
AM	190	170	10.2	379	268	29.3					
MD	164	105	36.1	176	163	7.4					
PM	252	212	16.1	289	190	34.3					
SB											
AM	185	181	2.2	247	268	-8.5					
MD	178	79	55.6	184	166	9.8					
PM	289	250	13.7	239	367	-53.6					

Table 7.11 Comparison of Delays for Great Southwest Parkway

Table 7.12 Comparison of Delays for Pioneer Parkway

Delay (sec)											
	Synch	ro plus	SimTraffic	Travel Time Study							
EB	Before	After	% reduction	Before	After	% reduction					
AM	127	133	-5.5	144	17	88.2					
MD	130	74	42.8	128	42	67.2					
PM	224	180	19.6	137	11	92.0					
WB	3										
AM	147	111	24.5	51	75	-47.1					
MD	117	118	-0.4	102	99	2.9					
PM	249	139	43.9	163	88	46.0					

Delay estimates from SimTraffic are very much different from those from the travel time studies. In the case of Great Southwest Parkway, SimTraffic underestimates the delay in all the cases except for two. But in the case of Pioneer Parkway, delay is overestimated in all the cases except one. The reduction percentages estimated by the SimTraffic are different from what are estimated from travel time studies. The author recommends that SimTraffic should be calibrated to represent existing conditions more accurately or any other more reliable software should be used.

A new methodology based on the benefits from signal retiming projects is proposed in the next chapter.

CHAPTER 8

PROPOSED METHODOLOGY

As previously discussed, NCTCOG's model is built on the severity of existing traffic flow conditions. However, a reasonable objective for any infrastructure project is to improve societal benefits. Poor traffic flow conditions along a corridor may not indicate that retiming signals along that corridor will produce a good benefit to cost ratio. Therefore, a new prioritization strategy must take into consideration greater overall societal benefits.

8.1 Modeling Benefits

In this research, an effort is made to relate the benefits to current conditions of the corridors. Regression analysis can be used for this purpose. All six benefits quantified in the previous chapter can be used. However, for the reasons given below, some of them are not taken into consideration.

8.1.1 Dependents and predictors in the model

The following benefits are considered:

 S_D = Saving in delay (in sec)

 S_F = Saving in fuel consumption (in gallons)

 S_E = Saving in NO_x emissions (in tons)

Reducing the number of stops indirectly reduces fuel consumption and emissions and driver frustration, which is difficult to quantify. Also, it is difficult to convert the number of stops into a monetary value. Hence, savings in the number of stops is not considered. With respect to emissions, NO_x is the only pollutant considered, as explained by Rupangi (2005).

The precursors of ozone are NO_x and VOCs. Since DFW is declared as a NO_x limited zone, overall reductions in NO_x would highly reduce the formation of ozone. (Rupangi, 2005)

At this time, safety is not included because of its long time horizons and stochastic characteristics. All the benefits are converted into a dollar amount so that the relative importance of any one benefit may be compared with the other benefits.

Many factors can influence the overall corridor benefits. In the first effort to relate benefits to corridor characteristics, many possible qualitative and quantitative variables must be considered. The variables can be divided into two categories, physical characteristics and traffic characteristics. Table 8.1 lists all the variables to be used. Each variable can be used in a number of forms.

Symbol	Description						
Physical c	haracteristics						
L	Length						
SIG	Number of signals						
NL	Number of lanes						
1	Spacing between the intersections						
Z	System type						
Traffic Cl	naracteristics						
ADT	Average Daily Traffic						
FRTIME	Free flow travel time						
TT	Measured travel time						
D	Delay						
NS	Number of stops						
М	Turning movements as a percentage of total volumes						

Table 8.1 Predictors Considered in Modeling Benefits

8.1.2 Discussion of predictors

First consideration in selecting the independent variables is that they should be easily available or can be obtained at the start of the prioritization process.

The total corridor length and the number of signals along the section may affect the benefits. Number of signals can be used separately or as signal density, the number of signalized intersections per mile. A corridor with intersections at short intervals, which are suffering from queue spillbacks, may get greater improvement after signal coordination than a corridor with fewer intersections.

Number of lanes on the arterial may affect the benefits. It is used as a qualitative variable.

Achievement of maximum progression and minimum delay timing is dependent on how uniform the spacing between each intersection is. Spacings are obtained with the help of NCTCOG road network and from aerial maps. Standard deviation of spacings is the parameter that indicates the non-uniformity of the spacings along a corridor. However, the distribution of standard deviations may be skewed, which may produce errors in the analysis. To overcome this, the logarithm of standard deviations can be used.

As discussed in the sixth chapter, system type is the variable that shows how the intersections along the corridors are connected. This can also affect the overall benefits.

Estimates of ADT, the average daily traffic, are available for each of the corridors considered. Traffic volumes may affect the overall benefits directly because this is going to be multiplied by the per vehicle benefits calculated from the before and after travel time studies.

The FRTIME, free flow travel time, is taken from the Dallas/Fort Worth Regional Transportation Model, abbreviated as DFWRTM, (NCTCOG, 2000) and prepared by the NCTCOG. Free flow travel time from any node to any other node is a basis for travel times between these nodes. In the DFWRTM, the intersection delay as well as delay due to intervening controls is incorporated into the free speed. Free flow travel time is the time taken to travel along a corridor at free speed.

As discussed in chapter six, one travel time run on each corridor was conducted by the NCTCOG's consultants. Measured travel time is the average of travel times on both directions. The number of stops and delay from this data are taken as independent variables. Delay may be represented as total delay per vehicle, delay/veh/signal or delay/veh/mile. Similarly, number of stops may be represented as total number of stops/vehicle, number of stops/veh/signal or number of stops/veh/mile. After thorough analysis, one can use the significant variables for the regression.

Finally, higher turning-in or turning-out volumes at the intersections decrease the benefits associated with signal coordination (McShane and Roess, 1998). Basically, signal coordination works on the basis of offsets, the time taken for a vehicle to travel from one intersection to the next intersection. Heavy turn-out volumes may impede platoons or destroy their structure by the loss of vehicles from the middle of the platoon. Heavy turn-in volumes cause more unexpected reductions in speeds and reduce the benefit to setting the offset to a particular value. Hence, the turning movements as a percentage of the total volume may be a significant variable; however, this variable may be difficult to accurately quantify beforehand. So, engineering judgment may be used to at least give a qualitative value for this variable or an estimate may be based on historical turning movements.

8.1.3 Model development

Multi-linear regression is used to estimate coefficients for the model. At present, very few corridors have been retimed and the benefits must be calculated after the before and after studies. NCTCOG is in the process of retiming another thirty to forty corridors in the near future. When these projects are finished and travel time studies are conducted, there will be enough data for applying regression. However, the values of predictors are available. Data is compiled for fifty-one corridors and uni-variate analysis is done. Correlation matrix for these data is calculated and presented in section 8.1.3.3.

8.1.3.1 Uni-variate analysis - Qualitative variables

Histograms of the two qualitative variables, Number of lanes (NL) and System type (Z) are shown in Figure 8.1 and Figure 8.2 respectively. About 75% of the corridors analyzed belong to system type 1.

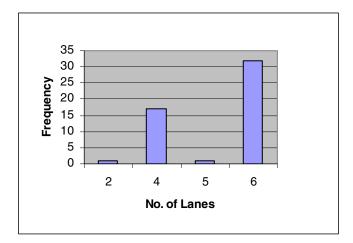


Figure 8.1 Histogram for Number of lanes (NL)

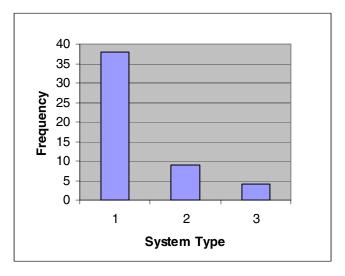


Figure 8.2 Histogram for System type (Z)

8.1.3.2 Uni-variate analysis - Quantitative variables

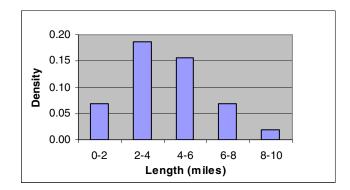
Results of uni-variate analysis of quantitative variables are presented in Table

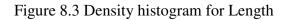
8.2.

S. No.	Variable	Min	Max	Mean	Median	St.Dev
1	Length (miles)	0.56	9.12	4.01	3.99	2.00
2	No. of signals	4	21	11.2	10	4.36
3	Signal density (signals/mile)	1.6	7.1	3.2	2.8	1.2
4	Log(Signal density)	0.19	0.85	0.47	0.44	0.15
5	St dev (Spacing) (mi)	0.03	0.43	0.25	0.25	0.09
6	Average daily traffic	20328	68356	39858	40627	11424
7	Free flow travel time (sec)	79.8	908.4	445.1	387.6	202.9
8	Measured travel time (sec)	157	1094	531	497	232
9	Total delay/veh (sec)	42.0	401.3	178.9	171.0	78.6
10	Delay/veh/signal (sec)	5.6	35.9	16.1	15.5	5.7
11	Delay/veh/mile (sec)	12.9	172.1	52.7	45.1	29.3
12	Number of stops/veh	0.8	8.6	3.9	3.5	1.7
13	Number of stops/veh/mile	0.4	3.1	1.1	0.9	0.5
14	Number of stops/veh/signal	0.2	0.7	0.4	0.4	0.1

Table 8.2 Uni-variate Analysis of Quantitative Variables

Figure 8.3 to Figure 8.16 show the density histograms for each of the qualitative variables mentioned in Table 8.2. Standard deviation of signal spacing in this case is not skewed. So logarithm is not used. As shown in Figure 8.5, distribution of Signal Density is skewed. So logarithm of Signal Density can be used.





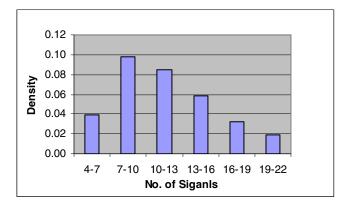


Figure 8.4 Density histogram for No. of signals

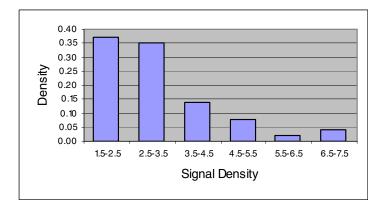


Figure 8.5 Density histogram for Signal density

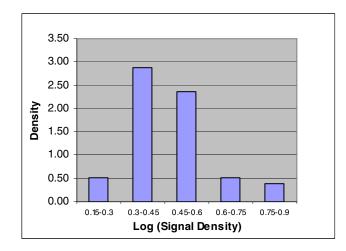


Figure 8.6 Density histogram for Log (Signal density)

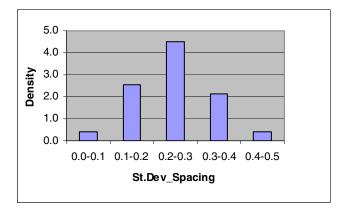


Figure 8.7 Density histogram for St. dev of spacing

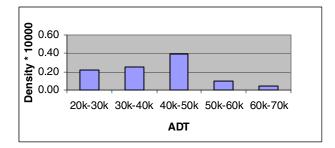


Figure 8.8 Density histogram for Average daily traffic

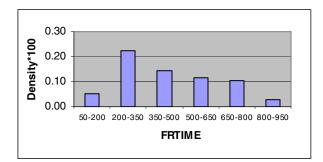


Figure 8.9 Density histogram for Free flow travel time

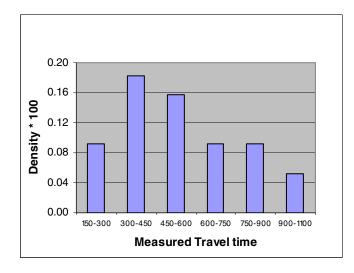


Figure 8.10 Density histogram for Measured travel time

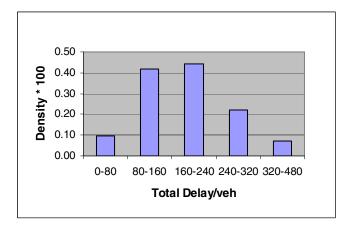


Figure 8.11 Density histogram for Total delay/vehicle

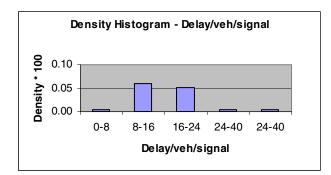


Figure 8.12 Density histogram for Delay/veh/signal

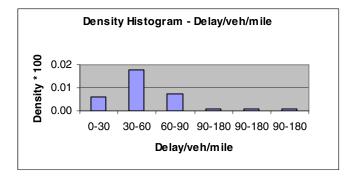


Figure 8.13 Density histogram for Delay/veh/mile

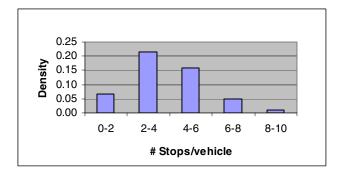


Figure 8.14 Density histogram for Number of stops/veh

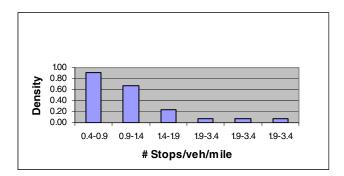


Figure 8.15 Density histogram for Number of stops/veh/mile

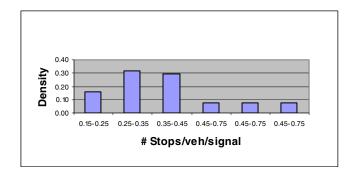


Figure 8.16 Density histogram for Number of stops/veh/signal

8.1.3.3 Correlation matrix

Correlation matrix including all the quantitative variables is calculated and presented in Table 8.3. Correlation matrix is the best way to identify the relation between any two of the variables. From Table 8.3, one can see that Length, FRTIME and Measured TT are highly correlated to each other. The most significant variable from these can be used for modeling. Similarly, there is a high correlation between Delay/veh and Number of stops/veh; Delay/veh/signal and Number of stops/veh/signal; and Delay/veh/mile and Number of stops/veh/mile. Hence any one of these six variables may be used in the regression. Once the data for dependent variables is compiled, one can proceed with further analysis.

	Length	Number of signals	Signal density		St dev_ Spacing	ADT	FRTIME	Measured TT	Delay/ veh	delay/veh/si gnal	delay/ veh/mile	# Stops/ veh	# Stops/ veh/mile	# Stops/ veh/ signal
Length	1.00													
Number of signals	0.82	1.00												
Signal density	-0.63	-0.22	1.00											
Log(Signal den)	-0.64	-0.16	0.98	1.00										
St dev_Spacing	0.41	0.08	-0.61	-0.62	1.00									
ADT	0.25	0.40	-0.11	-0.04	-0.06	1.00								
FRTIME	0.89	0.87	-0.47	-0.45	0.29	0.21	1.00							
Measured TT	0.94	0.86	-0.51	-0.50	0.36	0.14	0.91	1.00						
Delay/veh	0.63	0.65	-0.24	-0.23	0.25	-0.10	0.62	0.83	1.00					
Delay/veh/signal	-0.11	-0.27	0.03	-0.06	0.21	-0.63	-0.17	0.07	0.46	1.00				
Delay/veh/mile	-0.54	-0.34	0.78	0.71	-0.35	-0.44	-0.49	-0.35	0.08	0.58	1.00			
# Stops/veh	0.71	0.69	-0.31	-0.30	-0.09	0.03	0.70	0.85	0.88	0.25	-0.10	1.00		
# Stops/veh/mile	-0.50	-0.29	0.76	0.70	-0.35	-0.38	-0.43	-0.32	0.06	0.47	0.89	0.07	1.00	
# Stops/veh/ signal	0.05	-0.15	-0.13	-0.20	0.34	-0.47	-0.02	0.20	0.46	0.75	0.35	0.55	0.51	1.00

Table 8.3 Correlation Matrix for the Independent Variables

Note: Correlation values equal or more than 0.5 are bold

8.2 Monetary Benefits

To convert the benefits into monetary values, benefits must be multiplied by their respective value of benefits.

8.2.1 Value of time

Mattingly *et al.* (2004) analyzed a stated preference survey conducted in the DFW region to find out the value of time in the context of HOT lanes and HOV lanes. They concluded that the respondents' value of time is \$8.39 per hour. Though the present research is concerned with time savings of a few seconds, which poses some aggregation concerns, this value of time is still reasonable for comparison purposes. Further surveys may indicate how to address the aggregation difficulties for this particular case.

8.2.2 Fuel price

According to the American Automobile Association (2006), \$2.57 per gallon was the regional average gasoline price in southwest USA on April 6, 2006.

8.2.3 Value of NO_x emissions

Trading of NO_x emissions is still an emerging topic. NO_x trading is considered by Evolution Markets LLC. In a personal communication with the author, Peter Zabrowsky (2006), who is the managing director of the Environmental Markets of Evolution Markets LLC, specified a rough estimate of NO_x value as \$2500 per short ton, which is \$2756 per a metric ton. This number may be a national average. For the DFW area, two different values are given in the Texas Commission on Environmental Quality (TCEQ, 2006) based on earlier NO_x trading in this area. They are \$6500/ton and 3000/ton of NO_x. An average of the two values is applied in this research as a reasonable value.

8.3 Application of Methodology

Once the model is developed, it can be applied to the data collected for the candidate corridors. Benefits in delay, fuel consumption and emissions are calculated using the model. In order to obtain a single score for each corridor, these three benefits are added. This score is named the Project Benefit Score.

Project Benefit Score (PBS) = $V_D * S_D + V_F * S_F + V_E * S_E$ (8.1) where,

 V_D = value of time = \$8.39/hour

 V_F = Value of fuel = \$2.57/gallon and

 V_E = value of NO_x emissions = \$4750/ton for the existing condition.

 S_D = Saving in delay (in sec)

 S_F = Saving in fuel consumption (in gallons)

 S_E = Saving in NO_x emissions (in tons)

The PBS is calculated assuming that equal importance is given to all the benefits, but the funding organization may establish a different importance to each of these benefits. In that case, their relative importance has to be quantified according to the organization's policies. If the weightings for delay, fuel consumption and emissions are W_D , W_F , W_E respectively,

Weighted Project Benefit Score (WPBS) = $W_D V_D S_D + W_F V_F S_F + W_E V_E S_E$

(8.2)

Sorting WPBS for all the candidate projects, a priority list is obtained. The actual performance of this methodology will be known after it is applied at least once to prioritize corridors and then benefits are calculated. The author recommends the model may be periodically updated after a large number of corridors are retimed and before and after studies are completed.

CHAPTER 9

CONCLUSIONS AND RECOMMENDATIONS

9.1 Conclusions

The U.S. Department of Transportation's Federal Highway Administration (FHWA) started a campaign on retiming traffic signals with the video "It's About Time, Traffic Signal Management: Cost-Effective Street Capacity and Safety" in 2001. Inspired by this, more and more cities and regional planning authorities are going to retime signals because retiming traffic signals is one of the most cost-effective techniques available for improving operations.

The prioritization of signal retiming projects, like any other project, is necessary to maximize the benefits with limited funds. This thesis addresses this issue by explaining the benefits provided of traffic signal retiming and the steps involved in such projects before studying the necessity of prioritizing such projects.

The author considers current methods used by various cities and planning agencies in the United States in selecting retiming projects. Based on the responses from these agencies, many regions undertake signal retiming projects on a regular basis; however, there is no common methodology for prioritizing signal retiming projects except at the NCTCOG. Recently, NCTCOG used a sophisticated ranking model methodology for ranking retiming projects. NCTCOG's ranking methodology is based on the severity of the existing traffic conditions, but the traffic conditions being severe may not assure high benefits from retiming signals on that corridor. Benefits from signal coordination, a technique used in signal retiming to achieve progression of vehicles along the corridor, depend on various features such as uniformity of intersection spacing, and speeds along the corridor.

Hence, a new and more efficient methodology is proposed. In this methodology, regression analysis will be used to estimate the benefits based on existing corridor characteristics, both physical and traffic related. The benefits in delay, fuel consumption and emissions are all dependent variables. The overall corridor benefits for a period until the next retiming in the future are calculated using the data from before and after studies.

Using such a model, corridor benefits can be forecasted before implementation. This model can be used in the future to estimate the benefits associated with any signal retiming project. An overall benefit score called the weighted project benefit score is calculated using dollar rates and weighting for each of benefits. Priority order of these projects is the decreasing order of this overall benefit score.

9.2 Recommendations for Further Research

As there is not enough available data from before and after studies, the methodology is only proposed. NCTCOG is conducting retiming projects along another thirty to forty corridors during 2006. Before and after studies have to be conducted along each of these corridors. Once this data is available, model coefficients can be estimated.

This research considers the uniformity in intersection spacing as a variable on which benefits from retiming may depend. Intersection spacing has important role in coordinated signals. But, all the intersections along a corridor may not be coordinated while retiming. In that case, standard deviation of spacings between every two consecutive intersections may not be meaningful. Hence, groups of intersections may be decided to be coordinated and an average of standard deviations calculated for each group of corridors may be used as a variable. More research is needed in this respect.

Further research is needed in selecting the value of benefits. Research must be done to identify a more accurate dollar value associated with benefits in NO_x from vehicular emissions. Similarly, the value of time should also be examined again to see if any other appropriate value can be obtained for city travel in DFW region. This thesis applies a value of time which was calculated through stated preference surveys. The time savings on the arterials are typically a few seconds rather than a few minutes. Application of value of time which was calculated for HOV or HOT lanes to the savings on arterials may cause some aggregation errors. More research is needed to solve these potential problems.

APPENDIX A

RESPONSES OF VARIOUS TRANSPORTATION ORGANIZATIONS ON SIGNAL REITMING PROJECTS AND THEIR PRIORITIZATION

S.	
No.	Name of the Organization
1	New York State Dept of Transportation
2	New Jersey Transportation Planning Authority
3	Mid-America Regional Council, Kansas
4	East-West Gateway Council of Governments, Saint Louis
	South East Michigan Council of Governments / Michigan
5	Department of Transportation
6	Metropolitan Orlando
7	Santa Barbara County Association of Governments
8	S.California Association of Governments
9	Sacramento Council of Governments
10	Elmira-Chemung Transportation Council
11	Capital District Transportation Committee, NY
12	Palm Beach County Government
13	City of Indianapolis
14	Miami Dade County Government
15	Knoxville Regional Transportation Planning Organization (TPO)
16	Yuma Metropolitan Planning Organization
17	San Antonio-Bexar County Metropolitan Planning Organization
18	Boston Metropolitan Planning Organization
19	Capital Area Metropolitan Planning Organization, Austin

Recipient Organizations of the E mail Survey

Reply from City of Indianapolis:

City of Indianapolis has neither staff nor budget to accomplish retiming in regular intervals. Typically corridors are retimed if the corridor is being upgraded or when complaints about the corridors are received. Corridors with the most traffic are concentrated upon.

Reply from Knoxville Regional TPO:

A formal process for prioritization of signal retiming projects is currently not there. Corridors that have been identified as a "congested corridor" in their Congestion Management System (CMS) plan are concentrated upon. The TPO is in the process of updating their CMS plan with new travel time data, which could possibly be used to develop criteria for prioritization for signal retiming projects. Right now they just ask the local jurisdictions in the area to propose re-timing projects that they feel are needed. A good source of funding is available from the Congestion Mitigation and Air Quality Improvement (CMAQ) program, since the area is as a non-attainment area.

Reply from Miami-Dade Public Works:

Usually they do not have time or funding for scheduled traffic signal retiming projects. Instead, they solve signal timing problems on a "fire-fighting" basis. On the rare occasions when they have funding for such projects, they pick the corridors based on engineering judgment, which is in turn based on the following questions:

- How long has it been since the corridor was re-timed?
- How much has traffic flow changed since then?
- How many complaints are we getting about the timing on that corridor?

Reply from S. California Association of Governments - Ventura County:

In Ventura County the only regional prioritization affecting traffic signals would be the CMAQ project selection process. The screening criteria are divided into three categories: project eligibility, planning consistency and financial feasibility. Proposed projects must meet all of these screening criteria in order to move to the next phase of the process. There may also be signal synchronization projects done by individual jurisdictions, but if that is the case, the prioritization would be done by the individual jurisdiction.

Reply from S. California Association of Governments - Riverside County:

Typically they have a "call for projects" per fund type, not project type. Projects are scored for various criteria before being selected.

Reply from Metropolitan Orlando, Florida:

No criteria available at this time. Because there are 21 cities under this organization, the prioritization process can be complex and political. Recently their Board requested that they should look at retiming signals to achieve a regional standard for safety and efficiency. Recently, a corridor has been identified, which serves many of their counties and cities in their region, for their first region retiming project.

Reply from Michigan Department of Transportation:

They do not have a priority set up for what locations. In their view, the best method would be based on volumes and complaints. They started with the Detroit area but now are in the process of retiming the entire state. They are doing entire counties at a time to get better prices on their projects. They are not selecting individual corridors. APPENDIX B

ORIGINAL DATA OBTAINED FROM NCTCOG

		No. of Lanes	9	9	و	2	9	9	N/A	9	9	9	N/A	9	4	N/A	9	4	4	4	9	9	4	9	N/A	9	6	2
	s	Per Signal Per Signal	0.47	0.42	0.35	0.36	0.28	0.26	0.26	0:30	0.46	0.44	0.25	0.39	0.43	0.26	0.19	0.46	0.43	0.34	0.26	0.25	0.27	0.22	0.20	0.25	0.27	0.38
Stops	S	Average Stop Per Mile	1.27	1.47	0.89	1.37	0.97	0.66	0.68	0.86	0.74	2.40	0.76	0.83	1.58	0.77	0.44	0.50	0.60	0.93	0.77	0.71	1.01	0.50	0.84	0.68	1.21	1.04
Sto	Average Aeasured	B-A	9.5	4.0	2.5	0.7	4.5	5.0	34.0	3.0	2.5	6.5	3.5	4.0	4.0	32.0	9.0	2.5	3.5	0.7	6.5	1.5	3.5	2.0	17.0	3.5	5.0	4.0
	Average Measurec	8.A A-B	5.5	9.5	8.0	4.5	6.0	5.0	35.0	3.0	4.0	5.0	5.0	3.0	2.0	41.5	1.0	3.0	2.5	4.5	8.0	1.5	4.0	1.5	19.5	2.5	3.5	3.5
	sA) en	М өрвгө vA Тгах өГ Тіт Регсептаде	163%	163%	154%	173%	145%	132%	141%	136%	157%	204%	146%	131%	199%	132%	140%	121%	128%	153%	130%	131%	138%	116%	134%	122%	145%	145%
Time (Seconds)		emiT levelT e2) beeq2	570	455	483	376	486	613	4,252	347	314	186	541	326	170	4,646	124	424	426	999	834	191	360	274	2,117	420	360	313
Travel Time (ured Time nds)	B-A	1,000.5	642.5	652.0	682.0	704.0	849.5	5,960.5	450.0	475.0	434.5	802.5	411.0	392.0	6,020.5	174.0	495.0	546.5	968.0	1,122.5	221.5	492.0	366.0	2,730.0	540.0	512.0	468.0
Tra	Measured Travel Time (Seconds)	A-B	859.5	841.0	832.0	622.0	709.0	768.0	6,039.5	496.0	509.5	323.5	772.5	440.5	283.0	6,255.5	173.5	527.0	543.0	726.0	1,048.0	278.0	501.5	272.0	2,964.0	488.0	533.0	440.0
	ə	slengi2 sseJ oiwT betnuoO							15	2			0	2		12		2							7	2		
p		Other Signals Have To Be F	Γ						14				9			26									29			
	rial nent	(səliM) Length	5.9	4.6	5.9	4.2	5.4	7.6	50.5	3.5	4.4	2.4	5.6	4.2	1.9	47.6	1.7	5.5	5.0	6.2	9.4	2.1	3.7	3.5	21.8	4.4	3.5	3.6
	Arterial Segmen	No. of Signals	16	16	15	16	19	19	133	10	7	13	17	6	7	140	4	9	7	17	38	ى	14	8	91	12	16	10
		City	Dallas	Dallas	Dallas	Flower Mound, Lewisville	Dallas/Richardson/Dallas	Dallas	Richardson/Garland	Plano	Richardson/Garland	Lewisville	Dallas	Grand Prairie	Desoto	Dallas	Garland	Wylie/Sachse	Rowlett	Inving	Irving	Dallas	Farmers Branch	Dallas	Dallas	Dallas/Carrollton	Inving	Flower Mound, Lewisville
		East or South Limit "B"	SH 342	Illinois	Empire Central	39E-HI	Churchill	Saturn	N/A	PGBT EBFR	Brand	Lakepointe	N/A	SE 14th	IH-35E	N/A	Castle	Murphy Road	Roan	Norwood	Oakdale	Coit	Alpha	Arapaho	N/A	Country Square	SH 183	39E-HI
		West or North Limit "A"	Duncanville	Leath	IH-635	Churchill	Pres. George Bush		N/A	Spring Creek Pkwy	ad	Edmonds	N/A	Susan	Hampton	N/A	Naaman School	Brown (FM 3412)	Castle	Willowcreek	Lakeshore	Campbell			N/A	Hebron Pkwy	SH 114	Chinn Chapel
		Arterial	Illinois	2 Hampton	sa	4 FM 1171	5 Coit	6 Northwest Hwy	Richardson-Garland Group 1	8 Jupiter	9 SH 190 (PGBT Frontage Roads)	10 FM 3040/Hebron/Park Blvd	11 Dallas Group 3 (Royal E of US 75, etc.)	12 Pioneer Pkwy (Spur 303)		14 Dallas Group 2 (Preston,Royal, etc.)	15 SH 78	16 SH 78	17 Rowlett Road	18 Irving Blvd	19 Denton Tap/Belt Line		21 Valley View Ln		23 Dallas Group 1 (Oaklawn, etc.)	24 Marsh/Lemmon	hur	26 FM 407
		Row No.	Ē	2	m	4	ĥ	9	2	8	6	101	11	12	13	14	15	16	17	18	19	20	21.	22	23	24	25	26

From NCTCOG 1999 Volumes Volumes Unless Later Year is Noted Volume Unless Later Year is Noted Volume ADT Year Volume Arterial Volume Volume Anterial Volume Volume Illinois 32.640 1999 36.331 I Hampton 47,390 1999 35.31 38.1 I Hinry Hines 47,390 1999 35.36 48.66 I Fort 44,000 2001 45.77 58.66 56.70 I Northwest Hwy 58,930 1999 57.271 58.66 67.0 I Richardson-Garland Group 1 N/A N/A N/A N/A N/A	New New 23,500 New New 23,500 New 23,500 New 23,500 New 23,500 New 24,500 New		ume usted 2003 2003 2003 2003 2003 2003 2003 200	ADT ADT ADT ADT Banking 8875 38,875 49,228 49,228 51,296 51,296 55,9891 529,891		Currulative No. of Signals and Miles of Corridor No. of Length Signals (Miles) 16 59 16 59 16 47 16 4 17 16 4 10 33.6 101 33.6	Comments
ADT Vear Volume Nolume Newer Arterial Volume Year Adjusted ADT Arterial Volume 1999 35,311 38,113 is 32,640 1999 35,331 38,113 ptom 43,030 1999 46,577 47,316 Yhines 47,300 1999 51,296 48,601 ITT 44,000 2001 57,271 58,690 Invest Hwy 58,930 1999 63,788 67,016 mest Hwy N/A N/A N/A N/A	Newer ADT Volume 47,316 47,316 47,316 47,316 58,690 58,690 67,016 67,016 67,016 146,730 74,6730						Comments
is 32,640 1999 35,331 38,113 ption 43,030 1999 46,577 47,316 y Hines 47,390 1999 46,577 47,316 171 47,390 1999 51,296 46,029 171 47,390 1999 57,271 58,690 Mest Hwy 52,910 1999 57,271 58,690 Nvest Hwy 58,930 1999 63,708 67,016 ardson-Garland Group 1 N/A N/A N/A N/A	38,113 47,316 46,029 56,690 67,016 67,016 NVA A6,730 24,6730		38,875 49,228 46,950 33,151 59,864 68,366 83,366 N/A N/A	38,875 38,875 51,295 51,295 51,295 51,295 51,295 51,295 53,891	1 1 1 4 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5.9 16.4 20.6 26.0 33.6	
is 32,640 1999 35,331 38,113 pton 35,331 38,113 pton 43,030 1999 46,577 47,316 47,316 1171 1171 11999 51,296 46,029 1171 55,910 1999 57,271 58,690 hwest Hwy 58,930 1999 57,271 58,690 hwest Hwy 1999 53,788 67,016 ardson-Garland Group 1 N/A	38,113 47,316 46,029 58,690 58,690 67,016 N/A N/A 46,720 24,6720	┝╋╋╋╋	38,875 49,228 46,950 33,151 59,864 68,366 68,366 N/A N/A	38,875 49,228 51,296 51,296 53,778 59,864 68,356 529,891	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	5.9 10.5 20.6 26.0 33.6	
pton 43,030 1999 46,577 47,316 47,316 Y Hines 47,390 1999 51,296 46,029 117 1171 44,000 2001 45,778 32,501 1999 52,501 1171 52,910 1999 57,271 58,690 108 nwest Hwy 58,930 1999 57,271 58,690 108 ardson-Garland Group 1 N/A N/A N/A N/A N/A	47,316 46,029 58,690 67,016 N/A N/A 46,738 24,570		49,228 46,950 33,151 59,864 68,366 68,366 N/A N/A	49,228 51,296 45,778 59,864 68,356 68,356 529,891	1 32 1 47 1 63 1 82 1 101	10.5 16.4 20.6 33.6	
Y Hines 47,390 1999 51,295 46,029 1171 2400 2001 45,778 32,501 171 52,910 1999 57,271 58,690 hwest Hwy 58,930 1999 67,271 58,690 neest Hwy 58,930 1999 67,076 34,006 ardson-Garland Group 1 N/A N/A N/A N/A	46,029 32,501 58,690 67,016 N/A 46,738 24,520		46,950 33,151 59,864 68,356 88,356 N/A 1/A	51,296 45,778 59,864 68,356 529,891	1 47 1 63 1 101 1 101	16.4 20.6 26.0 33.6	
1171 44,000 2001 45,778 32,501 32,501 52,910 1999 57,271 58,690 58,727 58,690 58,690 58,727 58,690 58,701 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 58,727 58,690 59,727 58,690 59,727 58,690 59,727 58,690 59,727 58,690 59,727	32,501 58,690 67,016 N/A 46,738 24,520		33,151 59,864 68,356 N/A 47,673	45,778 59,864 68,356 529,891	1 63 1 82 101	20.6 26.0 33.6	
52,910 1999 57,271 58,690 nwest Hwy 58,930 1999 63,788 67,016 ardson-Garland Group 1 N/A N/A N/A N/A	58,690 67,016 N/A 46,738 24,520		59,864 68,356 N/A 47,673	59,864 68,356 529,891	1 82 101	26.0 33.6	
est Hwy 58,930 1999 63,788 67,016 4son-Garland Group 1 NVA NVA NVA NVA	67,016 N/A 46,738 24,520		68,356 N/A 47,673	68,356 529,891	1 101	33.6	
dson-Garland Group 1 N/A N/A N/A N/A	N/A 46.738 24.520		N/A 47,673	529,891	100	1000000	
	46,738 24,520		47,673	and the second se	1 233	84.1	
35,430 1999 38,351 46,738	24.520			47,673	1 243	87.6	
9 SH 190 (PGBT Frontage Roads) 6,400 1999 6,928 24,520 200		Cote	25,511	25,511	2 250	92.0	
10 FM 3040/Hebron/Park Blvd 39,770 1999 43,048			0	43,048	2 263	94.4	
11 Dallas Group 3 (Royal E of US 75, etc.) N/A N/A N/A N/A N/A N/A	N/A N/A	N/A	N/A	76,847	1 289	100.0	
12 Pioneer Pkwy (Spur 303) 31,680 1999 34,291 34,658 2003	34,658 2002	C of GP	35,351	35,351	1 298	104.2	
			0	22,460	2 305	106.1	
Group 2 (Preston, Royal, etc.) N/A N/A N/A N/A	N/A N/A	N/A	N/A	402,855	1 459		
1999 36,976 37,533		CofG	40,627	40,627	1 463		
			0	31,391	2 469		
365 3 3.			0		3 476	165.9	
1999			0	30,590	2 493	172.1	Excellent progression during PM peak
19 Denton Tap/Belt Line 60,670 1999 65,671			0	65,671	2 521	181.5	
1200			0	38,080	1 527	183.6	
1999 24,517 33,037		C of FB	35,059	35,059	1 541	187.3	
22 Preston 60,350 1999 65,325 60,837 200		CofD	63,295	65,325	1 549	190.8	Excellent progression during AM peak
23 Dallas Group 1 (Oaklawn, etc.) N/A N/A N/A N/A N/A N/A	N/A N/A	N/A	N/A	280,415	1 662	212.6	
1mon 38,080 1999	5		0	41,219	1 674	217.0	
hur 45,230 1999 48,958 49,400	49,400	C of Irv	51,396		2 690		
26 FM 407 25 A00 2001 26 A10 27 428 200	~3	CofL	29,107	29,107	2 700	224.1	

							р		Tr	Travel Time (Seconds)	Seconds)			Stops	S	1	
					Art Seg	Arterial Segment		90	Measured Travel Time (Seconds)	sured Time Inds)		sA) em	Average Measured	· · · · ·	2	S	
	Arterial	West or North Limit "A"	East or South Limit "B"	City	to. of Signals	(Miles) Length -	Other Signals Have To Be F	slengi2 sseJ DiwT betruoO	₽	₽-A	emiT leverT e2) beeq2	M elserayA IT lavel T Percentage	A A	×+10	Average Stop Per Mile	Per Signal Per Signal	No. of Lanes
104	27 First/Broadway	Avenue D	Centerville	Garland	2	2.3			249.0	248.5	205	121%	1.5	-		0.21	9
104	28 Buckner	Northcliff	Mercer	Dallas	2	1.8			219.0	223.5	162	137%	1.0	1.5	0.69	0.18	9
104	29 Hampton	Illinois	IH-20	Dallas	6	5.0			542.0	555.0	452	121%	2.5	2.5	0:50	0.25	و
103	30 MacArthur	Belt Line	SH 114	Inving	19	4.6			723.0	577.0	474	137%	5.5	3.0	0.92	0.22	9
(n)	31 Belt Line	Marsh	DNT SBFR	Addison	თ	1.9			277.5	164.0	166	133%	2.0	0.5		0.14	ی
0	32 Belt Line		Marsh	Carrollton	16	3.9			411.5	466.5	350	125%	1.0	5.5	0.83	0.20	9
10)	33 US 380	IH-35	Cooper Creek	Denton	16	5.3			740.5	626.5	486	141%	6.0	5.0	1.04	0.34	4
m	34 Carrier Pkwy	Conover	Bardin	Grand Prairie	15	4.5			490.0	618.5	401	138%	2.5	6.0	0.94	0.28	4
0	35 Abram/Jefferson	Great SW Pkwy	Camden	Grand Prairie	15	5.1			622.0	520.0	464	123%	4.5	3.0	0.74	0.25	4
(n)	36 MacArthur	FM 3040	Belt Line	Coppell	б	3.8			429.5	544.0	372	131%	2.0	3.0	0.66	0.28	4
10	37 Denton Tap/Belt Line	Oakdale	IH-20	Grand Prairie	24	8.0			1,033.5	801.0	671	137%	6.0	4.0	0.63	0.21	4
103	38 Campbell	Preston	Meandering Way	Dallas	ъ	1.6			185.5	202.0	166	117%	1.0	1.5	0.78	0.25	۵
נטן	39 FM 3040/Hebron/Park Blvd	Marchant	Marsh	Carrollton	13	5.7			578.5	582.5	455	128%	2.0	3.0	0.44	0.19	ى
4	40 Marsh/Lemmon	Country Square	IH-635	Addison/Farmers Branch	12	2.8			321.5	353.0	287	118%	1.0	3.5	0.80	0.19	9
4	41 Royal	MacArthur	IH-35E	lrving/Dallas	œ	3.5			340.5	365.5	273	129%	2.0	3.5	0.79	0.34	6
4	42 Preston	FM 720	SH 121	Frisco	თ	3.7			344.5	324.0	297	113%	2.0	-	0.34	0.14	۵
4	43 Broadway	Centerville	Guthrie	Garland	11	3.3			294.0	341.5	261	122%	1.5	1.0	0.38	0.11	9
4	44 US 380		SH 5	McKinney	11	2.2			358.0	247.0	195	155%	4.5	1.0			9
4	45 Denton Tap/Belt Line	SH 121	Lakeshore	Lewisville/Coppell	12	4.1			479.5	422.5	362	125%	3.0	3.5	0.79	0.27	9
4	46 Hampton	Wheatland	Parkenville	Dallas/Desoto	12	4.7			555.5	607.0	426	136%	3.5			0.33	4
4	47 SH 66	Centerville	Dalrock	Rowlett	2	4.6			411.0	374.0	345	114%	1.0	0.5	0.16	0.11	9
4	48 Bethany	US 75	Cheyenne		ω	2.7			350.5	377.0	251	145%	3.0	2.5	1.02	0.34	4
4	49 Camp Wisdom	Cedar Ridge	US 67	Duncanville/Dallas	12	3.2			354.0	566.5	291	158%	0.5	6.5	1.09	0.29	9
40	50 Garland Rd	Jupiter	La Vista	Dallas	13	3.8			369.0	422.0	347	114%	1.0		0.33	0.10	9
4)	51 Division/Main	Great SW Pkwy	MacArthur	Grand Prairie	16	4.8			557.5	488.0	436	120%	1.5	1.1	0.42	0.13	4
цц))	52 Galloway	Oates	Gross	Mesquite	20	5.7	_		809.5	772.5	587	135%	6.5	5.5	1.05	0.30	4
ç	53 Northeast Parkway	Crist	Castle	Garland	ъ	2.3			238.5	215.0	188	121%	2.0	0.5	0.54	0.25	9
	Key to Existing System Type: 1 = all intersections a	intersections are part of :	an existing system with	re part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently	ne but	not all	interseci	tions an	e part of ar	n existing s	ystem wi	th commu	nications	s; 3 = No	system	(current	tly
	ISUIALED UPERALIULY																1

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	From NCTCOG 1999 Vultures More Recent Count If Available ADT Propress Later Vear Is Noted More Recent Count If Available ADT Propress Later Vear Is Noted More Recent Count If Available ADT Propress Later Vear IS Noted More Recent Count If Available ADT Propress Later Vear IS Noted More Recent Count If Available ADT Noted Recent Count If Available No						Volume Data	n Data							
ADT Value Vear Value Value <td>ADT Vant Vant Vant Name Vantum Veal Vantum Veal Vantum Veal Vantum Veal Vantum Veal Veal Vantum Vantum Veal Vantum Veal</td> <td></td> <td></td> <td>From NCT Unless L</td> <td>rcog 1999 _ater Year</td> <td>Volumes is Noted</td> <td>More</td> <td>Recent Co</td> <td>ount If Avail:</td> <td>able</td> <td>ADT</td> <td>200</td> <td>Sumulative Signals and of Corric</td> <td>No. of I Miles dor</td> <td></td>	ADT Vant Vant Vant Name Vantum Veal Vantum Veal Vantum Veal Vantum Veal Vantum Veal Veal Vantum Vantum Veal			From NCT Unless L	rcog 1999 _ater Year	Volumes is Noted	More	Recent Co	ount If Avail:	able	ADT	200	Sumulative Signals and of Corric	No. of I Miles dor	
modelway 43,610 1399 47,205 47,873 13999 C of C 51,803 51,803 17 77 226,84 er 35,250 1999 37,502 27,010 C of D 28,413 1 77,4 22,82 hur 35,250 1999 37,562 51,000 2001 C of D 28,413 1 77,4 22,82 hur 45,716 1999 37,562 51,000 2001 C of D 28,413 23,43 23,43 ne 24,000 2099 35,263 2002 C of D 24,732 24,732 24,732 24,732 24,732 24,732 24,732 24,732 24,732 24,732 24,733 24,733 24,732 <td>modelway 13510 1399 47/205 47/673 1399 67/605 61/605<td></td><td>Arterial</td><td>ADT Volume</td><td>Year</td><td>Volume Adjusted to 2003</td><td>Newer ADT Volume</td><td>Year</td><td>Source</td><td>Volume Adjusted to 2003</td><td>Volume Used For Ranking</td><td>26 265</td><td></td><td>.ength Miles)</td><td>Comments</td></td>	modelway 13510 1399 47/205 47/673 1399 67/605 61/605 <td></td> <td>Arterial</td> <td>ADT Volume</td> <td>Year</td> <td>Volume Adjusted to 2003</td> <td>Newer ADT Volume</td> <td>Year</td> <td>Source</td> <td>Volume Adjusted to 2003</td> <td>Volume Used For Ranking</td> <td>26 265</td> <td></td> <td>.ength Miles)</td> <td>Comments</td>		Arterial	ADT Volume	Year	Volume Adjusted to 2003	Newer ADT Volume	Year	Source	Volume Adjusted to 2003	Volume Used For Ranking	26 265		.ength Miles)	Comments
err 35.60 1996 38.569 39.760 2001 Corin 41.366 41.366 1 714 2333 nin 43.90 1996 38.533 27.10 2001 Corin 55.90 56.490 5.6.490 5.7.43 27.33 nin 45.900 1999 47.652 51.000 2010 50.105 50.01 50.11 2 7.24 2333 nin 45.900 1999 47.652 50.02 Corin 53.11 2 76.2 2334 nin 24.000 1999 47.652 36.00 26.490 56.490 56.490 56.490 7.24 2333 Pervou 24.00 15.540 36.00 20.01 Corin 26.110 26.90 27.52 2371 Defreson 25.00 1999 30.70 24.90 26.140 26.130 26.91 27.52 237.53 Defreson 27.00 10.00 27.01 29.00 20.01	err 35.660 1396 38.569 39.760 2001 C of D 41.366 1 7.14 2.362 or 35.730 1309 45.370 2001 C of D 81.363 1 7.14 2.362 ner 51.160 1999 55.362 51.300 2001 C of D 36.430 56.430 1 7.24 2.332 ner 51.160 1999 55.70 1999 C of D 36.11 2.1450 2.926 2.3673 2.3691 2.3673 2.3691 2.3673 2.3691 2.3673 2.3691 2.3673 2.3691 2.3673 2.3691 2.3623 2.3730 Reky 2.8730 1999 2.9473 2.0202 C of D 2.3761 2.3623 2.376 Reky 2.3710 1999 2.3614 2.372 2.3611 2.361 2.375 2.3623 Reky 2.3710 1999 2.3613 2.3012 C of D 2.3752 2.3623 2.3275	0	7 First/Broadway	43,610	1999	47,205	47,673	1999	CofG	51,603	51,603	-		226.4	
min 26.200 1999 27.310 2001 C of IN 28.413 1 7.24 23.33 thur 51.940 1999 47.562 51.000 2001 C of IN 53.060 56.400 1 7.23 237.33 me 51.970 1999 47.565 51.000 2001 C of IN 53.060 52.01 7.34 23.33 Pkwy 24.000 2001 24.750 1999 25.701 1999 27.53 23.93 23.66 23.66 23.672 24.732 24.732 1 7.84 23.66 Pkwy 25.50 1999 29.764 24.247 2002 C of GP 24.732 1 17.41 2 23.23 Metric 27.530 1999 29.908 24.732 24.14 2 24.24 2 24.24 2 24.732 24.13 2 26.2 Metric 27.530 1999 24.732 24.141 2 26.2 20.3<	0in 35 30 15 27 30 27 30 31 7 74 33 hur 51 10 1999 47.562 51.00 2001 50.06 53.06 1 7.66 23.36 2 743 237.3 ne 45,970 1999 47.562 51.000 2001 75.97 75.93 237.3 ne 45,970 1999 57.70 1999 76.04 36.917 36.917 36.917 36.917 36.913 36.917 36.913 36.917 36.913 36.917 36.913 36.917 36.913	0	8 Buckner	35,650	1999	38,589	39,760	2001	CofD	41,366	41,366	-		228.2	
thut d3940 1999 47.562 $51,00$ 2001 $C \sigma i r$ $53,960$ 57.302 2022 2047 20537 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 20237 214732 17 20237 214732 17 20237 214732 17 20237 214732 17 20237 2023792 2023792 2023792 2023792 2023792 2023762	Ihur 43.940 1996 47.562 51.000 2001 C of Iw 53.960 53.36 55.32 73.00 237.90 1 755 233.7 ne 45.700 1996 55.36 55.325 55.30 55.36 55.37 55.37 55.3 55.37 55.3 55.37 55.3 55.37 55.3 55.37 55.37 55.37 55.37 55.37 55.37 55.37 55.37	2	9 Hampton	26,230	1999	28,392	27,310	2001	CofD	28,413	28,413	-		233.2	
ee 61,150 1999 65,386 55,382 2002 C of A 66,490 1 752 2337 ee 45,970 1999 37,759 7 <	ee 51.150 1996 65.385 55.387 500 7 752 2330 ee 345.90 1996 65.382 50.38 7 56.490 1 752 23436 ee 345.90 1996 36.97 36.97 36.97 2 7.36 23436 Pkevy 26.900 1996 37.75 36.96 36.97 2 7.36 23436 Pkevy 26.900 16.940 15.940 36.97 36.97 2 36.97 2 36.97 2 36.97 2 36.33 36.33 36.33 36.34 36.97 2 36.97 2 36.34 3	ι Π	0 MacArthur	43,940	1999	47,562	51,000	2001	C of Irv	53,060	53,060	2		237.8	
me 45,970 1999 47,560 1990 47,570 15,970 25,970 1999 Cor(Den) 21,111 2 784 283 Pkwy 26,879 1998 21,977 36,095 23,977 36,095 24,772 24,772 24,722 1 81,14 286,14 283,34 Deferson 15,940 1999 27,144 2002 Cor(FP 24,732 1 81,4 286,5 Deferson 15,940 1999 24,144 2002 Cor(FP 24,732 1 81,4 286,5 Deferson 27,01 1999 24,940 2001 Cor(FP 24,132 1 84,112 2 84,2 Und 27,03 41,910 2999 21,912 2001 Cor(FP 24,132 1 84,113 2 86,2 271,6 Und 27,03 2001 2001 Cor(FP 24,132 4,113 2 86,7 26,234 270,4 270,4	ie des	n	1 Belt Line	51,150	1999	55,366	55,382	2002	CofA	56,490	56,490	-		239.7	
	0 24,000 29,01 24,970 25,970 25,970 25,970 25,970 25,970 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 26,971 27,720 2999 27,717 2999 27,717 2999 24,732 24,732 24,732 24,732 24,732 26,973 25,923 thur 27,701 1999 20,909 47,990 24,914 26,000 26,173 24,732 14,132 2 84,1 2 86,5 277.5 thur 27,730 1999 47,900 2001 2001 26,07 26,99 271.6 277.5 thur 27,730 1999 27,930 2001 26,07 26,94 270.3 270.4 270.3 thur 27,530 24,750 21,91 26,71 44,113 24,113 27,193 277.6	m	2 Belt Line	45,970	1999	49,759				0	49,759	-		243.6	
Rkwy 26,873 1996 29,577 36,095 2002 C of GP 36,917 36,917 2 799 253.4 Ulefferson 15,940 1999 17,254 24,74 2002 C of GP 24,732 1 86,14 283.5 Tap/Belt Line 27,630 1999 28,14 2002 C of GP 24,192 24,192 2 847 273 2 273.3 220.3 223.3 220.3 </td <td>Pkwy 56/3 199 2/6/7 56/95 2/7/32</td> <td>со</td> <td>3 NS 380</td> <td>24,000</td> <td>2001</td> <td>24,970</td> <td>25,970</td> <td>1999</td> <td>C of Den</td> <td>28,111</td> <td>28,111</td> <td>2</td> <td></td> <td>248.9</td> <td></td>	Pkwy 56/3 199 2/6/7 56/95 2/7/32	со	3 NS 380	24,000	2001	24,970	25,970	1999	C of Den	28,111	28,111	2		248.9	
Undefineron 15,940 1996 17,254 24,74 2002 C of GP 24,732 24,732 1 814 286.5 1 1 265.26 1 1999 28,414 \sim 0 28,414 2 823.3 265.3 1 939 28,414 \sim 6 26,701 1 939 28,414 \sim 86.7 26.73 26.23 26.73 26.23 26.71 2 26.71 2 26.71 2 26.71 2 26.71 2 26.71 2 26.71 2 26.74 2 26.71 2 26.71 2 26.71 2 26.71 2 26.71	Sk harakhilterior 15 9u0 1724 22,421 200 24,723 21,232 21,232 21,325 22,656 32 MacAkhilterior 37,70 1999 27,41 200 26,41 2 24,323 25,323 101	m	4 Carrier Pkwy	26,879	1998	29,677	36,095	2002	C of GP	36,817	36,817	2			lanes wide from Crossland to Westchester
Intraction 26,260 1999 28,414 2 823 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 26,23 271,9 211,92 21,192 2 84,113 2 84,73 273,3 273,3 G0Hebron/Park Blwd 38,720 1999 47,595 43,900 2001 2001 2007 20,610 23,939 29,906 1 867 273,4 Lemmon 43,700 1999 47,595 43,900 200 2001 2007 20,61 43,130 28,66 237,6 Lemmon 37,000 2001 2002 2001 2001 2067 44,13 2 866 237,6 Lemmon 37,000 2001 33,200 20,204 20,00 2001 2001 2003 2003 Lemmon 36,160 1999 3	36 Mackuture 25:0 1999 26:41 3 Combinity 20:3 20:3 Mackuture 20:3 Mackuture 37 Tombeni Tap/Belt Line 37.70 1999 20:24 20:01 C of C 41.192 2 Bd7 70:0 Notherm portion i under construction 36 Fm3040/Hebron/Park Blvd 38.70 1999 47.906 20:01 C of C 41.13 2 Bd7 70:0 Notherm portion i under construction 36 Fm3040/Hebron/Park Blvd 38.700 1999 47.900 20:01 C of C 41.113 2 Bd7 Ad4	ι. Έ	5 Abram/Jefferson	15,940	1999	17,254	24,247	2002	C of GP	24,732	24,732	1	-	258.5	
T Tap/Belt Line 37,170 1999 40,234 40,384 2002 C of Cp 41,192 21,192 2 847 270.3 ell 27,630 1999 29,908 23,048 2001 C of C 41,113 24,113 2 865 277.6 uthebron/Park Blwd 38,720 1999 47,596 43,090 2001 C of C 44,113 2 865 277.6 uthebron/Park Blwd 38,720 1999 47,596 43,090 2002 C of C 44,113 2 865 277.6 uthebron/Park Blwd 38,720 1999 47,596 43,090 2002 C of C 44,113 2 865 277.6 uthebron/Park Blwd 33,200 2001 2012 C of C 44,113 2 203 2	30 Dentribution 37 170 1999 4,0384 2002 C of C 3,192 1,192 1 20 Northerr portion is under construction 39 N 300/Hebron/Park Ehid 37,70 1999 4,1912 2001 C of C 3,397 2,3979 2,900 1 662 271.9 Anual species of posted 39 N 300/Hebron/Park Ehid 37,00 1999 4,790 2001 C of C 4,3952 1 962 271.9 Anual species of posted 40 Narsh/Lemmon 37,00 1999 4,790 2001 C of C 4,4193 6,719 1 969 2910 1 960 2960 1 640 1 97 1 969 1 96 2010 0 1 960 2 200 2001 0 97 97 97 97 97 960 97 97 96 97 96 96 97 96 96 97 97	ι Γ	6 MacArthur	26,250	1999	28,414				0	28,414	2		262.3	
ell 27,630 1999 29,086 23,048 2001 C of D 23,779 29,908 1 86.2 271.6 MOHebron/Park Blvd 38,720 1999 41,912 42,400 2001 C of C 44,113 2 86.5 277.6 Lemmon 38,720 1999 41,912 42,400 2001 C of C 44,113 2 86.5 277.6 Lemmon 38,720 1999 45,912 43,900 2001 C of D 2,913 2 865 277.6 N 32,000 2001 32,93 52,128 2000 C of D 2,811 1 894 287.6 N 31,740 1999 34,561 21,932 2001 C of D 34,513 1 916 2903 N 31,740 1999 31,033 32,323 20,010 C of D 34,513 1 916 2913 N 31,41 31,40 1999 31,333 32,3	38 Campbell 2/530 1999 2/500 2/504 2/501 C of C 2/3/13 4/113 2/113 4/113 2/113 4/113 2/214 2/212 2/214 2/212 <	ς Γ	7 Denton Tap/Belt Line	37,170	1999	40,234	40,384	2002	C of GP	41,192	41,192	2	200		lorthern portion is under construction
400Hebron/Park Blvd 38/720 1999 41,912 42,400 2001 C of C 44,113 2 866 277.6 Lemmon 43,970 1999 47,595 43,900 2002 C of A 43,952 47,595 1 877 280.4 1 Lemmon 24,120 1999 47,595 43,900 2001 C of A 43,952 47,595 1 877 280.4 1 No 32,000 2001 33,293 52,128 2000 C of A 45,213 1 944 287.6 1 894 287.6 No 31,740 1999 34,563 51,028 2000 C of A 33,566 1 916 293.6 No 31,740 1999 31,033 32,392 2001 C of A 33,561 1 916 293.6 293.6 293.6 293.6 293.6 293.6 293.6 293.6 294.2 293.6 294.2 294.2 216.2	38 FM 30d0Heteron/Fark Bhd 38 720 1999 41,912 24,400 24,113 2 865 277.6 Atual speeds will in excess of posted 40 MarshLemmon 43,970 1999 47,565 43,000 2002 C of A 43,950 17.993 Atual speeds will in excess of posted 41 Rispial 24,120 1999 25,128 2000 C of C 47,23 54,234 1 885 2893 Colinas 41 Rispial 1099 35,160 1399 34,956 37,01 33,701 33,701 33,701 33,701 33,701 36,965 1 965 297.6 45 Benhary 25,560 1999 36,165 29,000 C of C 33,701 33,701 36,965 1 965 1 967 2903 45 Benhary 28,166 10,000 33,701 33,701 31,70 1 966 36,70 1 965 1 1 1 <td< td=""><td>ι Γ</td><td>8 Campbell</td><td>27,630</td><td>1999</td><td>29,908</td><td>23,048</td><td>2001</td><td>C of D</td><td>23,979</td><td>29,908</td><td>1</td><td></td><td>271.9</td><td></td></td<>	ι Γ	8 Campbell	27,630	1999	29,908	23,048	2001	C of D	23,979	29,908	1		271.9	
Lemmon $43,970$ 1399 $47,596$ $43,952$ $47,596$ 1 877 280.4 Lemmon $24,120$ 1999 $26,108$ $21,495$ 2000 $coff$ $43,564$ 1 877 280.3 n $32,000$ 2001 $33,293$ $52,128$ 2000 $coff$ $54,234$ 1 894 237.6 n $41,770$ 1999 $45,213$ $52,128$ 2000 $coff$ $54,234$ 1 896 283.6 n $31,740$ 1999 $35,160$ 1999 $34,356$ $31,332$ 2000 $coff$ $45,213$ 1 906 290.3 n $36,160$ 1999 $31,332$ 2000 $coff$ $33,366$ $21,360$ 290 2903 2913 n $25,600$ 2900 2001 100 $20,112$ $20,122$ 2901 2902 2903 2913 n $25,600$	40 MarshLemmon 43,970 47,956 47,956 47,956 47,956 47,956 47,956 47,956 47,956 47,956 41,053	e	9 FM 3040/Hebron/Park Blvd	38,720	1999	41,912	42,400	2001	CofC	44,113	44,113	2		277.6	
n 24,120 1999 26,108 21,495 2000 $C \sigma f F$ 54,234 1 26,108 2 885 233.9 62,128 2000 $C \sigma f F$ 54,234 1 894 237.6 1 894 237.6 1 894 237.6 1 894 237.6 1 894 237.6 1 906 237.6 1 906 239.6 237.6 1 906 239.6 237.6 1 906 239.7 239.2 237.6 239.2 237.6 239.2 237.6 239.2 237.6 239.2 237.6 239.2 237.6 239.2 237.2 <td>41 Ryain 54,120 1999 56,108 21,495 2000 Corf 54,234 61 2865 2895 5895 5903 610ms and at Los 42 Preston 32,000 2001 32,935 52,138 2001 $Corf$ 54,234 1 966 2993 and at Los 43 Broadway 317,400 1999 45,213 $Corf$ 45,234 1 966 2903 con and at Los 44 US 300 31,740 1999 45,133 $Corf$ 45,234 1 966 2903 con and at Los 44 US 300 57,130 2000 Corf 33,701 33,701 3676 2993 2004 46 Hamoton 27,500 2001 TxD0 33,701 33,701 33,701 30,70 2093 2004 2004 2004 2004 2004 2004 2004 2004 2014 2014 2014 2014 2014 2014<td>4</td><td>0 Marsh/Lemmon</td><td>43,970</td><td>1999</td><td>47,595</td><td>43,090</td><td>2002</td><td>CofA</td><td>43,952</td><td>47,595</td><td>t,</td><td></td><td>8.1.3</td><td>vctual speeds well in excess of posted</td></td>	41 Ryain 54,120 1999 56,108 21,495 2000 Corf 54,234 61 2865 2895 5895 5903 610ms and at Los 42 Preston 32,000 2001 32,935 52,138 2001 $Corf$ 54,234 1 966 2993 and at Los 43 Broadway 317,400 1999 45,213 $Corf$ 45,234 1 966 2903 con and at Los 44 US 300 31,740 1999 45,133 $Corf$ 45,234 1 966 2903 con and at Los 44 US 300 57,130 2000 Corf 33,701 33,701 3676 2993 2004 46 Hamoton 27,500 2001 TxD0 33,701 33,701 33,701 30,70 2093 2004 2004 2004 2004 2004 2004 2004 2004 2014 2014 2014 2014 2014 2014 <td>4</td> <td>0 Marsh/Lemmon</td> <td>43,970</td> <td>1999</td> <td>47,595</td> <td>43,090</td> <td>2002</td> <td>CofA</td> <td>43,952</td> <td>47,595</td> <td>t,</td> <td></td> <td>8.1.3</td> <td>vctual speeds well in excess of posted</td>	4	0 Marsh/Lemmon	43,970	1999	47,595	43,090	2002	CofA	43,952	47,595	t,		8.1.3	vctual speeds well in excess of posted
n 32,000 2001 33,293 52,128 2001 54,234 64,234 1 894 287.6 vay 41,770 1999 45,213 1 0 45,213 1 905 290.9 0 31,740 1999 34,556 31,932 2000 0 45,213 1 905 290.9 1 37,40 1999 34,556 31,932 2000 0 33,656 39,356 297.2 1 36,160 1999 31,033 32,392 2001 0 38,056 297.2 297.2 2011 33,701 3 940 301.9 of 27,501 1999 27,613 27,613 30,424 1 947 301.9 of 27,501 1999 27,613 27,613 30,134 3 30.19 of 27,610 1999 27,613 20,030 20,112 30,134 3 940 301.2 of <td>42 Preston 32,000 2001 33,293 52,128 2001 CofF 54,234 1 894 287.6 987.6 43 Broadway 31,740 1999 45,213 0 45,213 1 905 290.9 44 US 3300 31,740 1999 33,565 31,932 2000 C of M 33,968 34,366 1 905 290.9 45 Benton Tap/Beht Line 28,610 1999 38,058 2001 C of D 33,701 1 916 293 30.55 45 Hampton 28,560 1999 32,761 30,172 30,172 1 947 306.5 907 917 917 917 917 917 917 917 916 297.2 916 916.5 910 916.5 910 916.5 910 916.5 910 916.5 910 916.5 910.5 916.5 910.5 916.5 910.5 916.5 910.5 916.5 910.5 916.5 910.5 910.5 910.5 910.5</td> <td>4</td> <td>1 Royal</td> <td>24,120</td> <td>1999</td> <td>26,108</td> <td>21,495</td> <td>2000</td> <td>C of D</td> <td>22,811</td> <td>26,108</td> <td>2</td> <td></td> <td></td> <td>ving intersections do not have comm; ignals being added at Love and at Los colinas</td>	42 Preston 32,000 2001 33,293 52,128 2001 CofF 54,234 1 894 287.6 987.6 43 Broadway 31,740 1999 45,213 0 45,213 1 905 290.9 44 US 3300 31,740 1999 33,565 31,932 2000 C of M 33,968 34,366 1 905 290.9 45 Benton Tap/Beht Line 28,610 1999 38,058 2001 C of D 33,701 1 916 293 30.55 45 Hampton 28,560 1999 32,761 30,172 30,172 1 947 306.5 907 917 917 917 917 917 917 917 916 297.2 916 916.5 910 916.5 910 916.5 910 916.5 910 916.5 910 916.5 910.5 916.5 910.5 916.5 910.5 916.5 910.5 916.5 910.5 916.5 910.5 910.5 910.5 910.5	4	1 Royal	24,120	1999	26,108	21,495	2000	C of D	22,811	26,108	2			ving intersections do not have comm; ignals being added at Love and at Los colinas
41,770 1999 45,213 1 906 290.9 31,326 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 31,336 32,336 34,356 1 916 2933 32,332 2000 C of M 33,806 2 2937 2936 2937 2936 2937 2032 20114 20144 21 940 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 20136 201316 201316 201316	43 Broadway 41/70 1999 45/213 1 906 290.9 1 1 906 290.9 1 1 1 906 290.9 1 <td>4</td> <td>2 Preston</td> <td>32,000</td> <td>2001</td> <td>33,293</td> <td>52,128</td> <td>2001</td> <td>CofF</td> <td>54,234</td> <td>54,234</td> <td>÷</td> <td></td> <td>287.6</td> <td></td>	4	2 Preston	32,000	2001	33,293	52,128	2001	CofF	54,234	54,234	÷		287.6	
31,740 1999 34,356 31,932 2000 C of M 33,286 1 916 293 35,160 1999 38,058 \sim 31,332 2000 C of M 33,968 2 929 297.2 28,670 1999 31,033 32,392 2001 C of D 33,701 3 940 301.9 27,360 1999 29,615 29,000 2001 TADOT 30,172 1 947 306.5 27,360 1999 27,450 27,613 20,172 30,172 1 947 306.5 27,500 1999 27,450 27,613 20,172 30,172 1 947 306.5 27,000 1999 27,213 2003 C of A 27,613 3 967 312.4 38,900 1999 42,704 40,755 2002 C of G 27,540 1 967 316.2 34,760 1999 37,625 2002 C of G	44 US 380 31,740 1999 31,356 31,335 2000 Cof M 33,866 3,356 1 916 293 2 45 Denton Tap/Belt Line 35,160 1999 30,58 2 929 297.2 46 Denton Tap/Belt Line 27,560 1999 31,033 32,392 2001 Cof D 33,701 33,701 30,192 30.19 47 Bethany 25,560 1999 27,613 2000 2001 TyDOT 30,172 1 940 301.9 48 Bethany 25,560 1999 27,613 2003 Cof A 27,613 27,613 30,126 30,126 40 Bethany 25,500 1999 27,513 2003 Cof A 27,613 30,136 366 30,26 40 Bethany 37,01 30,132 27,613 20,122 20,120 10,126 27,613 31,22 30,13 31,24 366 30,24 366 30,12 31,24 366 31,26 31,02 366 31,66	4	3 Broadway	41,770	1999	45,213				0	45,213	1		290.9	
35,160 1999 38,058 2 201 0 38,058 2 292 297.2 28,670 1999 31,033 32,392 2001 CvfD 33,701 3 940 3019 27,360 1999 31,033 32,392 2001 TxDOT 31,172 1 947 306.5 27,360 1999 27,450 27,613 2003 CvfA 27,613 3 946 317.4 25,560 1999 27,450 27,613 2003 27,613 3 967 316.5 27,900 1999 42,704 27,613 20,194 3 967 312.4 38,900 1999 47,210 20,02 CvfD 37,613 3 967 312.4 34,760 1999 37,625 2002 CvfD 27,540 1 996 37.10 33,301 1999 37,625 2002 CvfD 37,656 3 1,016 32.6	45 Denton Tap/Belt Line 35,160 1999 36,058 1 0 38,058 2 927.2 2 46 Hampton 28,670 1999 31,033 32,370 33,701 3 940 301.9 47 SH66 27,560 1999 27,613 2001 TxDOT 30,172 1 940 301.9 48 Bethany 25,360 1999 27,450 27,613 20,194 3 965 309.2 48 Bethany 27,501 1094 27,613 2003 26,16 2001 26,530 1095 27,540 1 30,194 31.6 310.2 50 Garamy Wisdom 17,560 1999 27,244 40,755 30,194 31.6 310.2 310.2 310.3 316.2 301.0 310.2 310.2 310.2 310.2 310.2 310.2 310.2 310.2 310.2 310.2 310.2 310.2 310.1 310.2 310.2	4	4 US 380	31,740	1999	34,356	31,932	2000	C of M	33,886	34,356	1		293	
$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	46 Hampton 28,670 1999 31,033 2.3,322 2001 Cof D 33,701 33,701 3 940 301.9 301.9 47 SH 66 27,360 1999 27,513 2001 TxDOT 30,172 1 947 306.5 309.2 48 Bethany 27,360 1999 27,450 27,613 2003 C of A 27,613 3 965 309.2 306.5 49 Camp Wridom 27,090 1999 27,204 40,755 2001 C of D 30,194 3 965 309.2 316.2 A 51 Division/Main 17,360 1999 27,204 40,755 2002 C of D 37,612 1 980 316.2 A 52 Galloway 33,530 1999 37,625 2002 C of D 37,626 3 1,016 326.7 53 Ionitheast Parkway 33,330 1999 37,625 501 27,540 3 1,021 329.7 A 53 Ion	4	5 Denton Tap/Belt Line	35,160	1999	38,058				0	38,058	2		297.2	
27,360 1999 29,615 29,000 2001 TxDOT 30,172 30,172 1 947 306.5 306.7 306.5 306.5 30	47 SH 66 27,360 1999 29,615 29,000 2001 TxDOT 30,172 1 947 306.5 306.5 48 Bethany 25,360 1999 27,450 27,613 2003 Cof A 27,613 3 955 309.2 309.2 49 Camp Wisdom 27,090 1999 27,203 2003 C of D 30,194 3 967 312.4 50 Garland Rd 38,990 1999 42,704 40,755 2002 C of D 31,194 3 316.2 51 Division/Main 17,360 1999 18,791 22,098 2002 C of D 31,504 1 986 316.2 52 Galloway 37,505 10 37,505 3 1016 327.0 101 326.1 53 Northeast Parkway 33,330 1999 36,77 51,025 2001 C of G 53,105 3 1,021 329.0 104 vit	4	6 Hampton	28,670	1999	31,033	32,392	2001	CofD	33,701	33,701	ო		301.9	
25,360 1999 27,450 27,613 2003 C of A 27,613 27,613 3 955 309.2 27,090 1999 29,333 29,022 20,01 C of D 30,194 3 957 312.4 38,990 1999 42,204 40,755 2002 C of D 41,570 42,204 1 960 316.2 37,560 1999 18,791 22,098 2002 C of GP 41,570 42,204 1 960 316.2 34,760 1999 37,625 2002 C of GP 27,540 1 960 32.7 33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329.7	48 Bethany 25,360 1399 27,450 27,450 27,513 3 955 309.2 309.2 49 Camp Wisdom 27,090 1399 27,450 27,613 3 955 309.2 309.2 50 Garland Rd 38,990 13999 29,223 2001 C of D 30,194 30,194 312.4 51 Division/Main 17,360 1999 42,204 40,755 2002 C of D 21,570 1 986 31.0 52 Galloway 34,760 1999 18,791 22,088 2002 C of G 27,540 1 996 31.0 53 Journeastic 33,7525 20 0 20 C of G 25,400 10.16 36.7 The signal at Crist is installed but not yet 53 Northeast Parkway 33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329.9 Partational 54 Northe	4	7 SH 66	27,360	1999	29,615	29,000	2001	TxDOT	30,172	30,172	1		306.5	
27,090 1999 29,723 29,022 2001 C of D 30,194 31 967 312.4 38,990 1999 42,204 40,755 2002 C of D 41,570 42,204 1 980 316.2 17,360 1999 18,791 22,098 2002 C of GP 22,540 1 996 31.0 34,760 1999 37,625 2002 C of GP 22,540 1 996 321.0 33,330 1999 37,625 2001 C of G 53,105 3 1,016 326.7	48 Camp Wisdom 27,090 1999 29,323 29,022 2001 C of D 30,194 3 967 312.4 50 Garland Rd 38,990 1999 42,204 40,755 2002 C of D 41,570 42,204 1 980 316.2 51 Division/Main 17,380 1999 42,204 40,755 2002 C of D 21,570 42,204 1 980 316.2 52 Galloway 34,760 1999 37,525 2002 C of G 23,105 3 1,016 326.1 104 194 104 <	4	8 Bethany	25,360	1999	27,450	27,613	2003	C of A	27,613	27,613	m		309.2	
38,990 1999 42,204 40,755 2002 C of D 41,570 42,204 1 980 316.2 17,360 1999 18,791 22,098 2002 C of GP 22,540 1 996 321.0 34,760 1999 37,625 2001 C of GP 22,540 1 996 321.0 33,330 1999 37,625 2001 C of G 53,105 3 1,016 326.7	50 Garland Rd 38,990 1999 42,724 40,755 2002 C of D 41,570 42,204 1 980 316.2 2002 10 20 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 21.0 22.0 21.0 21.0 22.0 22.5,40 1 996 32.1.0 21.0 22.0 22.5,540 23.6,7 22.0 22.0 23.6,7 22.0 22.6 23.6,7	4	9 Camp Wisdom	27,090	1999	29,323	29,022	2001	C of D	30,194	30,194	m		312.4	
17,360 1999 18,791 22,098 2002 C of GP 22,540 1 996 321.0 34,760 1999 37,625 27,626 27,647 37,625 3 1,016 326.7 33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329.1	51 Division/Main 17,360 1999 18,791 22,098 2002 C of GP 22,540 1 996 321.0 52 Galloway 34,760 1999 37,625 2002 C of GP 27,625 3 1,016 326.7 The signal at Crist is installed but not yet 53 Northeast Parkway 33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329 operational Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No	5	0 Garland Rd	38,990	1999	42,204	40,755	2002	CofD	41,570	42,204	1		316.2	
34,760 1999 37,625 1016 326.7 33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329	52Galloway34,760199937,62537,626037,62631,016326.7The signal at Crist is installed but not yet53Northeast Parkway33,330199936,07751,0432001C of G53,10531,021329operationalKey to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No	5	1 Division/Main	17,360	1999	18,791	22,098	2002	C of GP	22,540	22,540	t i		321.0	
33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329	53 Northeast Parkway 33,330 1999 36,077 51,043 2001 C of G 53,105 3 1,021 329 operational Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No	5	2 Galloway	34,760	1999	37,625				0	37,625	в		326.7	
	Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No	ۍ ۲	3 Northeast Parkway	33,330	1999	36,077	51,043	2001	CofG	53,105	53,105		1,021		he signal at Crist is installed but not yet perational

Area Measured Legender Leg	Attential Material Transit Transit Transit Transit Transit Material Material <t< th=""><th></th><th></th><th></th><th></th><th></th><th></th><th>n.</th><th>L</th><th></th><th></th><th></th><th></th><th></th><th></th><th></th><th></th></t<>							n.	L								
$ \begin{array}{c c c c c c c c c c c c c c c c c c c $						Arte Segn	111		ə	Meas Travel (Seco	ured Time inds)		sA) en	Avera Measu		9	
	First Centendia Caland Cal 1		sst or North Limit "A"	East or South Limit "B"			(seliM)	Я 98 оТ э үвН		ÅВ	B.A		тіт Іе veлT	A B		Per Mile	Per Signal
	Demott Buncee/Main Censer I a 14 2 5 6 0 <td></td> <td></td> <td></td> <td>Sarland</td> <td>4</td> <td>1.6</td> <td></td> <td></td> <td>229.5</td> <td>199.5</td> <td>145</td> <td>148%</td> <td>2.0</td> <td>1.0 (</td> <td></td> <td>88</td>				Sarland	4	1.6			229.5	199.5	145	148%	2.0	1.0 (88
wey EH360 Convert Grand Pranie 14 53 31 51 51.5 41.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7 81.9 11.7	www BH-3BC Convert Grand Praine 14 G 3 G 315 G 71 G 3 <thg 3<="" th=""> <thg 3<="" th=""> <thg 3<="" th=""></thg></thg></thg>		creek/Twin Creeks	Malone		14	4.2			558.0	556.0	469	119%	2.0			20
Run IH-SEC SH 342 Lancaster 7 3 7 3 7 3 7 3 7 3 7 3 7 3 7 1 1 2 2 0 0 Read Read Read Read Control Read Control 1 <th< td=""><td>Bin H-3E H-342 Lensiter 7 3 7 3 7 3 7 7 5 7 0</td><td></td><td></td><td>200</td><td>Srand Prairie</td><td>14</td><td>5,3</td><td></td><td></td><td>569.5</td><td>571.5</td><td>487</td><td>117%</td><td>4.0</td><td></td><td></td><td>25</td></th<>	Bin H-3E H-342 Lensiter 7 3 7 3 7 3 7 7 5 7 0			200	Srand Prairie	14	5,3			569.5	571.5	487	117%	4.0			25
out Ream Beam Beam <th< td=""><td>out Read Read Selection Selection</td></th<> <td></td> <td></td> <td></td> <td>ancaster</td> <td>7</td> <td>3.7</td> <td></td> <td></td> <td>431.5</td> <td>470.5</td> <td>373</td> <td>121%</td> <td>2.5</td> <td>- 2</td> <td></td> <td>36</td>	out Read Read Selection				ancaster	7	3.7			431.5	470.5	373	121%	2.5	- 2		36
eff Dalars North Tollway (courty Firsco 3 1.2 1.05 fie35 1.13 1.4% 1.0	eff Dials Number Count Effect 13 14 10 13 143 10 10 03 03 apply Dials Number Number Number 13 14 13 143 10 10 03 03 13 14 03 03 03 13 14 03 03 03 13			1	Sarland	ъ	1.7			171.0	200.5	130	143%	1.0		- C.	30
hey Jordan Wisen Creek Plowy Mc/mery 5 11 141.6 153.6 151.8 10.1 10	lbb lbb /lbb</th <thl>lbb lbb<!--/lbb</th--> <th< td=""><td></td><td>Tollway</td><td>101</td><td>Trisco</td><td>m</td><td>1.2</td><td></td><td></td><td>170.5</td><td>163.5</td><td>113</td><td>148%</td><td>1.0</td><td>1.</td><td></td><td>33</td></th<></thl>		Tollway	101	Trisco	m	1.2			170.5	163.5	113	148%	1.0	1.		33
gle IH-20 Santa Fe Duncanvile 8 22 2315 2865 200 125% 16 35 1 Amoutin Samuelli Samuelli Samuelli Samuelli Samuelli Samuelli 10 200 4810 565 16 10 20 Amoutin Sping Creak Phwy Allen Samuelli Sping Creak Phwy Allen 3730 4815 500 10 20 10 20 040 Add CR 196 Manale Pkwy Allen 13 25 27 135 110 10 10 10 070 Add Cark Hampton Duncamule 13 25 27 25 116% 15 10 070 Add Cark Hampton Duncamule 13 25 25 116% 15 16 10 10 10 10 10 10 10 10 10 10 10 10	gge H+20 Santa Fe Duncamile B 22 2315 2865 15 16 17<	Virginia Pkwy	2		McKinney	5	1.1			141.5	159.0	83	181%	1.0	1.13		20
				2000	Duncanville	ω	2.2			231.5	268.5	200	125%	1.5			31
					Dallas	15	5.0			490.0	481.0	505	96%	1.0	3	÷	07
			Main	225	Allen	ъ	3.4			373.0	453.5	330	125%	1.0		-	30
Road CR 196 Angel Pkwy Allen Ducamule 5 21 1 207.0 204.0 133 143% 1.0 1.5 0.0 and Clark Hampton Denton Undento 113 35 347.5 347.5 347.5 347.6	add CR 196 Angel Pkwy Allen 5 21 207 2040 143 10 15 0.60 0.20 and Clark Hampton Denton Denton Early of the control 207.0 235.5 54.7.5 24.8 10 15 0.60 0.73 0.23 eth Worth Dr Bruton Bruton Denton Southwest Pkwy Fort Worth 7 30 6.0 67.5 64.1 65.8 55 45 15 45 10 1				McKinney	4	2.5			239.0	258.5	222	112%	0.5		_	25
and Clark Hampton Duncanvile 17 4.8 16 5.4.5 5.4.5 5.4.5 5.4.5 5.4.5 5.4.5 5.4.5 5.0.5 5.0.0 2.0.0 0.0 Fut Worth Dr Sheman IH-35E Denton Suntyvale Duncanvile 13 2.5 6.4.5 5.5 6.0.5 5.0.15 5.0.15 0.0 Int BH Differson Southwest Pkwy Arington 7 3.0 5.5.5 60.4.0 5.7.0 4.5 NA Jefferson Cooper Great SW Pkwy Arington, Grand Praine 12 4.0 7.3 5.6.5 6.0.1 5.0 4.5 1.0 0.75 Jefferson Cooper Great SW Pkwy Arington, Grand Praine 12 4.0 7.3 5.0 4.5 1.0 0.75 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 0.5 <td>and Clark Hampton Duncamille 17 4.8 5.33 5.47.5 415 134% 3.5 4.0 0.78 0.75 For Worth Dr Sheman IH-35E Denton Summary IH-35E Denton Similar Juncles Juncles</td> <td></td> <td></td> <td></td> <td>Allen</td> <td>5</td> <td>2.1</td> <td></td> <td></td> <td>207.0</td> <td>204.0</td> <td>143</td> <td>144%</td> <td>1.0</td> <td>- 21</td> <td></td> <td>25</td>	and Clark Hampton Duncamille 17 4.8 5.33 5.47.5 415 134% 3.5 4.0 0.78 0.75 For Worth Dr Sheman IH-35E Denton Summary IH-35E Denton Similar Juncles				Allen	5	2.1			207.0	204.0	143	144%	1.0	- 21		25
Fort Worth Dr Sherman IH-36E Denton 13 25 1 273.5 253.5 253.7 106% 20 0 00 e Outhine Bnuton	Ent Worth Dr Sherman IH-3EE Denton Bouton Bouton Bouton Bouton Bouton Sumwale/Mesquite 13 25 10 20 22 0 20 0 20 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 10 20 20 10 20			n	Duncanville	17	4.8			563.5	547.5	415	134%	3.5			22
interm Cuthrine Bruton Suntwast Pkwy Fort Worth 16 60 670.5 611.5 551 116% 4.5 2.5 0.50 Intermotion Int-30 Southwest Pkwy Fort Worth 7 30 0 534.0 296 185% 5.5 4.5 NA Underson Great SW Pkwy Animption 12 4.0 555.5 604.0 537.0 539.6 5.6 4.5 1.0 Dake SE/SW Kelly-Flink NA Animption 12 3.1 2 7 3.1 2 6.04.0 533.0 5.96 4.5 4.5 1.6 Davie Etcl NA Southwest Pkwy Fort Worth 17 3.3 1 2 875.0 5.0 6.4.5 7.0 2.05 Southwest Pkwy Hir30 Fort Worth 17 3.3 1 2 837.0 2.96 4.5 4.5 1.59 Southwest Pkwy Mina Vista For	e concreti de la constant cons	e			Denton	13	2.5			279.5	253.5	252	106%	2.0			15
Initiation IH-30 Southwest Pkwy Fort Worth 7 30 660.0 534.0 296 185% 5.5 4.5 NA Jefferson Cooper Great SW Pkwy Adington 12 4.0 $5.5.5$ 604.0 372 152% 5.0 4.5 1.19 Oaks SE/SW Kelly-Elliott SH 360 Animation 748.5 604.0 372 152% 5.0 4.5 1.19 Oaks SE/SW Kelly-Elliott SH 360 Farat SW Pkwy Adington, Grand Prairie 12 4.0 7.48.5 604.0 372 156% 5.6 6.5 6.0 530 146% 5.0 5.6 6.5 6.5 6.0 530 146% 5.6 6.5 6.5 6.5 6.6 6.5	Indication Indication Southwest Pkwy Fort Worth 7 30 5600 5340 2565 6165 157 61 151 10 10 Udfreson Cooper Great SW Pkwy Adington 12 40 745.5 604.0 372 152% 50 45 1.90 0.40 Dh SeSESM Kelly-Inter Shado Shado 372 152% 50 45 1.90 0.40 Dh SeSESM Kelly-Inter Nud Nud 778 50 45 1.59 0.40 0.40 Dh Seses Kelly-Inter Nud Fort Worth 17 3 1 2 650 530 545 45 1.69 0.40 Dowe Suthwest Pkwy Mina Vista Hatom City, Watauga, Kell 9 2 24 154% 25 45 1.69 0.45 Dowe Suthwest Pkwy Mina Vista Fort Worth, Hatom City, Watauga, Kell 10 224 154%				Sunnyvale/Mesquite	16	6.0			670.5	611.5	551	116%	4.5			22
Jefferson Cooper Great SW Pkwy Arington 12 4.0 5.5.5 60.0 372 152% 5.0 4.5 119 Daks SE/SW Kelly-Elliott SH 30 Arington, Grand Prairie 12 6.6 $-$ 7.85 60.0 372 152% 6.0 6.5 1.95 Orth Group 3 (camp Bowie, etc.) NUA Fort Worth 17 3.3 1 2 285 60.0 633 154% 6.0 6.5 1.50 Owie SH 183 IH-30 Fort Worth 8 2.3 1 2 265 60.0 633 154% 5.0 6.7 2.05 7.0 2.05 Owie Sh 183 IH-30 Fort Worth, Haltom City, 10 2.5 7.0 2.45 2.0 1.5% 6.5 7.0 2.6 7.0 2.0 1.5% 0.7 1.5% 0.6 6.5 6.1 5.6 1.5% 0.6 6.5 6.1 5.6 6.1	Jefferson Cooper Great SW Pkwy Atington 12 4.0 52.5 614.0 37.2 15.2% 5.0 4.5 1.19 0.40 Jake SE/SW Keily-Elliott SH 360 Atington, Grand Praine 12 6.6 6.6 6.6 6.5 0.45 6.0 6.5 0.45 0.40 Owne NMA IN-30 Fort Worth 17 3.2 12.9 5.6 10.40 5.3 14.5% 6.7 2.6 0.45 6.7 2.6 0.40 6.4 1.79 0.40 Owne NMA IN-30 Fort Worth 17 2.2 2.97 397.0 2.39 156.% 5.7 2.9 0.45 0.45 0.45 Owne Southwest Pkwy Intervention 1 2.3 1 2.9 0.45 1.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45 0.45				Fort Worth	7	3.0			560.0	534.0	296	185%	5.5	12	1.33	71
	Dake SE/SW Kelly-Elliott SH 360 Arlington, Grand Prainie 12 66 748,5 804,0 530 146% 60 65 70 205 0.40 oth Group 3 (Camp Bowie, etc.) N/A Evt. Worth Evt. Worth 17 33 1 2 657.0 643.5 233 230% 6.5 7.0 2.05 0.40 30vie State Braadway Haltom City, Watauga, Ke 19 8.9 739.1 224 154% 2.5 4.5 1.59 0.44 inin Southwest Pkwy Mira Vista Fort Worth 10 2.5 240 50.0 633 156% 9.2 80.4 0.30 vinting Vista Fort Worth 10 2.5 740 50.0 633 156% 9.2 80.4 0.30 Min Net Net Net Net Net 10 2.5 54.1 1.55 0.45 1.55 0.45 1.55 0.45				Arlington	12	4.0			525.5	604.0	372	152%	5.0	-	-	40
orth Group 3 (Camp Bowie, etc.) N/A N/A Fort Worth 17 33 1 2 657.0 643.5 283 230% 6.5 7.0 2.05 4.5 1.59 Jowie SH 183 IH-30 Fort Worth 8 2.2 24.5 397.0 224 154% 2.5 4.5 1.59 Jowie Keller-Hicks Broadway Haltom City, Watauga, Kel 19 8.9 $1.109.5$ 1.079.0 693 158% 9.2 8.0 0.97 Initial Visita Fort Worth, Haltom City, 10 2.5 0 224.0 504.0 2.22 180% 1.5 4.5 N/A Southwest Pkwy Mira Vista Fort Worth, Haltom City, 10 2.5 2.4.0 504.0 2.22 180% 1.5 4.5 N/A Southwest Pkwy State Fort Worth, Haltom City, 10 2.5 7.20 5.5 1.5 1.5 Soldspevine Hwy Shama Bardin Animaton	orth Group 3 (Camp Bowie, etc.) N/A M/A Fort Worth 17 33 1 2 667.0 643.5 230% 6.5 7.0 2.06 0.44 Jowie Sh1B3 IH-30 Fort Worth B 2.2 1 294.5 397.0 224 154.% 2.5 4.5 1.59 0.44 Jowie Keller-Hicks Broadway Haltom City, Watauga, Kell 19 8.9 10.109.5 10.700 683 158% 9.2 80 0.34 0.34 Min Southwest Pkwy Mira Vista Fort Worth, Haltom City, 10 2.5 10.109.5 10.70 2.25 156 1.5 1.5 1.6 0.30 Vistapewine Hwy Southwest Pkwy Mira Vista NRH 10 2.5 7.4 1.55 4.5 1.15 0.30 Mathematic NRH NRH 10 5.2 7.4 1.56 5.5 1.15 0.30 Mathematic Mathematic 1.5 </td <td></td> <td></td> <td>20</td> <td>Arlington, Grand Prairie</td> <td>12</td> <td>6.6</td> <td></td> <td></td> <td>748.5</td> <td>804.0</td> <td>530</td> <td>146%</td> <td>6.0</td> <td></td> <td></td> <td>52</td>			20	Arlington, Grand Prairie	12	6.6			748.5	804.0	530	146%	6.0			52
Bowie SH 183 IH-30 Fort Worth 8 22 1 294.6 397.0 224 154% 2.5 4.5 1.59 Noise Keller-Hicks Broadway Haltom City, Watauga, Kel 19 89 1 1,109.5 1.079.0 633 158% 9.2 8.0 0.97 Min Southwest Pkwy Mira Vista Fort Worth, Haltom City, 10 2.5 1 1079.0 633 158% 9.2 8.0 NA Southwest Pkwy Mira Vista Fort Worth, Haltom City, 10 2.5 742.0 793.0 433 156% 6.5 5.5 1.15 Southwest Pkwy Stanta Bardin Almagon 12 4.4 10 52.0 742.0 739.0 433 156% 5.5 1.15 Main Abram Bardin Almagon 15 5.1 4.4 10 52.0 530.0 531.6 5.5 5.5 1.15 Main Bowe	Bowie SH 183 IH-30 Fort Worth 8 2.2 2.94.5 397.0 2.24 1.54% 2.5 4.5 1.59 0.44 0.45 Nim Keller-Hicks Broadway Haltom City, Watauga, Kell 19 8.9 1,109.5 1,079.0 8.93 1.56% 4.5 1.04 0.45 No Southwest Pkwy Mira Vista Fort Worth, Haltom City, 10 2.5 742.0 7.93 1.66% 6.5 1.15 0.46 No Bardin Animation 10 5.2 7.42.0 7.93 1.65% 6.5 1.15 0.66 6.5 1.15 0.66 No Bardin Animation 10 5.2 7.42.0 7.93 1.65% 6.5 5.5 1.25 0.46 Main Devision/Main Fainont 12 4.4 5.910 7.5 7.5 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75 0.75)	N/A		Fort Worth	17	3.3	-	2	657.0	643.5	283	230%	6.5		_	-
Keller-Hicks Broadway Haltom City, Watauga, Kel 19 8.9 1,109.5 1,079.0 693 158% 9.2 8.0 0.97 Ivin Southwest Pkwy Mira Vista Fort Worth, Haltom City, Watauga, Kel 10 2.5 294.0 504.0 222 180% 1.5 4.5 N/A Softweet Pkwy Mira Vista Fort Worth, Haltom City, 10 2.5 742.0 799.0 693 156% 6.5 5.5 1.15 4.5 N/A Softapevine Hwy Sylvania Rufe Snow NRH 10 5.2 742.0 799.0 493 156% 6.5 5.5 1.15 Softapevine Hwy Abram Bardin Arlington 12 4.4 583.0 521.5 381 145% 5.5 1.25 Main Division/Main Fairment Grand Prairie 15 5.1 570 172% 570 770 770 770 770 770 770 770 770	Initiation Keller-Hicks Broadway Hattom City, Watauga, Kell 19 8.9 1,109.5 1,079.0 693 168% 9.2 8.0 0.97 0.45 Nim Southwest Pkwy Mira Vista Fort Worth, 10 2.5 294.0 504.0 222 180% 9.5 6.5 1.15 0.46 0.30 3/Grapewine Hwy Swithwest Pkwy Mira Vista Fort Worth, Haltom City, 10 5.2 742.0 739.0 433 156% 5.5 5.5 1.25 0.46 Mouthwest Pkwy Bandin Anington 12 4.4 583.0 515.5 3.55 1.25 0.46 5.7 0.75 0.45 5.5 1.75 0.46 Minan Bandin Fainmett Alingtion 12 4.4 583.0 517.5 3.61 1.75% 5.5 1.75 0.46 Main Division/Main Fainmett Alingtion 1.5 4.4 581.0 575 3.61 1.76<	1		0.50	Fort Worth	ω	2.2			294.5	397.0	224	154%	2.5			44
Invin Southwest Pkwy Mira Vista Fort Worth 10 2.5 10 2.9 0.4.0 2.22 180% 1.5 4.5 NA % Grapevine Hwy Symania Fort Worth, Hattom City, 1 2 2 29.0 29.0 29.0 29.0 5 5 1.15 5 5 1.15 5 5 1.15 5 5 1.15 5 5 1.15 5 5 1.15 5 5 1.15 5 5 1.15 5 5 5 5 1.15 5 5 5 5 1.15 5 5 5 5 1.15 5 5 1.25	Invinc Southwest Pkwy Mira Vista Fort Worth, Haltom City, 10 25 0 294.0 604.0 222 180% 1.5 4.5 N/A 0.30 N/A N/A <th< td=""><td></td><td></td><td></td><td>Haltom City, Watauga, Kel</td><td>19</td><td>8.9</td><td></td><td></td><td>1,109.5</td><td>1,079.0</td><td>693</td><td>158%</td><td>9.2</td><td></td><td>and a</td><td>45</td></th<>				Haltom City, Watauga, Kel	19	8.9			1,109.5	1,079.0	693	158%	9.2		and a	45
y Event Market Mar	Year is by brania Four Worth, Haltom City, Iso 10 5.2 742.0 799.0 493 156% 6.5 6.5 1.15 0.16 Adviant Brufe Advington 12 4.4 583.0 521.5 381 145% 5.5 1.25 0.46 Adviant Advington 12 4.4 583.0 521.5 381 145% 5.5 5.5 1.25 0.46 Obvision/Main Fairmont 15 6.1 910 581.0 4.4 175% 5.5 5.5 0.75 0.46 Devision/Main Fairmont 15 6.1 782.0 772.5 5.70 136% 5.0 136 0.37 0.38 Devision/Main Great SWey Adington 15 6.1 772.5 5.70 136% 5.0 10.47 0.38 Paire Chart Line Haltorn City, NRH 13 4.1 627.0 533.5 338 172% 7.5 4.0 1.40 0.44	Irvin	'kwy		Fort Worth	6	2.5			294.0	504.0	222	180%	1.5		5.5	30
Abram Bardin Arlington 12 4.4 583.0 521.5 381 145% 5.5 5.1 125 Division/Main Fairmont Grand Prairie 15 5.1 919.0 581.0 424 177% 4.5 3.5 0.78 Bowen Great SW Pkwy Arlington 16 6.2 722.0 772.5 570 136% 5.0 7.0 0.97	Abram Bardin Arlington 12 4.4 583.0 51.5 381 145% 5.5 1.25 0.46 Division/Main Fairmont Grand Prairie 15 5.1 15 5.6 1.25 0.78 5.5 1.25 0.46 7.5 0.78 5.5 1.25 0.78 0.27 0.27 Division/Main Fairmont Great SW Pkwy Arlington 16 6.2 782.0 772.5 570 7.5 4.0 1.40 0.44 V Rufe Snow Precinct Line Halton City, NRH 13 4.1 627.0 533.5 338 172% 7.5 4.0 1.40 0.44 Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently)	apevine Hwy		1000	⁻ ort Worth, Haltom City, VRH	10	5.2			742.0	799.0	493	156%	6.5			8
Division/Main Fairmont Grand Prairie 15 5.1 19.0 581.0 424 177% 4.5 3.5 0.78 Bowen Great SW Pkwy Admintson 16 6.2 72.0 772.5 570 133% 5.0 70 0.97	Division/Main Fairmont Grand Prairie 15 5.1 15 5.1 17.0 4.5 3.5 0.78 4.5 3.5 0.78 0.27 0.27 Bowen Great SW Pkwy Arlington 16 6.2 782.0 772.5 570 136% 5.0 7.0 0.37 0.38 y Rufe Snow Precinct Line Haltom City, NRH 13 4.1 627.0 533.5 338 172% 7.5 4.0 1.40 0.44 rype: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently)	20 			Arlington	12	4.4			583.0	521.5	381	145%	5.5	-		46
Bowen Great SW Pkwy Avlington 16 6.2 782.0 772.5 570 136% 5.0 7.0 0.97	Bowen Great SW Pkwy Artington 16 6.2 782.0 772.5 570 136% 5.0 7.0 0.37 0.38 ewine Hwy Rufe Snow Precinct Line Haltom City, NRH 13 4.1 627.0 533.5 338 172% 7.5 4.0 1.40 0.44 og System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently		u		Srand Prairie	15	5.1			919.0	581.0	424	177%	4.5	10.0		27
	evine Hwy Rufe Snow	142 25		200	Arlington	16	6.2			782.0	772.5	570	136%	5.0		1.00	38
Rute Snow Precinct Line Itation Uity, NRH 13 4.1 16 627.U 533.5 338 172% 7.5 4.U 1.4U	Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently	evine Hwy	26	Line	Haltom City, NRH	13	4.1			627.0	533.5	338	172%	2.5	- 8		44

$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	From NCTOOG 1999 Volumes More Recent Count If Available ADT Noture Noture ADT Noture Not Note Not Note Note Not Note Note Not Note Note Note Note Note Not Not Not					Volume Data	e Data						02	
			From NCT Unless I	rcog 1999 Later Year	Volumes is Noted	More	e Recent Co	ount If Avail:	able	ADT	em Type	Cumulative Signals an of Corri	No. of 3 Miles dor	
Miller 15160 1999 16,410 7 10 15,110 3 1,025 339.0 Miller Miller 2003 36,110 2003 16,410 21,540 2 1,026 334.0 Parer PNNy 35,116 2003 36,118 2003 26,449 2002 C r r r 21,540 2 1,026 34.33 Parer PNNy 35,101 1999 28,943 202 C r r r 0 21,540 3 1,026 34.33 Row 31,121 3990 1999 28,943 2002 C r r r 0 25,563 3 1,016 34.56 Cvignia PNNy 25,502 1999 26,469 2002 C r r r 2,459 3 1,016 34.56 Cvignia PNNy 25,502 1999 1996 35,03 3 1,101 36.03 Cvignia PNNy 25,502 1999 26,503 3 1,110 36.105 3 1,101 36.103		Arterial	ADT Volume	Year	Volume Adjusted to 2003	Newer ADT Volume	Year	Source	Volume Adjusted to 2003	Volume Used For Ranking	100 D0040		_ength (Miles)	Comments
Main/McDemoth 36,618 34,773 32,033 36,618 2 1,033 33,618 34,733 36,18 34,733 36,18 34,733 36,18 34,733 36,18 34,733 36,183 34,134 34,134 <td></td> <td>54 Miller</td> <td></td> <td>1999</td> <td>16,410</td> <td></td> <td></td> <td></td> <td>0</td> <td>16,410</td> <td>m</td> <td>1,025</td> <td>330.6</td> <td></td>		54 Miller		1999	16,410				0	16,410	m	1,025	330.6	
Carrier PkwyZe, 190199028, 349Z7, 584Z02C or GPZ8, 238Z8, 349Z1, 050343Plaesart Run19, 0019, 9021, 54021, 54031, 000345345Main Street13, 567200114, 260777021, 54031, 000345Main Street13, 567200114, 260777021, 54031, 000345Main Street13, 567200114, 26014, 26010026, 45931, 010366365Main Street15, 560199925, 45940, 9662001C or D26, 45931, 100366Main Street25, 561199925, 49010, 30340, 9662001C or D26, 49331, 100366Jubler2, 5, 10199929, 27, 8240, 966200214, 77200214, 773073737Jubler2, 44020, 10199925, 7610, 7026, 5631, 105367367Jubler2, 441199920, 1010, 3014, 77200214, 77301373737Jubler2, 44119992, 20232, 2, 2719992, 2721, 103633636Jubler2, 44119992, 3719992, 3719993, 11, 1037373737 <td></td> <td>55 Main/McDermott</td> <td>35,618</td> <td>2003</td> <td>35,618</td> <td>34,773</td> <td>2003</td> <td>C of A</td> <td>34,773</td> <td>35,618</td> <td>2</td> <td>1,039</td> <td>334.8</td> <td></td>		55 Main/McDermott	35,618	2003	35,618	34,773	2003	C of A	34,773	35,618	2	1,039	334.8	
Desant Run19.0019.9021.5.4021.5.4021.5.4031.0.0034.5Norder Road23.300199925.892201026.892310.06534.5Norder Road23.5.00199925.4957711110.0534.5Norder Road23.5.00199925.49577111111Norder Road23.5.00199925.49577111<		56 Carrier Pkwy	26,190	1999	28,349	27,684	2002	C of GP	28,238	28,349	2	1,053	340.1	
Owdert Road 23,920 1999 25,802 34 1005 345.7 Main Street 13,847 2001 14,260 30 10,25,892 3 10,06 346.7 Vain Street 23,500 1999 28,649 3 10,06 36,10 399 36,00 399 36,00 399 36,00 399 36,00 399 36,00 </td <td></td> <td>57 Pleasant Run</td> <td>19,900</td> <td>1999</td> <td>21,540</td> <td></td> <td></td> <td></td> <td>0</td> <td>21,540</td> <td>e</td> <td>1,060</td> <td>343.8</td> <td></td>		57 Pleasant Run	19,900	1999	21,540				0	21,540	e	1,060	343.8	
Min Street 13,67 2001 14,260 24,92 26,443 3 10,68 34,67 Virginia Pkwy 23,550 1999 26,443 7 10 26,443 3 10,73 35,70 Order Fildle 25,640 1999 26,443 7 10 26,433 3 10,13 36,10 Order Fildle 25,610 1999 25,430 14,70 7 2 2,223 3 1,101 366,43 3 1,101 36,0 Upter 27,610 1999 25,718 27,611 14,757 2002 6,764 2,613 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,101 366,43 3 1,112 367,43 3 1,121 367,43 3 1,121		58 Rowlett Road	23,920	1999	25,892				0	25,892	e	1,065	345.5	
Virginia Pkwy23,520199925,45931073347.8Cubrer26,610199928,64340,9652001026,80431,061360.0Cubrer11,00020029,32340,9652001026,80431,101363.4Upter10,01020039,32340,96527,61014,7672002026,81331,101363.4Upter27,610199929,77627,6312002C of M28,18429,77831,101363.4Stev Road9,9002001109925,73332,7241999C of M28,18429,77831,101363.4Stev Road9,9002001109925,33332,2741999C of M28,18429,77831,101363.4Stev Road9,000109925,33332,2741999C of De20,1461,70231,101363.4Stev Road27,850199920,1467026,92331,105367.331,105367.3Stev Road27,850199927,790199927,790199927,79011991196Stev Road27,850199927,190199927,190119911191Stev Road27,850199927,190199927,1901427111Stev		59 Main Street	13,697	2001	14,250				0	14,250	m	1,068		Signals widely spaced
Cedar RidgeZ6, Eq.199928, B04 \rightarrow \rightarrow 0 28, B04 3 $1, 081$ 350.0 Dicknet15, 630199915, 630199915, 630199915, 6312001 $0, 10$ $2, 64.2$ 1 $1, 096$ 355.0 Uptication27, 510199027, 5132002 $0, 17$ $2, 10.2$ $2, 10.1$ 30.3 $31, 10.1$ 363.0 Stary Road9, 900201110, 300 $14, 15$ 2002 $0, 14, 15$ $20, 23, 23.3$ $31, 110^2$ 363.0 Stary Road9, 9002010199925, 303 $14, 156$ 2002 $0, 150.02$ $34, 334$ $21, 1140$ 370.3 Stary Inform23, 450199925, 303 $32, 233$ $14, 156^7$ 2002 $0, 150.02$ $34, 10.1$ 363.0 Start Under20, 400199925, 199 $14, 156^7$ 2002 $0, 1690$ $32, 10.1$ 363.0 Start Under $30, 40, 10^7$ $10, 10^2$ $32, 233$ $32, 11, 10^7$ 363.0 Start Worth Group 3 (Camp Bowie, etc.) N/A N/A N/A N/A N/A N/A 1909 $32, 106$ $32, 106$ $32, 106$ $32, 106$ Start Worth Group 3 (Camp Bowie, etc.) N/A N/A N/A N/A N/A N/A 10^7 $31, 127$ 367.0 Start Worth Group 3 (Camp Bowie, etc.) N/A N/A N/A N/A N/A 10^7 $21, 140$ 37.16 37.16 <t< td=""><td></td><td>60 Virginia Pkwy</td><td>23,520</td><td>1999</td><td>25,459</td><td></td><td></td><td></td><td>0</td><td>25,459</td><td>m</td><td>1,073</td><td>347.8</td><td></td></t<>		60 Virginia Pkwy	23,520	1999	25,459				0	25,459	m	1,073	347.8	
Unchner 15,690 1999 16,983 40,966 2001 C of D 42,642 1 1,096 355.0 Unpler 9,140 2002 9,323 20 2,642 1 1,096 356.0 Eldor Rodd 9,100 2001 10,907 2,751 10,907 2,761 36.10 365.0 Eldor Rodd 9,900 2001 10,909 25,383 2 1,106 365.0 Second/Fort Worth Dr 20,400 1999 25,383 3 1,27 367.8 Second/Fort Worth Dr 20,400 1999 25,383 3 1,36 370.3 Second/Fort Worth Dr 20,400 1999 2,327 1 109 2 7 7 Second/Fort Worth Dr 20,410 1999 2,327 1<		61 Cedar Ridge	26,610	1999	28,804				0	28,804	ß	1,081	350.0	
Uptiert 0,140 2002 9,233 27,01 1,036.4 36.101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.4 36.1101 368.101111111 368.1011111111 <t< td=""><td></td><td>62 Buckner</td><td>15,690</td><td>1999</td><td>16,983</td><td>40,986</td><td>2001</td><td>C of D</td><td>42,642</td><td>42,642</td><td>1</td><td>1,096</td><td>S</td><td>Actual speeds well in excess of posted</td></t<>		62 Buckner	15,690	1999	16,983	40,986	2001	C of D	42,642	42,642	1	1,096	S	Actual speeds well in excess of posted
Eldorado 27,510 1999 27,761 17,05 27,610 3900 2001 10,300 14,767 2002 Cof M 28,184 29,778 3 1,105 363.0 Stacy Road 9,900 2001 10,300 14,767 2002 Cof M 28,194 2 1,105 363.0 Anhertand 2,346 1999 2,26,33 3 2,202 City of A 15,062 1 1,105 363.0 Anhertand 2,346 1999 2,26,33 3 2,274 1999 2,779 1 110 363.0 Antoriber 20,340 1999 2,779 1999 2,274 1999 2,779 1 160 376.3 Antoriber 27,850 1999 30,146 10 1999 2,116 10 2 7 70 Antoriber 27,850 1999 30,146 10 10 2,126 10 136.0 136.3 16 16 136.		63 Jupiter	9,140	2002	9,323				0	9,323	e	1,101	358.4	
Stacy Road 9,900 2001 10,300 14,767 2002 City of A 15,062 3 1,110 363.0 Mheatland 23,450 1999 25,383 $$ $ $		64 Eldorado	27,510	1999	29,778	27,631	2002	C of M	28,184	29,778	m	1,105	360.9	
Mheatland 23,450 1999 25,383 3 1,127 367.8 3 CarnollFort Worth Dr 20,400 1999 22,082 32,774 1999 C of Den 34,934 2 1,400 370.3 Bit Line $30,420$ 1999 32,928 \sim		65 Stacy Road	9,900	2001	10,300	14,767	2002	City of A	15,062	15,062	ო	1,110	363.0	
CarnollyFort Worth Dr $20,400$ 1999 $22,082$ $32,274$ 1999 $C \sigma f Den$ $34,934$ 2 $1,140$ 370.3 Belt Line $30,420$ 1999 $32,928$ $22,928$ $22,928$ $21,146$ $27,79$ 2 7 70 Bytart-Inkin $21,860$ 1999 $30,146$ $72,938$ $19,146$ $27,79$ 70 $37,739$ 17 70 Abrark-Iefferson $21,440$ 1999 $30,146$ $77,79$ 70 $37,779$ 17 70 Abrark-Iefferson $23,280$ 1999 $32,116$ NA NA NA NA $73,833$ 1 47 19.1 Carth Worth ScrE/SW $23,280$ 1999 $25,199$ NA NA NA NA NA $73,833$ 1 47 19.1 Carth Worth ScrE/SW $23,280$ 1999 $27,116$ NA NA NA NA NA NA $73,833$ 1 47 71.6 Safty Bowie $41,920$ 1999 $32,116$ NA NA NA NA NA $23,301$ $24,951$ $28,67$ Safty Bowie $42,330$ $12,330$ $23,330$ $12,330$ $24,340$ $24,340$ $24,940$ <t< td=""><td></td><td>66 Wheatland</td><td>23,450</td><td>1999</td><td>25,383</td><td></td><td></td><td></td><td>0</td><td>25,383</td><td>ო</td><td>1,127</td><td>367.8</td><td></td></t<>		66 Wheatland	23,450	1999	25,383				0	25,383	ო	1,127	367.8	
Belt Line $30,420$ 1999 $32,928$ $32,928$ $31,156$ 376.3 376.3 Byant-Inin $27,890$ 1999 $30,146$ 2 7 70 Atram/Lefferson $44,140$ 1999 $30,146$ 7 0 $30,146$ 2 7 70 Atram/Lefferson $44,140$ 1999 $47,779$ 1 31 16.9 316.6 Forem Oaks SE/SW $23,280$ 1999 $25,199$ $32,116$ NA NA NA NA NA 70 316.6 376.5 For Worth Group 3 (Camp Bowie, etc.) NVA N/A N/A N/A N/A N/A 70 316.6 376.5 Camp Bowie $23,790$ 1999 $32,116$ N/A N/A N/A N/A 70 $32,16$ 376.5 306.5 Sam Particitic $42,330$ $12,330$ $12,330$ $12,320$ $32,46$ 36.7 30.5 <td></td> <td>67 Carroll/Fort Worth Dr</td> <td>20,400</td> <td>1999</td> <td>22,082</td> <td>32,274</td> <td>1999</td> <td>C of Den</td> <td>34,934</td> <td>34,934</td> <td>2</td> <td>1,140</td> <td></td> <td>Actual speeds well in excess of posted</td>		67 Carroll/Fort Worth Dr	20,400	1999	22,082	32,274	1999	C of Den	34,934	34,934	2	1,140		Actual speeds well in excess of posted
Bryant-Invin 27 (BD 1999 30,146 N 0 30,146 2 7 7.0 Attram/lefferson $44,140$ 1999 $47,779$ 1 19 136 136 Term/lefferson $44,140$ 1999 $47,779$ 1 7 7 7.0 Term Dake SE/SW $23,280$ 1999 $25,199$ NA NA NA 7 7 7 7 7.0 Term Dake SE/SW $23,280$ 1999 $32,116$ NA NA NA 7 7 7 7 70 16.9 136 Saft SE/SW $29,321$ 1999 $32,116$ NA NA NA 7 7 7 7 28.0 19.1 16.9		68 Belt Line	30,420	1999	32,928				0	32,928	m	1,156	376.3	
Abram/Lefferson $44,140$ 1999 $47,779$ $47,779$ 1 19 13.6 Other Morth Group 3 (Camp Bowie, etc.) NA NA NA NA NA NA NA NA NA $73,933$ 1 47 19.1 Cant Worth Group 3 (Camp Bowie, etc.) NA NA NA NA NA NA NA $73,933$ 1 47 19.1 Camp Bowie $29,70$ 1999 $32,116$ NA NA NA $73,933$ 1 47 19.1 Camp Bowie $42,330$ 1999 $32,116$ NA NA NA $73,933$ 1 47 19.1 Camp Bowie $41,930$ 1999 $32,116$ NA NA $73,933$ 1 47 19.1 Camp Bowie $41,930$ 1999 $32,116$ NA NA $73,933$ 1 47 19.1 Balknap/Grapewine Hwy $21,300$ 1999 $45,45$		69 Bryant-Iwin	27,850	1999	30,146				0	30,146	2	7	7.0	
Tenen Oaks SE/SW 23,280 1999 25,199 N/A N/A N/A N/A N/A N/A N/A 73,833 1 47 19.1 Cart Worth Group 3 (Camp Bowie, etc.) N/A N/A N/A N/A N/A N/A N/A 73,833 1 47 19.1 Camp Bowie 29,670 1999 32,116 N N/A N/A 73,833 1 57 28.0 JS377 29,670 1999 32,116 N N N N 73,833 1 57 28.0 JS377 29,570 1999 42,330 42,330 1999 $45,451$ 0 $42,330$ 3 74 $30,5$ JSant-Join 41,990 1999 45,451 0 $61,977$ 0 $42,330$ 74 $30,5$ JSant-Join 41,990 1999 $45,451$ 0 $61,977$ 2 84 $40,1$ JSant-Join 38,709 1999 $27,924$ 1999 $24,994$ 1 1 1 1 <		70 Abram/Jefferson	44,140	1999	47,779				0	47,779	1	19	1	New system under other TIP project
mmp Bowie, etc.) N/A N/A N/A N/A N/A N/A N/A 73,833 1 47 19.1 29,670 1999 37,116 N N N 0 32,116 1 55 28.0 42,330 2003 $42,330$ 32,116 N N 0 $42,330$ 3 74 30.5 41,990 1999 $45,451$ N N 0 $42,330$ 3 74 36.7 7 23,790 1999 $45,451$ N N 0 $42,330$ 3 74 36.7 7 38,780 1999 $45,97$ N N 0 $41,977$ 2 106 45.2 7 38,780 1999 $21,976$ N N 0 $20,328$ 1 127 $51,4$ 7 38,780 1999 $21,994$ 20,328 1 127 $55,6$ 82,990 1999	72 Fort Worth Group 3 (Camp Bowie, etc.) N/A N/A N/A N/A N/A 73,B33 1 47 19.1 67 19.1 73 Camp Bowie, etc.) N/A N/A N/A N/A N/A N/A 73,B33 1 47 19.1 Felimed as West Pilot Project; consider for 73 Camp Bowie 42,330 2003 32,116 1 55 28.0 Felimed as West Pilot Project; consider for 74 US377 A 41,990 45,451 2 84 30.5 upgrade to closed-loop system 75 Bryant-Invin 38,780 1999 45,451 2 84 30.5 upgrade to closed-loop system 76 Belknap/Crapewine Hwy 23,790 1999 41,977 2 84 40.1 40.1 45.5 106 45.2 106 45.2 106 107 2 105 107 2 106 45.2 106 45.2 106 45.2 106 45.2 106 45.2 106 45.2 106 45.2 106 45.2	71 Green Oaks SE/SW	23,280	1999	25,199				0	25,199	1	31	16.9	
29,670 1999 $32,116$ 1 56 28.0 $42,330$ 2003 $42,330$ 203 $42,330$ 3 74 305 $41,990$ 1999 $45,451$ 2 84 35.7 $41,990$ 1999 $45,451$ 2 84 35.7 78 $23,790$ 1999 $25,751$ 0 $47,971$ 2 84 40.1 $78,780$ 1999 $41,977$ 0 $41,977$ 2 106 45.2 $18,780$ 1999 $20,328$ 0 0 $20,328$ 1 127 51.4 $72,259$ 1999 $20,328$ 0 0 $24,094$ 1 137 55.5 700 $22,259$ 1999 $25,709$ 3 150 54.5 700 $20,94$ 0 0 $24,994$ 1 137 55.5 700 100	73 Camp Bowie 29,670 1999 32,116 1 55 28.0 Retired as West Pilot Project; consider for Retired as West Project; consider for Retired as West Pilot Project; consider for Retired as West Pilot Project; consider for Retired a	72 Fort Worth Group 3 (Camp Bowie, etc.)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	73,833	1	47	19.1	
42,330 2003 42,330 42,330 3 74 30.5 41,990 1999 45,451 2 84 35.7 23,790 1999 25,751 3 94 40.1 38,780 1999 41,977 2 106 45.2 18,780 1999 24,994 0 20,328 1 121 51.4 22,259 1999 24,094 0 24,094 1 137 55.5 22,259 1999 35,709 35,709 0 35,709 3 150 55.5	74 US 377 42,330 2003 42,330 42,330 3 74 30.5 Retimed as West Pliot Project; consider for system 75 Bryant-Invin 41,990 1999 45,451 2 84 35.7 upgrade to closed-loop system 76 Belknap/Crapewine Hwy 23,790 1999 25,751 0 45,451 2 84 30.7 upgrade to closed-loop system 77 Collins 23,790 1999 25,751 3 94 40.1 1 17 106 45.2 106 45.2 106 14,97 2 106 45.2 106 45.2 106 14,97 2 106 45.2 106 45.2 106 45.2 106 45.2 106 45.2 106 14,97 106 <td< td=""><td>73 Camp Bowie</td><td>29,670</td><td>1999</td><td>32,116</td><td></td><td></td><td></td><td>0</td><td>32,116</td><td>1</td><td>55</td><td>28.0</td><td></td></td<>	73 Camp Bowie	29,670	1999	32,116				0	32,116	1	55	28.0	
41,990 1999 45,451 2 84 35.7 23,790 1999 25,751 3 94 40.1 38,780 1999 41,977 0 25,751 3 94 40.1 18,780 1999 41,977 0 24,1977 2 106 45.2 18,780 1999 20,328 0 41,977 2 106 45.2 22,259 1999 24,094 0 24,094 1 137 55.6 32,990 1999 35,709 35,709 3 150 56.5	75 Bryant-Irvin 41,990 1999 45,451 2 84 35.7 35.7 76 Belknap/Grapewine Hwy 23,790 1999 25,751 3 94 40.1 77 Collins 38,780 1999 24,977 2 106 45.2 77 Collins 38,780 1999 24,094 20,328 1 121 51.4 78 Great Southwest Pkwy 18,780 1999 20,328 0 24,094 1 173 55.5 New system under other TIP project 78 Division/Main 22,299 1999 24,094 0 24,094 1 137 55.5 New system under other TIP project 80 Belknap/Grapewine Hwy 32,990 1999 35,709 0 3 150 64.5 New system under other TIP project 80 Belknap/Grapewine Hwy 32,990 1999 35,709 3 150 64.5 New system under other TIP project 80 Belknap/Grapewine Hwy 32,990 10 3 150 64.5 New system under other	74 US 377	42,330	E002	42,330				0	42,330	m	74		Retimed as West Pilot Project; consider for upgrade to closed-loop system
(*) 23,790 1999 26,751 3 94 40.1 38,780 1999 41,977 2 106 45.2 18,780 1999 21,977 2 106 45.2 18,780 1999 20,328 1 121 51.4 22,259 1999 24,094 0 24,094 1 137 56.5 7 32,990 1999 35,709 35,709 3 150 64.5	76 Belknap/Grapevine Hwy 23,790 1999 25,751 3 94 40.1 7 Collins 38,780 1999 41,977 0 41,977 2 106 45.2 7 Collins 38,780 1999 41,977 0 41,977 2 106 45.2 7 Collins 20,328 0 20,328 0 107 51.4 56.5 New system under other TIP project 7 Division/Mane 22,259 1999 24,094 0 24,094 1 137 55.6 New system under other TIP project 80 Belknap/Grapevine Hwy 32,990 1999 35,709 0 3,5,709 3 150 64.5 New system under other TIP project 80 Belknap/Grapevine Hwy 32,990 1999 35,709 3 150 64.5 New system under other TIP project 80 Pstring System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No	75 Bryant-Iwin	41,990	1999	45,451				0	45,451	2	84		
38,780 1999 41,977 2 106 45.2 18,780 1999 20,328 1 17 2 106 45.2 18,780 1999 20,328 1 12 51.4 51.4 22,259 1999 24,094 1 137 55.6 55.6 1 32,990 1999 35,709 3 150 54.5	77 Collins 38,780 1999 41,977 2 106 45.2 78 Great Southwest Pkwy 18,760 1999 20,328 1 121 51.4 79 Division/Main 22,299 1999 24,094 0 20,328 1 137 55.5 New system under other TIP project 80 Belknap/Crapewine Hwy 32,990 1999 35,709 0 35,709 3 150 64.5 New system under other TIP project 80 Belknap/Crapewine Hwy 32,990 1999 35,709 0 35,709 3 150 64.5 Key to Existing system with communications; 2 = some un tot all intersections are part of an existing system with communications; 2 = some unications; 2 = some unications; 3 = No	76 Belknap/Grapevine Hwy	23,790	1999	25,751				0	25,751	Э	94	40.1	
18,780 1999 20,328 0 20,328 1 121 51.4 22,259 1999 24,094 0 24,094 1 137 55.5 7 32,990 1999 35,709 35,709 3 150 64.5	78 Great Southwest Pkwy 18,780 1999 20,328 0 20,328 1 121 51.4 79 Division/Main 22,269 1999 24,094 0 24,094 1 137 55.5 New system under other TIP project 80 Belknap/Grapevine Hwy 32,990 1999 35,709 3 150 84.5 New system under other TIP project Rey to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No Not of an existing system with communications; 3 = No	77 Collins	38,780	1999	41,977				0	41,977	2	106	45.2	
Division/Main 22,259 1999 24,094 0 24,094 1 137 55.5 88/knap/Grapevine Hwy 32,990 1999 35,709 64.5		78 Great Southwest Pkwy	18,780	1999	20,328				0	20,328	1	121	51.4	and secondary days and
Belknap/Grapevine Hwy 32,990 1999 35,709 1999 35,709 36,709 36,709 37 150	ш.	79 Division/Main	22,259	1999	24,094				0	24,094	1	137		New system under other TIP project
	Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No	80 Belknap/Grapevine Hwy	32,990	1999	35,709				0	35,709	ო	150	64.5	

						P			Travel Time (Seconds)	(Seconds	()		Stops	sd	~	
					Arti Segi	Arterial Segment			Measured Travel Time (Seconds)		sA) er	Average Measured	age ured	2	e	
	Arterial	West or North Limit "A"	East or South Limit "B"	City	No. of Signals	Length (Miles) Other Signals	Nangi Signals Have To Be R SlengiS seals	Counted Twic	E E	emiT leverT e2) beeq2	Average Mo ni Travel Tin Percentage	A.B	₽,A	Perage Stop: Per Mile	Per Signal Per Signal	No. of Lanes
8	81 FM 1709		SH 114	Keller, Southlake	21	9.0		0.999.0	0 894.0	757	125%	5.5	4.0	0.53	0.23	4
8	82 SH 183	Ridgmar Mall	SH 199	Fort Worth	11	4.5		523.0			150%	4.0	2.5	0.72	0.30	4
8	83 Weatherford Hwy			Fort Worth	8	2.3		324.0		-	159%	3.0	3.0		0.38	9
œ	84 Fort Worth Group 1 (Granbury-Wabash)	N/A	N/A	Fort Worth	13	3.0	+	0 489.5		272	183%	4.0	5.0	1.50	0.35	N/A
Ő	85 Little Rd/Green Oaks W	Treepoint	Pleasant Ridge	Arlington	10	1.3	2	246.5	5 176.0	120	176%	3.0	1.0	1.54	0.20	4
Ő	86 Pioneer Pkwy (Spur 303)		5	Arlington	20	8.2		771.0		644	130%	3.5	5.5		0.23	4
8	87 Oakland/Miller	Meadowbrook	Martin	Fort Worth	10	3.7		517.5	5 472.0	314	158%	4.0	3.0	0.95	0.35	4
Ő	88 Matlock	Pioneer	Debbie	Arlington, Mansfield	17	7.3		781.0	0 720.0	593	127%	5.5	4.5	0.68	0.29	4
ő	89 Collins	Green Oaks NW	Abram	Arlington	11	3.2		418.0	-	326	130%	3.0	3.0	0.94	0.27	و
6		9	IH-35W	Fort Worth	11	3.8		480.0			123%	3.5	4.5		0.36	9
6	91 Crowley Rd			Fort Worth	9	2.0		272.0	0 231.0	174	145%	2.0	1.5	0.88	0.29	9
9	2 Watauga/ Mid Cities	US 377	FM 1938	Watauga, NRH	7	3.2		498	_		140%	3.0	2.0	_	0.36	4
တ်	93 Fort Worth Group 1 (N of IH-820)	N/A	N/A	Fort Worth	59	9.0	0	2 1,333.5	3.5 1,277.5		160%	9.0	6.0		0.26	N/A
6	94 Harwood		FM 157	Bedford	13	4.1		579.5	_		164%	5.5	5.0	-	0.40	4
ர	95 Cooper	UTA Blvd	Turner-Warnell	Arlington	22	8.9		917.0	0 1,117.5	715	142%	6.0	10.5	0.93	0.38	4
6	96 Central	Cummings	SH 183	Bedford	9	1.5		251.0		136	175%	2.0	2.0	1.33	0.33	9
9	97 Cooper	nell	Debbie	Mansfield	m	1.5		183.5		109	153%	9.0	9.0	0.33	0.17	4
ത്	98 FM 157	Mid Cities	US 183 EBFR	Bedford/Euless	2	2.0		266.0	0 222.5		153%	2.0	1.5	0.88	0.25	4
ஞ	99 Beach	IH-820	st	Fort Worth	6	4.9		640.0			121%	2.5	4.5	0.71	0.39	4
10	100 Bridge St		IH-820	Fort Worth	10	3.0		383.5	- 23	262	136%	4.5	2.0	1.08	0.33	4
10	101 FM 1938		IH-820	NRH, Keller, Southlake	5	7.2		617.	-		123%	4.0	5.0	0.63	0.30	4
10.	102 Bedford-Euless Rd	ner	n Trail	Hurst	б	2.6		445.0		263	162%	3.0	4.0	1.35	0.39	4
10	103 SH 10		Main	Euless	ω	3.4		316.0	_	249	140%	0.5	2.5	0.44	0.19	4
10.	104 Bedford Rd	200	Martin	Bedford	7	2.6		291.5		204	152%	1.5	0.5	0.38	0.14	4
10	6 SH 199	Tenderfoot	Love Circle	Fort Worth	4	4.3		275.	-		115%	0.0	0.5	-	0.06	4
10	106 Lancaster	Riverside	Handley	Fort Worth	12	4.9		578.0	0 573.5	443	130%	3.0	2.5	0.56	0.23	4
10	107 Summit/8th/Cleburne	Rio Grande	Benbrook Blvd	Fort Worth	15	3.0		647.0	0 604.5	327	191%	8.5	8.0	2.75	0.55	4
Ş	(c							901 X				c
	TUB Cooper	Lamar	Division	Arlington	۵	4.	+	A/N	A/N	۲N	N/A	A/A	A/N	KN N	N/N	٥
đ	109 Cooper	Division	UTA Blvd		ო	0.4		N/A	A NA	N/A	N/A	N/A	N/A	N/A	N/A	و
	Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently isolated norsation)	tersections are part of :	an existing system with	h communications; 2 = som	ne but I	not all inte	ersectio.	ns are part	of an existing	system v	vith commu	unication	s; 3 = N	o system	(current	ly
	Isulated operations]

					Volume Data	e Data							
		From NCT Unless I	rom NCTCOG 1999 Volumes Unless Later Year is Noted	Volumes is Noted	More	Recent C	More Recent Count If Available	able	ADT	em Type	Cumulative No. of Signals and Miles of Corridor	re No. of nd Miles ridor	
	Arterial	ADT Volume	Year	Volume Adjusted to 2003	Newer ADT Volume	Year	Source	Volume Adjusted to 2003	Volume Used For Ranking	tav(S gnitaix∃	No. of Signals	Length (Miles)	Comments
) Ö	81 FM 1709	43,570	1999	47,162				0	47,162	-	171	69.0	
82	2 SH 183	32,560	1999	35,244				0	35,244	2	182	71.3	
8	3 Weatherford Hwy	26,560	1999	28,749				0	28,749	2	190	74.3	
8	84 Fort Worth Group 1 (Granbury-Wabash)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	45,365	2	204	75.6	
8	5 Little Rd/Green Oaks W	34,910	1999	37,788				0	37,788	-	214		New system under other TIP project
8	86 Pioneer Pkwy (Spur 303)	29,160	1999	31,564				0	31,564	-	234		New system under other TIP project
87	7 Oakland/Miller	18,090	1999	19,581				0	19,581	2	244	94.8	
8	88 Matlock	33,410	1999	36,164				0	36,164	2	261	98.0	New system under other TIP project
8	89 Collins	35,320	1999	38,232				0	38,232	2	272	101.8	New system under other TIP project
90	90 SH 183	26,560	1999	28,749			1	0	28,749	2	283	103.8	
9,	1 Crowley Rd	22,540	1999	24,398				0	24,398	2	289	107.0	
92	2 Watauga/ Mid Cities	25,430	1999	27,526				0	27,526	ო	296	_	Split into 2 segments
6	93 Fort Worth Group 1 (N of IH-820)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	94,042	m	323		
6	94 Harwood	22,282	1999	24,119	22,282	1999	C of Bed	24,119	24,119		336		Combination of segments 11-1 and 11-2
8	95 Cooper	29,560	1999	31,997				0	31,997	m	328	130.5	
த்	5 Central	18,347	2002	18,714	27,300	2002	C of Bed	27,846	27,846	m	364	132.0	
6	97 Cooper	29,560	1999	31,997	30,134	2002	C of M	30,737	31,997	m	367	134.0	
ണ്	98 FM 157	17,610	1999	19,062				0	19,062	2	374	138.9	
8	99 Beach	25,590	1999	27,699				0	27,699	m	383	141.9	
100	100 Bridge St	8,910	1999	9,644				0	9,644	2	393	149.1	
10	101 FM 1938	30,160	1999	32,646				0	32,646	en	408	151.7	
102	102 Bedford-Euless Rd	8,900	1999	9,634				0	9,634	ო	417	-	New system under other TIP project
103	3 SH 10	23,200	1999	25,112				0	25,112	m	425	157.7	South Sec. 20-
102	104 Bedford Rd	21,302	2000	22,606	19,030	2000	C of Bed	20,195	22,606	ო	432	162.0	
105	105 SH 199	38,790	1999	41,988				0	41,988	m	436	166.9	8
106	5 Lancaster	20,550	1999	22,244				0	22,244	m	448	169.9	Annual of of an and an and
107	107 Summit/8th/Cleburne	25,540	1999	27,645				0	27,645	2	463	15.3	Utility construction adversely affected TT runs
90	108 Caoper	37,010	1999	40,061				0	40,061				New system under other TIP project; TT data unavailable due to roadway construction (currently being widened to 6 lanes)
100	109 Cooper	61.420	1999	66.483				0	66.483	÷.			TT data unavailable due to roadway construction (currently being widened to 6 lanes)
	Key to Existing System Type: 1 = all int	ersections	are part of	an existing	system wit	h commun	ications; 2:	= some but	not all inte	rsectio	ins are pai	t of an ex	Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No
	system (currently isolated operation)												

							р	_	Travel Tim	Travel Time (Seconds)	(0		Stops	SC	-	
					Art Seg	Arterial Segment			Measured Travel Time (Seconds)		s V) əu	Average Measured	2 2	s	s	
	Arterial	West or North Limit "A"	East or South Limit "B"	City	No. of Signals	(Miles) Length	other Signals Have To Be F SlengiS seals	counted Twic	8-A	emiT leveiT 9C) beeq2	Average Mi Travel Tir Percentage	A-B	B-A	Av erage Stop Per Mile	Persge Stop Per Signal	sens. of Lanes
-	110 Belt Line	DNT SBFR	Coit	Dallas	ω	Э.1		452.1	1.0 463.5	289	158%	2.5	3.0	0.89	0.34	و
-	111 Jupiter	Buckingham	Northwest Hwy	Garland/Dallas	16	4.6		618.0	1.0 616.5		159%	4.0	4.0	0.87	0.25	۵
-	112 Spring Valley	Inwood	Meandering Way	Farmers Branch/Dallas	ω	2.7		403.5	1.5 427.5	273	152%	3.5	3.0	1.20	0.41	و
-	113 Alpha	Dallas North Tollway		Dallas	2	2.1		376.5	309.5	212	162%	2.5	2.5	1.19	0.36	ъ
-	114 Jupiter	PBGT EBFR	Buckingham	Richardson	₽	4.7		553.5	1.5 569.5	422	133%	3.5	4.0	0.80	0.38	۵
~	115 Oaklawn	Blackburn		Dallas	1	1.5		323.5	-		192%	3.0	3.0	2.00	0.27	4
F	116 Forest	US 75	IH-635	Dallas	<u>б</u>	2.2		304.5			158%	2.5	1.5	0.91	0.22	و
~	117 Harry Hines	Empire Central		Dallas	თ	2.3		325.5	.5 285.0		162%	3.0	2.5	1.20	0.31	٥
-	118 Forest	Harry Hines		Dallas	21	1.7		971.5			138%	6.5	4.5	0.77	0.26	و
~	119 Belt Line	Coit	Jupiter	Richardson	16	5.1		785.0	0.0 682.5	527	139%	3.5	4.5	0.78	0.25	و
F	120 Preston	Arapaho	IH-635	Dallas	9	2.6		378.0	1.0 352.5	204	179%	2.0	1.5	0.67	0.18	ى
1	121 Inwood	Alpha	Mockingbird	Dallas	15	6.3		775.0	.0 878.0	622	133%	4.5	5.0	0.75	0.32	4
	122 FM 3040/Hebron/Park Blvd	Marsh	Alma	Plano	ß	7.6		56 258		675	132%	7.5			0.28	و
1.	23 First	Buckingham	Avenue D	Garland	4	1.5		158.0	180.0	127	133%	1.5	0.5	0.67	0.25	9
	124 Preston	SH 121	PBGT	Plano	16	5.7		520.5	1.5 724.5	468	133%	2.0	- 2	0.61	0.22	و
-	125 Royal	US 75	IH-635	Dallas	ω	3.4		468.0	-	346	138%	2.5	-	0.66	0.28	و
1.	126 Northwest Hwy	Newkirk	US 75	Dallas	28	8.9		1,10	1,106.0 1,019.0	0 871	122%	10.0	6.0	0.90	0.29	9
	127 SH 121	Denton Tap	IH-36E	Lewisville	ъ	2.4		236.5	.5 230.5	147	159%	1.5	1.5	0.63	0:30	ى
1.	128 Marsh/Lemmon	Almazon	US 75	Dallas	21	5.4		711.5	.5 715.5	536	133%	3.0	4.0	0.65	0.17	9
1.	129 Arapaho	US 75	Jupiter	Richardson	10	2.5		285.5	-		143%	1.5	2.0	0.70	0.18	9
1	130 Inwood	Mockingbird	Conveyor	Dallas	13	2.7		399.0			131%	4.0	2.0	1.11	0.23	9
÷	131 Belt Line/First	Jupiter	Buckingham	Garland	7	3.5		446.0	-		133%	4.5		0.71	0.23	۵
	132 Arapaho/Garland Ave	Jupiter	Avenue F	Garland	13	5.0		595	.0 493.0		131%	4.5	3.0	0.75	0.29	4
1.	133 Skillman/Forest	Audelia	State	Dallas/Garland	16	3.7	0	396.5		295	143%	1.5	2.5	0.54	0.13	9
1.	134 Shiloh	Pres. George Bush	Northwest Hwy	Garland/Dallas	18	8.0		984.0			135%	6.0	6.0	0.75	0.33	4
1.	135 Inving Blvd/Industrial	Norwood	Reunion	Dallas	17	5.7		648.5			124%	4.5	4.5	0.79	0.26	9
-	136 Spring Valley/Centennial	Meandering Way	College Park	Richardson	13	4.0		442.5	.5 478.5	385	120%	2.5	4.0	0.81	0.25	ى
÷	137 FM 3040/Hebron/Park Blvd	Alma	Los Rios	Plano	œ	3.9		493.0	10 542.0	443	117%	3.5	4.0	0.96	0.47	4
-	138 Royal	IH-35E	US 75	Dallas	20	7.2		924.5	5 795.0	745	115%	6.0	3.0	0.63	0.23	و
1	139 Preston	IH-635	Northwest Hwy	Dallas	16	4.0		508.5	.5 511.0	411	124%	3.5	2.0	0.69	0.17	9
÷	140 Buckingham	College Park	SH 78	Garland	12	4.6		457	.5 493.5	396	120%	1.0	1.0	0.22	0.08	ى
	Key to Existing System Type: 1 = all intersections are part of an existing system with communications; 2 = some but not all intersections are part of an existing system with communications; 3 = No system (currently isolated more intersections).	intersections are part of	an existing system with	1 communications; 2 = som	he but	not all in	itersectio	ns are par	of an existin	g system v	vith comm	unication	s; 3 = No	o system	(current	tly
	Isulated uperation															

From NCTCOG 1999 Volumes Volume Unless Later Year is Noted Volume ADT Year Volume 110 Belt Line A17,700 1999 47,302 111 Jupiter 39,330 1999 47,302 No 113 Alpha 31,160 1999 37,259 No 114 Jupiter 31,500 1999 37,529 No 115 Spring Valley 31,500 1999 37,529 No 116 Forest 31,500 1999 37,529 No 117 Harry Hines 31,500 1999 37,529 No 118 Forest 46,000 1999 47,553 No 118 Forest 40,360 1999 37,700 1999 47,703 117 Harry Hines 31,100 1999 47,703	More Recent Count If Available Newer Vo Newer Year Newer Source Volume Source VIA Year Volume Source N/A Tot 10,920 2002 30,529 1998 10,920 Tot	ount If Avails Source C of G C of G C of C C of C C of D C of D C of D	Lume Unsted 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	ADT Volume Used For Ranking 56,128 33,772 33,772 41,738	g System Type 요 요 요	Cumulative No. of Signals and Miles of Corridor	
ADT Year Volume Adterial Year Volume Atterial Year Adjusted Atterial Volume 10000 Belt Line 43,700 1999 47,302 Jupiter 39,300 1999 47,302 Jupiter 31,160 1999 33,729 Jupiter 31,160 1999 33,729 Jupiter 31,670 1999 37,729 Jupiter 31,670 1999 37,729 Jupiter 31,670 1999 37,729 Jupiter 31,670 1999 37,729 Jupiter 33,570 1999 37,729 Jupiter 33,570 1999 47,564 Ferston 1999 37,709 137,109 Freston 24,360 1999 37,709 Freston 24,360 1999 37,709 Freston 24,360 1999 26,201 Freston 24,360 1999		Source C of G C of R C of R C of D C of R		volume Used For Ranking 47,302 56,128 33,729 33,772 41,738	tsy2 g		
Belt Line 43,700 1999 47,302 Jupiter 39,930 1999 47,302 Spring Valley 31,160 1999 33,729 Spring Valley 31,160 1999 33,729 Alpha 31,160 1999 33,729 Jupiter 31,200 1999 33,729 Jupiter 31,200 1999 37,728 Jupiter 31,200 1999 37,728 Jupiter 34,670 1999 47,729 Daklawn 45,000 1999 47,793 Harry Hines 43,900 1999 47,719 Preston 34,190 1999 47,719 Preston 34,190 1999 37,008 Inwood 24,280 1999 37,008 Inwood 24,280 1999 37,008 Inwood 24,190 1999 37,008 Inwood 24,280 1999 37,008 Inwood 24,190 1999 37,		CofG CofR CofR CofR CofR CofR	0 56,128 0 0 41,738 41,738 49,516	47,302 56,128 33,729 33,772 41,738	5	No. of Length Signals (Miles)	Comments
Jupiter 39,930 1999 43,222 Spring Valley 31,160 1999 33,729 Alpha 31,200 1999 33,729 Alpha 31,200 1999 33,729 Jupiter 31,200 1999 33,729 Jupiter 31,200 1999 37,720 Jupiter 34,670 1999 37,528 Jupiter 39,290 1999 42,559 Forest 46,000 1999 42,549 Harry Hines 31,770 1999 47,584 Belt Line 43,960 1999 37,008 Preston 34,190 1999 37,008 Inwood 24,280 1999 37,008 Inwood 24,150 1999 37,008 Inwood 24,280 1999 37,008 Inwood 24,160 1999 37,008 Inwood 24,280 1999 37,008 Inwood 47,150 1999 47,307		C of G C of R C of D C of D C of D	56,128 0 0 41,738 41,738 49,516 0	56,128 33,729 33,772 41,738	-	8 3.1	
alley 31,160 1996 33,729 alley 31,200 1999 33,722 31,200 1999 37,728 34,570 34,670 1999 37,528 37,528 34,670 1999 37,529 49,752 66 37,770 1999 42,529 67 1999 40,792 40,792 67 1999 41,790 1999 67 1999 37,190 1999 719 1999 37,106 1716 719 1999 37,109 1716 714browPark Blwd 47,150 1999 51,037 AltebrowPark Blwd 47,150 1999 47,205		C of R C of D C of D C of R C of R	0 0 41,738 49,516 0	33,729 33,772 41,738	1	24 7.7	
31,200 1999 33,722 34,670 1999 37,528 34,670 1999 37,528 39,290 1999 42,529 45,000 1999 42,529 45,000 1999 42,529 45,000 1999 47,720 45,000 1999 47,719 41,900 1999 37,719 41,900 1999 37,719 41,900 1999 37,719 41,900 1999 37,719 41,900 1999 37,719 41,900 1999 37,719 41,900 1999 37,719 41,900 1999 37,019 41,900 1999 47,205 41,900 1999 47,205		C of R C of R C of D C of R C of R	0 41,738 0 49,516	33,772 41,738	-	32 10.4	
34,670 1999 37,528 39,290 1999 47,529 96,000 1999 42,529 46,000 1999 49,752 17,70 1999 47,720 14,900 1999 47,719 14,900 1999 47,719 14,9190 1999 37,719 14,920 1999 37,719 14,920 1999 37,719 14,920 1999 37,719 14,920 1999 37,719 14,910 1999 37,719 14,910 1999 37,719 14,910 1999 36,281 14,910 1999 37,719 14,910 1999 47,205 14,910 1999 47,205		C of R C of D C of D C of R C of R	41,738 0 49,516 0	41,738	-	39 12.5	
39,290 1999 42,529 es 45,000 1999 49,792 a6,000 1999 49,792 49,792 a6,000 1999 43,792 43,719 a7,190 1999 43,719 43,719 a1,190 1999 37,719 34,190 a1,190 1999 37,719 37,195 a1,190 1999 37,701 34,719 a1,190 1999 37,701 34,719 a1,190 1999 37,701 34,719 a1,190 1999 37,701 34,719 a1,190 1999 37,701 34,7205		C of D C of D C of R C of R	0 49,516 0		1	17.2	
46,000 1999 49,792 es 37,770 1999 49,793 77,700 1999 40,764 40,000 1999 47,544 40,390 1999 47,544 40,390 1999 43,719 34,190 1999 37,008 24,290 1999 27,008 1999 47,150 1999 26,001 14bron/Park Blvd 47,150 1999 47,205		C of D C of D C of R C of R	49,516 0	42,529	1 6	60 18.7	
es 37,770 1999 40,883 43,960 1999 47,584 40,390 1999 43,719 34,190 1999 37,008 34,190 1999 37,008 24,280 1999 57,008 47,150 1999 51,037 43,510 1999 47,205		C of D C of R C of R	c	49,792	1	69 20.9	
43,960 1999 47,584 40,390 1999 43,719 34,190 1999 37,008 34,190 1999 37,008 24,280 1999 26,281 Ylebron/Park Blwd 47,150 1999 51,037 43,510 1999 51,037 146		C of D C of R Cof D	2	40,883	1	78 23.2	
40,390 1999 43,719 34,190 1999 37,008 34,190 1999 37,008 24,280 1999 26,281 Hebron/Park Blwd 47,150 1999 51,037 43,510 1999 51,037 1999		CofR	40,316	47,584	1 5	99 30.3	
34,190 1999 37,008 24,280 1999 26,281 Hebron/Park Blwd 47,150 1999 51,037 43,510 1999 47,205 1399		CofD	41,718	43,719	1 1		
24,280 1999 26,281 47,150 1999 51,037 43,510 1999 47,205		A CONTRACTOR	35,306	37,008	1 1.	125 38.0	
47,150 1999 43,610 1999		CofD	33,706	33,706	1 1.	140 44.3	
43,610 1999			0	51,037	1	163 51.9	Not considered at City request (TT runs for regional assessment only)
	3 2		0	47,205	1	167 53.4	
124 Preston 54,101 54,101			0	54,101	1	183 59.1	Not considered at City request (TT runs for regional assessment only)
24,390 1999 26,401	26,525 2002	CofD	27,056	27,056	1 19	191 62.5	
st Hwy 53,000 1999 57,369	62,353 2002	C of D	63,600	63,600	1 2	219 71.4	
32,200 1999 34,854			0	34,854	2	224 73.8	Deleted mainlanes now under construction
emmon 51,730 1999 55,994	N/A		0	55,994	1 2.		
0 44,044	41,270 2002	CofR	42,095	44,044	1 2		
53,650 1999 58,072	41,374 2002	CofD	42,201	58,072	1 2	268 84.4	
34,550 1999			0	37,398	1		
d Ave 25,930 1999 28,067			0	28,067	1 2	292 92.9	
an/Forest 50,040 1999 54,165		CofD	52,798	54,165	- -		
Shiloh 28,980 1999 31,369	30,183 1999	CofG	32,671	32,671	2 3		
31,560 1999 34,162			-	34,162	- 0	343 110.3	
Spring Valley/Centennial 40,680 1999 44,033	44,150 2003	CofR	44,150	44,150	- 0	56 114.3	
137 FM 3040/Hebron/Park Blvd 21,740 1999 23,532			0	23,532	3	364 118.2	Uelete at Uity request LL runs for regional assessment only
34,450 1999 37,290	35,657 2001	C of D	37,098	37,290	1 3		Actual speeds well in excess of posted
31,580 1999			0	34,183	1 4		
140 Buckingham 37,090 1999 40,147			0	40,147	1 4	412 134.0	

						1								ŀ	T
				Art. Segi	Arterial Segment	voVV tertT Setimed	ə	Measured Travel Time (Seconds)		peunsee (spuoo	le vei Tito	Average Measured	2 2	s	
Arterial	West or North Limit "A"	East or South Limit "B"	City	to .oV Signals	Length (seliM) Length	Other Signals Have To Be F Less Signals	counted Twic	A B	ф У Таvel Time	e2) beed2 M eperevA	Travel Tir Percentage ≯	ы А-В-	р Аverage Stop		o of Lanes
141 Mockingbird	Dallas North Tollway	Irving Blvd	Dallas	20	4.2		ٽ ا	556.0 4	471.0 4	446 115%		2.0 1.0	0 0.36	6 0.08	
142 Forest/Ave B & D/SH 66	State	Centerville	Garland	10	3.3		m	318.0 31	364.5 2		118% 1	1.0 2.	2.0 0.45	-	
143 Marsh/Lemmon	IH-635	Almazon	Dallas	7	3.6		м М	360.0 39	395.0 3	362 104	104% 0	0.5 1.	1.5 0.28	9 0.14	
144 FM 1382	Clark Rd N	IH-35E											3		
145 Loop 288	McKinney	Southridge	Denton									_	3	-	
146 Custer	Pres. George Bush	McDermott	Plano												
147 SH 121	Alma	Hardin	Allen, McKinney							2 14	╞		1 4		
148 University	Camp Bowie	Crestline/Harley	Fort Worth	4	0.6		-	113.0 2(201.5	54 291%		2.0 1.	1.5 2.92	2 0.44	
149 Camp Bowie/7th	Montgomery	Stayton	Fort Worth	۵	1.5		5	246.0 2	228.5 1	115 206	206% 2	2.0 2.	2.5 1.50	0.38	ڡ
150 Montgomery	Camp Bowie	Vickery	Fort Worth	1	1.2		Ŭ,	298.0 2	213.5 1	114 224%	Cara I	2.5 3.0	0 2.29	9 0.39	4
151 Wabash/Granbury	Seminary	Gorman/Wedgemont	Fort Worth	8	1.3		2	253.5 29	294.0 1	114 240%		2.5 3.0	0 2.12	2 0.34	4
152 Basswood	Riverside	US 377	Fort Worth	2	2.4		4	400.5 23	273.0 2	213 158%		3.5 1.	1.0 0.94	4 0.32	4
153 Western Center	M35W	125 SU	Fort Worth	10	3.0		4	444.5 46	462.5 2	279 163	163% 3	3.0 2.	2.5 0.92	2 0.28	4
154 McCart/Granbury	Benbrook Blvd	Trail Lake	Fort Worth	Ś	1.7		З.	236.0 2	213.5 1	158 142%		1.5 2.	2.0 1.03	3 0.35	4
155 Beach	Tarrant Pkwy N	IH-820	Fort Worth	12	3.6		4	488.5 5.	542.0	324 155	159% 2	2.5 2.	2.5 0.69	9 0.21	4
156 Main Street	Northwest	Mustang	Grapevine												
157 Dallas Rd (SH 26)	New Wal-Mart Signal	Main	Grapevine												_
158 William D. Tate/Bass	Northwest	Mustang	Grapevine												
159 Northwest Hwy	SH 114	Gridiron	Grapevine												
160 Mockingbird	Dallas North Tollway	Inving Blvd	Dallas	20	4.2		ű	556.0 4	471.0 4	446 115	115% 2	2.0 1.	1.0 0.36	6 0.08	9
161 Harry Hines	Empire Central	Wycliff	Dallas	6	2.3		m			188 162	162% 3	3.0 2.	2.5 1.20	0.31	
162 Inwood	Mockingbird	Conveyor	Dallas	13	2.7		́́́т	399.0 29	294.0 2	264 131	131% 4	4.0 2.0	0 1.11	1 0.23	۵
163 Oaklawn	Blackburn	Highline	Dallas	11	1.5		ю	-			192% 3	3.0 3.0	0 2.00	0 0.27	4
164 Marsh/Lemmon	Almazon	US 75	Dallas	21	5.4		7				133% 3	3.0 4.0	0 0.65	5 0.17	9
165 Irving Blvd/Industrial	Norwood	Reunion	Dallas	17	5.7		ف								
166 Dallas Group 1 (Oaklawn, etc.)				91	21.8	29	7 2,5	2,964.0 2,7	2,730.0 2,	2,117 134	134% 19	19.5 17	17.0 0.84	4 0.20	Gage

									Ī				
		From NC ¹ Unless	rom NCTCOG 1999 Volumes Unless Later Year is Noted	9 Volumes is Noted	More	Recent Co	More Recent Count If Available	lable	ADT	9.04	Cumulative No. of Signals and Miles of Corridor	e No. of d Miles idor	
	Arterial	ADT Volume	Year	Volume Adjusted to 2003	Newer ADT Volume	Year	Source	Volume Adjusted to 2003	Volume Used For Ranking	tsγS gnitsix∃	No. of Signals	Length (Miles)	Comments
141 Moc	141 Mockingbird	45,060	1999	48,774	40,716	2002	C of D	41,530	48,774	-	432	138.2	
142 Fon	142 Forest/Ave B & D/SH 66	51,790	1999	56,059				0	56,059	2	442	141.5	
143 Mar	143 Marsh/Lemmon	32,040	1999	34,681	30,872	2001	CofD	32,119	34,681	+	449	145.1 A	Actual speeds well in excess of posted
144 FM 1382	1382												Deleted due to roadway construction
145 Loop 288	p 288												Deleted due to roadway construction
146 Custer	ster												Deleted at City request
147 SH 121	121										T		Deleted due to roadway construction
148 University	versity	22,860	1999	24,744				0	24,744	t	4	0.6	
149 Can	149 Camp Bowie/7th	23,710	1999	25,664				0	25,664	1	10	2.1	
150 Moi	150 Montgomery	21,640	1999	23,424				0	23,424	1	17	3.3	
151 Wal	Wabash/Granbury	25,540	1999	27,645				0	27,645	2	25	4.6	
152 Basswood	poowss	24,120	1999	26,108				0	26,108	2	32	7.0	
153 We	153 Western Center	31,040	1999	33,599				0	33,599	m	42	10.0 S	Split into 2 segments
154 Mc(154 McCart/Granbury	16,370	1999	17,719				0	17,719	2	47	11.7	
155 Beach	ich	31,720	1999	34,335				0	34,335	'n	59	15.3	
156 Mai	156 Main Street												Deleted (currently being retimed as City project)
157 Dall	157 Dallas Rd (SH 26)	-											Deleted (currently being retimed as City project)
158 Will	158 William D. Tate/Bass											d	Deleted (currently being retimed as City project)
159 Nor	159 Northwest Hwy			5								14	Deleted (currently being retimed as City project)
160 Mot	160 Mockingbird	45,060	1999	48,774	40,716	2002	C of D	41,530	48,774	1	2,114	712.6	
161 Har	161 Harry Hines	37,770	1999	40,883				0	40,883	ł			
162 Inwood	poo	53,650	1999	58,072	41,374	2002	C of D	42,201	58,072	1	2,136	717.6	
163 Oaklawn	klawn	39,290	1999	42,529	N/A			0	42,529	÷	2,147	719.1	
164 Mar	164 Marsh/Lemmon	51,730	1999	55,994	N/A			0	55,994	1	2,168	724.5	
165 Irvin	ng Blvd/Industrial	31,560	1999	34,162	N/A			0	34,162	Ļ	2,185	730.2	
166 Dall	166 Dallas Group 1 (Oaklawn, etc.)								280,415	-			

							n				þ			1	2	
					Arterial Segment			e	Measured Travel Time (Seconds)	ured Time nds)		sA) er	Average Measured			
	Arterial	West or North Limit "A"	East or South Limit "B"	City	No. of Signals	(Other Signals Have To Be R	slengiS seal IoiwT betruoO	₽ A	B-A	: emiT leverT e2) beeq2	M ecage Me niT le verT egetreore	A-B	⊐ Average Stop: Average Stop:	Per Mile Average Stop:	Per Signal No. of Lanes
167 Belt Line	Line	DNT SBFR	Coit	Dallas	ω	3.1			452.0	463.5	277	165%	2.5	3.0 0	0.89 0.34	Sec
168 Inwood		Alpha	Mockingbird	Dallas	15	6.3			775.0	878.0	622	133%	4.5	5.0 0	0.75 0.32	Sec.
169 Mars	169 Marsh/Lemmon	IH-635	Almazon	Dallas	7	3.6			360.0	395.0	362	104%	0.5	1.5 0	0.28 0.14	
170 Alpha		Dallas North Tollway	Hillcrest	Dallas	7	2.1			376.5	309.5	212	162%	2.5	2.5 1	1.19 0.36	21000
171 Forest		Harry Hines	US 75	Dallas	21	7.1			971.5	869.5	669	138%	6.5	4.5 0	0.77 0.26	1
172 Royal		IH-35E	US 75	Dallas	20	7.2			924.5	795.0	745	115%	6.0	3.0 0	0.63 0.23	in an
173 North	173 Northwest Hwy	Newkirk	US 75	Dallas	28	6.8			1106.0	1019.0	871	122%	10.0	6.0 0.3	0.90 0.29	9 6
174 Spring Valley		Inwood	Meandering Way	Farmers Branch/Dallas	ω	2.7			403.5	427.5	273	152%	3.5	3.0 1	1.20 0.41	
175 Preston		IH-635	Northwest Hwy	Dallas	16	4.0			508.5	511.0	411	124%	3.5	2.0 0	0.69 0.17	
176 Preston		Arapaho	IH-635	Dallas	10	2.6			378.0	352.5	204	179%	2.0	1.5 0	0.67 0.18	
177 Dalla:	Dallas Group 2 (Preston,Royal, etc.)				140	47.6	26	12 1	6,255.5	6,020.5	4,646	132%	10.6	32.0 0	0.77 0.26	90
178 Forest		US 75	IH-635	Dallas	6	2.2			304.5	312.5	195	158%		- 32	0.91 0.22	22 6
179 Royal			IH-635	Dallas	ω	3.4			468.0	490.0	346	138%	-	-	-	
180 Dalla	180 Dallas Group 3 (Royal E of US 75, etc.)				17	5.6	б	0	772.5	802.5	541	146%	-		0.76 0.25	ц С
181 Beach	ĥ	Tarrant Pkwy N	IH-820	Fort Worth	12	3.6			488.5	542.0	324	159%	2.5	2.5 0	-	21 4
182 Bass	Basswood	Riverside	US 377	Fort Worth	7	2.4			400.5	273.0	213	158%	3.5	-	-	32 4
183 West	3		US 377	Fort Worth	6	3.0			444.5	462.5	279	163%	-		-	0.28 4
184 Fort '	1 (N of IH-820)				29	9.0	0	2	1333.5	1277.5	816	160%	-	-	-	g
185 McCi		Benbrook Blvd		Fort Worth	ъ	1.7			236.0	213.5	158	142%	1.5		-	0.35 4
186 Waba		Seminary	Gorman/Wedgemont	Fort Worth	ω	1.3			253.5	294.0	114	240%	2.5	-	-	34 4
187 Fort \	o 2 (Granbury-Wabash)				13	3.0	-	0	489.5	507.5	272	183%	4.0	-	-	ŝ
188 Camp	/7th	Montgomery	Stayton	Fort Worth	ى	1.5			246.0	228.5	115	206%	2.0		-	
189 Montgomery		Camp Bowie	Vickery	Fort Worth	7	1.2		21	298.0	213.5	114	224%	2.5		-	
190 University	ərsity	Camp Bowie	Crestline/Harley	Fort Worth	4	0.6		4	113.0	201.5	54	291%	2.0		-	14 6
191 Fort \	h Group 3 (Camp Bowie, etc.)				17	с. 1 1	-	2	657.0	643.5	583	230%	6.5	+	+	
192 Belt Line		Cort	Jupiter	Richardson	16	5.1	1	┥	785.0	682.5	325	226%	3.5	-		0.25 6
193 Belt 1	Line/First	Jupiter	Buckingham	Garland	11	3.5	T		446.0	361.5	303	133%	4.5			
194 First	8.	Buckingham	Avenue D	Garland	4	1.5	╡	┥	158.0	180.0	105	161%	1.5	-	+	
195 Jupiter		PBGT EBFR	Buckingham	Richardson	6	4.7		┨	553.5	569.5	422	133%	3.5			
196 Jupiter	224	Buckingham	Northwest Hwy	Garland/Dallas:	16	4.6			618.0	616.5	88 89	159%	4.0		-	0.25 6
197 Shiloh			Northwest Hwy	Garland/Dallas	18	8.0			984.0	915.5	703	135%	6.0	6.0		
198 Sprin	//Centennial	Way	College Park	Richardson	13	4.0			442.5	478.5	385	120%	2.5	4.0 0		
199 Buckingham	2000 1000	College Park	SH 78	Garland	12	4.6			457.5	493.5	396	120%	1.0	1.0 0		0.08 6
200 Skilln		a	State	Dallas/Garland	16	3.7			396.5	446.5	295	143%	1.5	2.3	0.54 0.13	Sec."
201 Fores	Forest/Ave B & D/SH 66	State	Centerville	Garland	10	3.3			318.0	364.5	290	118%	1.0	2.0 0	0.45 0.15	
202 Arapaho		US 75	Jupiter	Richardson	10	2.5			285.5	359.0	226	143%	1.5	2.0 0	0.70 0.	0.18 6
203 Arap:	203 Arapaho/Garland Ave	Jupiter	Avenue F	Garland	13	5.0			595.0	493.0	414	131%	4.5	3.0 0	0.75 0.29	9 4
204 Richs	Richardson-Garland Group 1				133	50.5	14	15	6,039.5	5,960.5	4,252	141%	35.0	34.0 0	0.68 0.26	90

Form NCTCOG 1999 Volumes More Recent Fount If Availate Unless Later Year Is Noted Anterial More Recent Fount If Availate Unless Later Year Is Noted Anterial Anterial Anterial ADT Volume Newer Is Noted Source Bit Line 24,3/00 1999 24,300 1999 26,301 Year Source MarshLemmon 32,040 1999 33,722 Num Year Source MarshLemmon 31,200 1999 37,203 88/50 2001 Cof D MarshLemmon 31,300 1999 37,018 38,750 Nu/A Cof D Spring Valley 31,300 1999 37,018 2001 Cof D Spring Valley 31,300 1999 37,018 2002 Cof D Spring Valley 31,300 1999 37,309 Nu/A Cof D Spring Valley 31,300 1999 37,309 Nu/A Cof D Spring Valley 31,300 <t< th=""><th>Litume Litume Li</th><th>w س ے ے ے ے ے ے ے ے ے ے ے ے ک ک ک Existing System Type</th><th></th><th>of th 1 1 2 3 2 3 3 4 4 4 4 4 5 5 6 6 6 6 7 3 5 5 6 6 7 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7</th></t<>	Litume Li	w س ے ے ے ے ے ے ے ے ے ے ے ے ک ک ک Existing System Type		of th 1 1 2 3 2 3 3 4 4 4 4 4 5 5 6 6 6 6 7 3 5 5 6 6 7 5 7 7 7 7 7 7 7 7 7 7 7 7 7 7
ADT Valume Year Adjusted A	Volume Adjusted to 2003 33.705 33.705 33.705 33.709 63.600 63.600 63.600 63.600 63.600 63.600 63.600 63.600 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	tsyS gnitsix3 هـ ه. الم		
Belt Line 43,700 1999 47,302 N/A M Marsh/Lemmon 24,280 1999 26,281 30,529 1998 C of D Marsh/Lemmon 32,040 1999 37,72 30,872 2001 C of D Marsh/Lemmon 31,200 1999 37,520 35,67 2001 C of D Ansh 31,200 1999 57,369 55,57 2001 C of D Royal 31,160 1999 37,290 35,67 2001 C of D Royal 31,160 1999 37,290 34,614 2002 C of D Royal 31,160 1999 37,305 N/A 2002 C of D Royal 31,160 1999 37,305 N/A 2002 C of D Royal 50,001 1999 37,035 N/A 2002 C of D Royal 50,001 1999 37,035 N/A 2002 C of D Royal 50,01 <	0 33,706 32,119 0 1 32,116 33,008 13,008 13,008 13,008 13,008 13,008 13,008 13,008 13,008 10 10 10 10 10 10 10 10 10 10 10 10 10			
Inwood 24,280 1999 26,281 30,529 1996 C of D Marsh/Lemmon 31,200 1999 34,681 30,872 2001 C of D Forest 43,960 1999 37,729 N/A 2010 C of D Forest 43,960 1999 37,739 SP/70 C of D Forest 43,960 1999 37,739 N/A 2001 C of D Spring Valley 31,160 1999 37,739 N/A 2002 C of D Preston 31,160 1999 37,739 N/A 2002 C of D Preston 31,160 1999 37,739 N/A 2002 C of D Preston 31,160 1999 37,708 34,614 2002 C of D Dallas Group 2 (Preston,Royal, etc.) 31,160 1999 35,614 2002 C of D Dallas Group 2 (Preston,Royal, etc.) 31,120 1999 26,410 2002 C of D Dallas Group 2 (Pres	33,706 32,119 0 1 32,119 32,1098 137,098 137,098 137,098 137,098 137,098 137,098 137,098 10 10 10 10 10 10 10 10 10 10 10 10 10		++++++++++++++++++++++++++++++++++++	
Marsh/Lemmon 32,040 1999 34,661 30,872 2001 C of D Apha 31,200 1999 3,772 N/A C C of D Forest 31,200 1999 3,752 N/A C C of D Forest 31,200 1999 3,753 N/A C C of D Spring Valley 31,160 1999 3,739 N/A C C of D Spring Valley 31,160 1999 3,739 N/A C of D C of D Spring Valley 31,160 1999 3,703 N/A C of D C of D Preston 31,160 1999 3,703 N/A C of D C of D Dallas Group 2 (Preston, Royal, etc.) 1 24,309 3,708 3,614 2002 C of D Dallas Group 3 (Royal E of US 75, etc.) 1 1 26,512 2003 2,610 2003 2,610 Beach Userter 1 1999 26,108 2,612	32,119 0 1 37,0316 37,0308 1 37,0306 1 37,0306 2 36,306 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	m m		
Apha Japa Japa <th< td=""><td>40.316 37.098 37.098 6.37.098 0 0 49.516 7.056 27.056 0 0 0 0 0</td><td>~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~</td><td></td><td></td></th<>	40.316 37.098 37.098 6.37.098 0 0 49.516 7.056 27.056 0 0 0 0 0	~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~ ~		
Forest 43,960 1999 47,564 38,750 2001 C of D Royal 34,460 1999 37,290 35,657 2001 C of D Nuthwest Hwy 53,000 1999 37,290 35,657 2001 C of D Nuthwest Hwy 31,5160 1999 37,730 55,032 C of D C of D Preston 31,5160 1999 34,130 1999 34,514 2002 C of D Preston 34,190 1999 34,130 1999 34,514 2002 C of D Reston 34,190 1999 34,614 2002 C of D 2010 Reston 24,300 1999 34,614 2002 C of D 2010 Reston 24,300 1999 34,614 2002 C of D 2010 Reston 24,300 1999 34,614 2002 C of D 2010 Reston 24,300 1999 25,4112 128,525 2002 <t< td=""><td>40,316 37,098 63,600 0 0 35,306 49,516 7 27,056 0 0 0</td><td>m m m m m m m m m m m m m m m m m m m</td><td>+ + + + + + + + + + + + + + + + + + +</td><td></td></t<>	40,316 37,098 63,600 0 0 35,306 49,516 7 27,056 0 0 0	m m m m m m m m m m m m m m m m m m m	+ + + + + + + + + + + + + + + + + + +	
Royal 34,450 1999 37,250 36,657 2001 C of D Nuthwest Hwy 63,000 1999 67,369 62,353 2002 C of D Psening Valley 31,160 1999 33,729 NAA C of D C of D Psening Valley 31,160 1999 34,163 2002 C of D Preston 31,160 1999 34,614 2002 C of D Dallas Group 2 (Preston, Royal, etc.) 34,160 1999 34,614 2002 C of D Beach 24,901 1999 26,401 26,620 2002 C of D Beach 31,040 1999 26,108 26,525 2002 C of D Beach 31,040 1999 26,108 26,545 2002 C of D Mort Morth Group 1 (N of HB20) 31,040 1999 27,645 2002 C of D Mort Morth Group 2 (Granbury 16,370 1999 27,645 2002 C of R Montgormery 21,640	37,098 83,600 0 35,306 10 27,056 0 0 0 0 0	m m	+ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$	
Northwest Hwy 53,000 1999 57,369 62,353 2002 C of D Spring Valley 31,160 1999 33,729 N/A 2 2 Preston 31,160 1999 33,739 N/A 2 3 <td< td=""><td>63,600 0 35,306 27,056 0 0 0</td><td>m m</td><td></td><td></td></td<>	63,600 0 35,306 27,056 0 0 0	m m		
Spring Valley 31,160 1999 33,729 N/A N N Preston 31,580 1999 34,183 N 2002 Cof D Preston 31,580 1999 34,183 N 2002 Cof D Preston 34,190 1999 34,183 N 2002 Cof D Preston 46,000 1999 26,101 26,525 2002 Cof D Forest 46,000 1999 26,108 49,752 26,50 Cof D Baach 31,720 1999 26,108 34,335 N N N Baach 31,040 1999 27,545 1999 27,545 N N N Worth Group 3 (Royal E of US 75, etc.) 31,040 1999 27,545 N	0 0 35,306 49,516 27,056 0 0	m m		00. 40
Preston 31,560 1999 34,163 Cof D Cord D Preston 34,190 1999 37,008 34,614 2002 Cof D Dallas Group 2 (Preston, Royal, etc.) 46,000 1999 37,008 34,514 2002 Cof D Forest 46,000 1999 26,401 26,526 2002 Cof D Royal 24,300 1999 26,401 26,526 2002 Cof D Reach 24,300 1999 26,401 26,526 2002 Cof D Bastond 24,120 1999 26,401 28,509 26,508 2002 Cof D Worth Group 1 (N of IH-820) 31,720 1999 27,645 2002 Cof R Monclarriver 24,120 1999 27,645 2002 Cof R Montlooup 1 (N of IH-820) 16,370 1999 27,645 2002 Cof R Montlooup 2 (Granbury-Wabash) Eot Worth Group 2 (Granbury-Wabash) 25,664 2002 Cof R Montloo	0 36,306 49,516 27,056 0 0	m m	+ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$ $+$	0. 40
Preston $34,50$ 1999 $37,008$ $34,614$ 2002 Cof D Dallas Group 2 (Preston, Royal, etc.) $46,000$ 1999 $49,792$ $48,545$ 2002 C of D Forest $24,390$ 1999 $26,401$ $26,555$ 2002 C of D Royal $21,300$ 1999 $25,401$ $26,555$ 2002 C of D Basel $21,720$ 1999 $25,610$ 299 $26,108$ 2002 C of D Western Center $31,720$ 1999 $25,108$ 2002 C of D 2002 C of D Western Center $31,040$ 1999 $27,646$ 2002 2002 2010 Western Center $31,040$ 1999 $27,646$ 2002 2002 2002 Western Center $21,740$ 1999 $27,646$ 2002 2016 Western Center $25,564$ 2002 2002 2017 2002 2017 Montgornery </td <td>35,306 49,516 27,056 0 0</td> <td></td> <td>+++++</td> <td>4 00</td>	35,306 49,516 27,056 0 0		+++++	4 00
Dallas Group 2 (Preston, Royal, etc.) A6,000 1999 49,792 48,545 2002 C of D Royal 24,390 1999 26,401 26,555 2002 C of D Royal 21,720 1999 34,355 2002 C of D Baaswood 24,120 1999 34,355 2002 C of D Basswood 24,120 1999 34,355 26 2002 C of D Western Center 31,040 1999 26,108 26,108 26,401 26,401 Worth Group 1 (N of IH-820) 16,370 1999 27,645 2002 20,5 Worth Group 2 (Granbury 16,370 1999 27,645 2002 20,6 Worth Group 2 (Granbury Wabash) 25,540 1999 27,645 2002 20,6 Montgornery 21,640 1999 27,645 2002 20,6 20 Montgornery 21,640 1999 27,645 2002 20,6 20 Montgornery 21,640<	49,516 27,056 0 0			8
Forest 46,000 1999 49,722 48,545 2002 C of D Royal 24,390 1999 26,401 26,525 2002 C of D Dallas Group 3 (Royal E of US 75, etc.) 31,720 1999 26,401 26,525 2002 C of D Beach 31,720 1999 34,335 AP AP AP Basswood 24,120 1999 33,599 AP AP AP Rot Venth Group 1 (N of IH-820) 31,040 1999 35,599 AP AP AP McCart/Granbury 16,370 1999 37,594 AP AP AP McCart/Granbury 16,370 1999 27,645 AP AP AP McCart/Granbury 25,540 1999 27,544 AP AP AP Montgomery 216,40 1999 23,424 AP AP AP University 22,640 1999 24,744 AP AP AP <	49,516 27,056 0 0	ლ ლ ლ თ თ	+ + + + + + + + + + + + + + + + + + +	8
Royal 24,300 1999 26,401 26,525 2002 C of D Dallas Group 3 (Royal E of US 75, etc.) 31,720 1999 34,335 7 2 c c c c c d	27,056 0 0		+++	8
Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of US 75, etc.) Dallas Group 3 (Royal E of C of Royal E of C of R O of C O R O of C of R O of C O R O O O O O O O O O O C O C O R O R		ო ო ო	\vdash	
Beach $31,720$ 1999 $34,335$ m m Basswood $24,120$ 1999 $26,106$ m m m Western Center $31,040$ 1999 $33,599$ m m m Western Center $31,040$ 1999 $33,599$ m m m Western Center $31,040$ 1999 $17,719$ m m m McCart/Granbury $25,540$ 1999 $27,645$ m m m Fort Worth Group 2 (Granbury-Wabash) $25,540$ 1999 $27,645$ m m m Montgomery $25,540$ 1999 $27,424$ m m m Montgomery $21,640$ 1999 $23,424$ m m m University $21,640$ 1999 $24,744$ m m m University 21999 $21,640$ 19999 $20,702$ m		ოო		
Basswood 24,120 1999 26,108 Western Center 31,040 1999 35,599 <		ო	2,602 862.0	0
Western Centter 31,040 1999 33,599 Fort Worth Group 1 (N of IH-B20) 56,540 1999 17,719 <td< td=""><td></td><td>1.00</td><td>2,609 864.4</td><td>4</td></td<>		1.00	2,609 864.4	4
Fort Worth Group 1 (N of IH-B20) Fort Worth Group 1 (N of IH-B20) 16,370 1999 17,119 P P McCart/Granbury 16,370 1999 17,119 P P P McCart/Granbury 25,540 1999 27,645 P P P Fort Worth Group 2 (Granbury-Wabash) 25,540 1999 27,645 P P P Camp Bowie/Th 21,640 1999 25,654 P P P P Montgomery 21,640 1999 23,424 P P P P P P Montgomery 21,640 1999 23,424 P		m	2,619 867.4	.4 Split into 2 segments
McCart/Granbury 16,370 1999 17,719 McCart/Granbury Fort Worth Group 2 (Granbury-Wabash) 25,540 1999 27,645 McCart/Granbury Fort Worth Group 2 (Granbury-Wabash) 23,710 1999 27,644 McCart/Granbury Camp Bowier/Thh 21,640 1999 25,664 McCart/Granbury McCart/Granbury Camp Bowier/Thh 21,640 1999 24,744 McCart/Granbury McCart/Granbury University 22,860 1999 24,744 McCart/Granbury McCart/Granbury Montgomery 21,640 1999 24,744 McCart/Granbury McCart/Granbury Montgomery 21,640 1999 24,744 McCart/Granbury McCart/Granbury Month Group 3 (Camp Bowie, etc.) 34,550 1999 24,744 McGanbury McGanbury Belt Line/First 34,550 1999 37,398 McGanbury McGanbury Month Group 3 (Camp Bowie, etc.) 34,550 1999 C of G McGanbury McGanbury Month Group 3 (Camp Bowie, et		m	_	2
Wabash/Granbury 25,540 1999 27,645 Fort Worth Group 2 (Granbury-Wabash) 23,710 1999 23,664	1	2	+	
23/710 1999 25,664		2	2,661 879.4	4
Camp Bower/Tth 23.710 1999 25.664 A A Montgomery 21.640 1999 23.424 A A University 21.640 1999 24.744 A A Ontidometry 22.960 1999 24.744 A A Fort Worth Group 3 (Camp Bowie, etc.) 20 1999 37.719 40,900 2002 C of R Belt Line 34.550 1999 37.338 A A A First 43.510 1999 37.558 47.673 1999 C of G Juptier 34.570 1999 37.528 40.9200 C of G	45,365	2	-	
Montgomery 21,640 1999 23,424 A University 22,860 1999 24,744 A A Fort Worth Group 3 (Camp Bowie, etc.) 22,860 1999 24,744 A A Bett Line 34,550 1999 37,396 A A A Bett Line/First 34,550 1999 47,205 47,673 1999 C of R First 34,560 1999 37,526 47,673 1999 C of G Juptier 34,570 1999 37,528 40,920 C of G C of G		-	2,680 883.9	ōj
University 22,860 1999 24,744 Constraint Fort Worth Group 3 (Camp Bowie, etc.) 20,390 2022 C of R Belt Line 34,550 1999 37,79 40,900 2002 C of R Belt Line 34,550 1999 37,398 2022 C of R 1 First 34,550 1999 37,526 47,673 1999 C of G Juptier 34,570 1999 37,528 40,920 2002 C of G		-	-	-
Fort Worth Group 3 (Camp Bowle, etc.) A0,390 1999 43,719 40,900 2002 C of R Belt Line/First 34,550 1999 37,398 2002 C of R First 34,550 1999 37,308 2002 C of R Belt Line/First 34,550 1999 37,205 47,673 1999 C of G First 33,510 1999 37,528 40,920 2002 C of G	0 24,744		2,990 990.0	0
Delit Line Delit Line/First 34,530 1999 37,518 40,500 2002 C 016 First 43,610 1999 47,205 47,673 1999 C 0f 6 First 34,670 1999 37,528 40,920 C 0f R	44 740		1 204 004 4	
Direct Direct <thdirect< th=""> <thdirect< th=""> <thdirect< td="" th<=""><td>- C</td><td></td><td>7.735 897.6</td><td></td></thdirect<></thdirect<></thdirect<>	- C		7.735 897.6	
Jupiter 34,670 1999 37,528 40,920 2002 C of R	51,603	•	+	ji ←
	41.738	-	2.749 903.8	0
1999 43,222 51,854 1999 C of G	56,128	÷	2,765 908.4	4
1999 31,369 30,183 1999 CofG		2	2,783 916.4	4
		1	2,796 920.4	4
199 Buckingham 37,090 1999 40,147 0 0	0 40,147	1	2,808 925.0	0
200 Skillman/Forest 50,040 1999 54,165 50,748 2001 C of D 52,798		-	2,824 928.7	7
201 Forest/Ave B & D/SH 66 51,790 1999 56,059 6	0 56,059	2	2,834 932.0	0
202 Arapaho 40,690 1999 44,044 41,270 2002 C of R 42,095		1	2,844 934.5	5
203 Arapaho/Garland Ave 25,930 1999 28,067 0 0		1	2,857 939.5	5
204 Richardson-Garland Group 1	529 891	1 16		

APPENDIX C

DETAILED STUDY STATISTICS FROM BEFORE AND AFTER TRAVELTIME STUDIES

			AM	Northb	ound B	efore R	etiming	ţ					
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)		Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1166	Claremont	34	0.2	23	16	3	31	34	0.01	1.47	13.11	0.99
3	2533	Bardin	69	0.8	25	30	14	37	69	0.03	2.66	25.98	1.62
4	812	IH20 EB	53	0.8	10	40	28	50	53	0.02	1.82	14.86	1.04
5	1088	IH20 WB	25	0.2	29	9	3	14	25	0.01	1.31	14.00	0.92
6	452	Sara Jane	9	0.0	36	1	0	2	9	0.01	0.75	9.36	0.59
7	1838	Forum	78	1.0	16	50	29	59	78	0.02	2.13	20.68	0.88
8	2711	Mayfield	57	0.2	32	16	1	25	57	0.03	2.93	32.50	2.02
9	5367	Arkansas	105	0.6	35	23	12	26	105	0.05	3.76	44.22	2.01
10	2111	Pioneer Pkwy	44	0.2	33	11	4	16	44	0.02	2.13	24.48	1.42
11	3223	Marshall	74	0.6	30	25	12	29	74	0.03	3.26	36.72	2.06
12	2718	Timberlake	44	0.0	42	3	0	3	44	0.02	2.14	27.12	1.36
13	2771	W.E. Roberts/Sherman	44	0.0	43	2	0	0	44	0.02	1.54	19.99	0.75
14	1001	Jefferson/Abram	125	0.6	5	110	94	119	125	0.03	2.80	24.84	0.73
15	547	SH 180/Main	50	0.8	8	42	26	49	49	0.01	1.32	10.36	0.58
Total	28338		813	6.0	24	379	226	463	813	0.32	30.03	318.23	16.96
	To	otal per mile	152	1.1		71	42	86	151	0.06	5.60	59.29	3.16

Detailed Study Statistics for Great Southwest Farkway Confider	Detailed Study Statistics	for Great Southwest	Parkway Corridor
--	---------------------------	---------------------	------------------

			AI	M Nort	hbound	After I	Retimin	g					
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Total Delay (s)	Time <= 0 MPH	Time <= 35 MPH	Time <= 55 MPH	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	30	0.0	27	12	0	23	30	0.01	1.62	15.83	1.18
3	2441	Bardin	83	1.0	20	46	30	52	83	0.03	2.49	23.94	1.19
4	898	IH-20 EBFR	42	0.8	15	28	12	42	42	0.01	1.68	12.49	1.14
5	1102	IH-20 WBFR	22	0.0	34	5	0	13	22	0.01	1.42	16.21	1.08
6	446	Sara Jane Pkwy	8	0.0	39	1	0	1	8	0.00	0.52	6.77	0.38
7	1829	Forum	56	0.4	22	28	10	40	56	0.02	1.44	13.93	0.57
8	2729	Mayfield	64	0.4	29	22	5	35	64	0.03	3.14	33.92	2.15
9	5393	Arkansas	100	0.4	37	19	13	26	100	0.05	3.99	49.03	2.25
10	2081	Pioneer	52	0.4	27	20	12	26	52	0.02	1.94	21.05	1.11
11	3246	Marshall	69	0.2	32	20	8	26	69	0.03	2.91	33.29	1.78
12	2715	Timberlake	48	0.2	38	7	1	14	48	0.03	2.30	27.89	1.50
13	2800	W.E. Roberts / Sherman	47	0.0	41	4	0	9	47	0.02	1.98	25.21	1.18
14	1007	Jefferson / Abram	52	1.4	13	37	18	45	52	0.02	1.54	11.44	0.80
15	537	Main St / Division	26	0.2	14	18	8	25	26	0.01	0.86	7.30	0.49
Total	28411		700	5.4	28	268	117	378	699	0.30	27.83	298.30	16.80
	Tot	al per mile	130	1.0		50	22	70	130	0.06	5.17	55.44	3.12

		Ree	ductions	for AN	1 Nortl	ıbound	(Befor	e-Afte	r)				
Node Number	Length (ft)	Node Names	Travel time (s)		Avg Speed (mph)	Total Delay (s)	Time <= 0 MPH	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	4	0.2		4	3	8	4	-1E-04	-1E-01	-3E+00	-2E-01
3	2441	Bardin	-13	-0.2		-15	-15	-15	-13	-7E-04	2E-01	2E+00	4E-01
4	898	IH-20 EBFR	11	0.0		12	16	8	11	2E-03	1E-01	2E+00	-1E-01
5	1102	IH-20 WBFR	3	0.2		3	3	2	3	3E-04	-1E-01	-2E+00	-2E-01
6	446	Sara Jane Pkwy	1	0.0		1	0	1	1	1E-03	2E-01	3E+00	2E-01
7	1829	Forum	22	0.6		22	18	19	22	6E-03	7E-01	7E+00	3E-01
8	2729	Mayfield	-7	-0.2		-7	-4	-10	-7	-1E-03	-2E-01	-1E+00	-1E-01
9	5393	Arkansas	5	0.2		3	-1	0	5	-2E-03	-2E-01	-5E+00	-2E-01
10	2081	Pioneer	-8	-0.2		-9	-8	-9	-8	-3E-04	2E-01	3E+00	3E-01
11	3246	Marshall	6	0.4		6	4	4	6	2E-03	4E-01	3E+00	3E-01
12	2715	Timberlake	-4	-0.2		-4	-1	-11	-4	-1E-03	-2E-01	-8E-01	-1E-01
13	2800	W.E. Roberts / Sherman	-2	0.0		-2	0	-9	-2	-2E-03	-4E-01	-5E+00	-4E-01
14	1007	Jefferson / Abram	73	-0.8		74	76	73	73	1E-02	1E+00	1E+01	-7E-02
15	537	Main St / Division	24	0.6		23	18	24	24	5E-03	5E-01	3E+00	9E-02
Total	28411		114	0.6		111	109	85	113	2E-02	2E+00	2E+01	2E-01
	Red	uction per mile	22	0.1		21	20	16	21	0.00	0.42	3.85	0.04
	9	% Reduction	14	10		30	49	19	14	7	8	7	1

			Mid l	Day No	rthbou	nd Befo	re Reti	ming					
Node Number	Length (ft)	Node Names	Travel time (s)		Avg	Total Delay (s)		Time <= 35	Time <= 55 MPH	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1158	Claremont	31	0.4	26	13	3	21	31	0.01	1.48	13.93	1.06
3	2440	Bardin	55	0.6	30	18	6	19	55	0.02	2.09	20.92	1.24
4	927	IH20 EB	46	0.8	14	32	18	40	46	0.02	1.70	13.81	1.05
5	1071	IH20 WB	21	0.0	34	4	0	10	21	0.01	1.14	12.81	0.81
6	463	Sara Jane	9	0.0	37	2	0	4	9	0.00	0.54	6.23	0.40
7	1840	Forum	44	0.8	29	16	6	18	44	0.02	1.68	17.32	1.02
8	2706	Mayfield	45	0.0	41	4	0	5	45	0.03	2.34	28.86	1.56
9	5378	Arkansas	93	0.2	40	11	4	9	93	0.04	2.90	34.81	1.32
10	2086	Pioneer Pkwy	57	0.8	25	25	13	28	57	0.02	2.18	22.66	1.29
11	3241	Marshall	58	0.2	38	9	0	12	58	0.03	2.95	35.01	1.99
12	2706	Timberlake	45	0.0	41	3	0	2	45	0.02	1.87	23.57	1.08
13	2784	W.E. Roberts/Sherman	45	0.0	42	2	0	0	45	0.02	1.57	20.30	0.78
14	1014	Jefferson/Abram	29	0.4	24	14	6	16	29	0.01	0.84	8.22	0.40
15	532	SH 180/Main	33	0.6	11	25	13	32	32	0.01	0.93	6.88	0.47
Total	28346		610	4.8	32	176	68	215	610	0.27	24.23	265.33	14.48
	Tot	al per mile	114	0.9		33	13	40	114	0.0511	4.51	49.42	2.70

		N	lid Day I	Northb	ound A	After R	etimir	ng					
Node Number	Length (ft)	Node Names	Travel time (s)		Avg Speed (mph)		<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1156	Claremont	38	0.6	21	20	5	33	38	0.02	1.77	14.64	1.28
3	2467	Bardin	70	0.6	24	32	13	50	70	0.03	2.71	25.79	1.68
4	913	IH 20 EBFR	28	0.6	22	14	3	26	28	0.01	1.56	13.27	1.22
5	1089	IH 20 WBFR	20	0.0	37	3	0	6	20	0.01	1.00	12.11	0.67
6	437	Sara Jane Pkwy	8	0.0	36	1	0	4	8	0.00	0.52	6.51	0.38
7	1840	Forum	47	0.6	27	19	13	21	47	0.02	1.68	19.53	0.89
8	2707	Mayfield	52	0.2	35	11	5	15	52	0.03	2.34	26.77	1.48
9	5392	Arkansas	91	0.2	40	9	6	10	91	0.05	3.36	42.82	1.75
10	2101	Pioneer	41	0.4	35	9	2	13	41	0.02	1.53	16.13	0.89
11	3254	Marshall	63	0.6	35	14	2	21	63	0.03	2.88	33.12	1.87
12	2688	Timberlake	49	0.2	38	7	1	11	49	0.03	2.57	31.23	1.75
13	2797	W.E. Roberts / Sherman	46	0.0	42	3	0	3	46	0.02	1.85	23.75	1.06
14	1037	Jefferson / Abram	27	0.2	26	11	7	12	27	0.01	0.80	8.23	0.37
15	520	Main St / Division	17	0.2	21	9	0	16	16	0.01	0.48	3.72	0.26
Total	28398		597	4.4	32	163	56	240	597	0.28	25.06	277.63	15.52
	-	Total per mile	111	0.8		30	10	45	111	0.0514	4.66	51.62	2.89

		Reductio	ns for	Mid Da	ay Nort	hbour	nd (Be	fore-A	After)				
Node Number	Length (ft)	Node Names	Travel time (s)		Avg Speed (mph)		<= 0		<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	-7	-0.2		-7	-2	-12	-7	-2E-03	-3E-01	-7E-01	-2E-01
3	2441	Bardin	-15	0.0		-14	-7	-31	-15	-4E-03	-6E-01	-5E+00	-4E-01
4	898	IH 20 EBFR	18	0.2		18	15	15	18	3E-03	1E-01	5E-01	-2E-01
5	1102	IH 20 WBFR	1	0.0		1	0	4	1	6E-04	1E-01	7E-01	1E-01
6	446	Sara Jane Pkwy	0	0.0		0	0	0	0			-3E-01	
7	1829	Forum	-4	0.2		-4	-7	-4	-4	-4E-04	-4E-03	-2E+00	1E-01
8	2729	Mayfield	-7	-0.2		-8	-5	-10	-7	-1E-03	-2E-03	2E+00	8E-02
9	5393	Arkansas	2	0.0		2	-2	-2	2	-3E-03	-5E-01	-8E+00	-4E-01
10	2081	Pioneer	16	0.4		16	11	16	16	4E-03	7E-01	7E+00	4E-01
11	3246	Marshall	-5	-0.4		-5	-2	-8	-5	-1E-04	8E-02	2E+00	1E-01
12	2715	Timberlake	-4	-0.2		-4	-1	-9	-4	-3E-03	-7E-01	-8E+00	-7E-01
13	2800	W.E. Roberts / Sherman	0	0.0		-1	0	-3	0	-1E-03	-3E-01	-3E+00	-3E-01
14	1007	Jefferson / Abram	2	0.2		3	-1	4	2	4E-04	5E-02	-9E-03	3E-02
15	537	Main St / Division	16	0.4		16	13	16	16	4E-03	5E-01	3E+00	2E-01
Total	28411		13	0.4		13	12	-24	13	-2E-03	-8E-01	-1E+01	-1E+00
	R	eduction per mile	3	0.1		2	2	-4	3	0.00	-0.15	-2.20	-0.19
		% Reduction	2	9		7	17	-11	2	-1	-3	-4	-7

			PM N	orthbo	und Be	efore F	letimir	ng					
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Delay	Time <= 0 MPH	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1180	Claremont	35	0.2	23	17	8	22	35	0.01	1.50	15.32	0.96
3	2429	Bardin	63	0.4	26	26	15	27	63	0.02	2.15	22.85	1.13
4	906	IH20 EB	82	1.4	8	68	40	80	82	0.02	2.43	18.66	1.24
5	1080	IH20 WB	22	0.0	34	5	0	12	22	0.01	1.39	15.50	1.06
6	459	Sara Jane	8	0.0	37	1	0	2	8	0.00	0.42	5.28	0.28
7	1842	Forum	40	0.4	32	12	6	13	40	0.02	1.53	17.68	0.87
8	2691	Mayfield	49	0.2	37	8	3	10	49	0.03	2.08	24.78	1.25
9	5386	Arkansas	103	0.6	36	21	9	23	103	0.05	3.53	40.68	1.81
10	2088	Pioneer Pkwy	89	0.8	16	57	39	60	89	0.03	3.14	32.97	1.70
11	3238	Marshall	63	0.2	35	14	2	18	63	0.03	3.14	36.78	2.11
12	2711	Timberlake	46	0.0	41	4	0	6	46	0.02	2.07	26.06	1.27
13	2787	W.E. Roberts/Sherman	48	0.0	39	5	0	8	48	0.03	2.21	27.10	1.39
14	1013	Jefferson/Abram	52	1.0	13	37	22	42	52	0.02	1.46	12.23	0.69
15	538	SH 180/Main	23	0.4	16	15	7	22	22	0.01	1.11	9.90	0.80
Total	28348		723	5.6	27	289	149	345	723	0.30	28.16	305.77	16.57
	То	otal per mile	135	1.0	1.0	54	28	64	134	0.06	5.24	56.85	3.08

			PM N	orthbo	ound A	fter Re	timin	g					
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Total Delay (s)	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1182	Claremont	25	0.0	32	7	0	17	25	0.01	1.49	15.24	1.11
3	2439	Bardin	62	0.6	27	25	14	29	62	0.02	2.09	22.70	1.09
4	926	IH 20 EBFR	45	0.4	14	31	23	35	45	0.01	1.53	15.71	0.80
5	1073	IH 20 WBFR	24	0.4	30	8	0	14	24	0.01	1.16	11.96	0.81
6	472	Sara Jane Pkwy	9	0.0	37	1	0	3	9	0.01	0.69	8.53	0.54
7	1822	Forum	39	0.4	32	11	7	12	39	0.02	1.36	15.61	0.73
8	2719	Mayfield	57	0.6	33	16	10	20	57	0.03	2.51	29.33	1.56
9	5368	Arkansas	83	0.0	44	3	0	7	83	0.05	3.50	44.85	2.01
10	2090	Pioneer	60	1.0	24	28	18	34	60	0.02	1.85	17.82	0.93
11	3261	Marshall	63	0.2	35	13	2	22	63	0.03	3.16	35.85	2.15
12	2694	Timberlake	56	0.6	33	15	7	19	56	0.03	2.54	29.87	1.62
13	2787	W.E. Roberts / Sherman	45	0.0	43	2	0	5	45	0.02	2.05	26.35	1.27
14	1028	Jefferson / Abram	39	0.4	18	23	15	27	39	0.01	1.13	10.33	0.54
15	522	Main St / Division	17	0.2	21	9	0	16	17	0.01	0.64	5.04	0.43
Total	28383		622	4.8	31	190	96	261	622	0.29	25.70	289.19	15.59
	T	otal per mile	116	0.9	6	35	18	48	116	0.05	4.78	53.80	2.90

		Redu	ctions	for PM	I North	bound	l (Befo	ore-Af	ter)				
Node Number	Length (ft)	Node Names	Travel time (s)		Avg Speed (mph)		<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	9	0.2		9	8	5	9	1E-03	1E-02	8E-02	-2E-01
3	2441	Bardin	2	-0.2		2	0	-1	2	-1E-04	6E-02	2E-01	5E-02
4	898	IH 20 EBFR	37	1.0		37	16	45	37	8E-03	9E-01	3E+00	4E-01
5	1102	IH 20 WBFR	-3	-0.4		-3	0	-2	-3	1E-04	2E-01	4E+00	2E-01
6	446	Sara Jane Pkwy	0	0.0		0	0	-2	0	-1E-03	-3E-01	-3E+00	-3E-01
7	1829 Forum		1	0.0		1	-1	0	1	6E-04	2E-01	2E+00	1E-01
8	2729	Mayfield	-7	-0.4		-7	-7	-10	-7	-3E-03	-4E-01	-5E+00	-3E-01
9	5393	Arkansas	20	0.6		18	9	16	20	4E-04	3E-02	-4E+00	-2E-01
10	2081	Pioneer	29	-0.2		29	21	27	29	8E-03	1E+00	2E+01	8E-01
11	3246	Marshall	0	0.0		0	1	-4	0	5E-04	-2E-02	9E-01	-3E-02
12	2715	Timberlake	-10	-0.6		-11	-7	-13	-10	-4E-03	-5E-01	-4E+00	-4E-01
13	2800	W.E. Roberts / Sherman	4	0.0		3	0	3	4	1E-04	2E-01	8E-01	1E-01
14	1007	Jefferson / Abram	13	0.6		14	7	15	13	3E-03	3E-01	2E+00	2E-01
15	537	Main St / Division	6	0.2		6	6	6	6	3E-03	5E-01	5E+00	4E-01
Total	28411		101	0.80		99	53	85	101	2E-02	2E+00	2E+01	1E+00
	Red	luction per mile	19	0.15		18	10	16	19	0.00	0.46	3.06	0.18
	9	% Reduction	14	14		34	35	24	14	6	9	5	6

			AM So	outhbo	ound B	efore F	Retimi	ng					
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Delay		Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	SH 180/Main											
2	596	Jefferson/Abram	44	1.0	9	34	19	43	44	0.01	1.65	11.42	1.07
3	1032	W.E. Roberts/Sherman	24	0.4	29	8	2	14	24	0.01	1.56	15.79	1.22
4	2796	Timberlake	47	0.0	41	4	0	3	47	0.02	2.06	25.27	1.26
5	2683	Marshall	49	0.2	38	8	1	9	49	0.02	1.70	19.55	0.90
6	3224	Pioneer Pkwy	72	0.4	31	23	11	27	72	0.03	2.92	33.54	1.74
7	2125	Arkansas	56	0.6	26	24	12	27	56	0.02	2.29	24.43	1.42
8	5371	Mayfield	106	0.8	35	24	11	27	106	0.05	4.27	49.08	2.51
9	2705	Forum	64	0.2	29	23	1	39	64	0.03	2.49	27.04	1.49
10	1845	Sara Jane	53	0.6	24	24	5	36	53	0.02	2.60	25.74	1.83
11	442	IH20 WB	37	0.8	8	30	19	36	37	0.01	1.18	8.57	0.65
12	1076	IH20 EB	25	0.4	29	8	1	15	25	0.01	1.47	13.98	1.13
13	934	Bardin	20	0.0	32	5	0	11	20	0.01	1.08	11.01	0.79
14	2456	Claremont	54	0.6	31	16	4	18	54	0.02	1.81	18.72	0.96
15	1079	Fairmont	31	0.4	24	14	1	25	30	0.01	1.17	11.11	0.73
Total	28364		680	6.4	28	247	88	329	680	0.30	28.25	295.25	17.71
	То	otal per mile	127	1.2	5	46	16	61	127	0.06	5.26	54.96	3.30

			AM S	outhbo	ound A	fter Re	etiming	g					
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Main St / Division											
2	625	Jefferson / Abram	28	0.4	15	18	4	28	28	0.01	1.17	8.58	0.82
3	1023	W.E. Roberts / Sherman	33	0.4	21	17	8	26	33	0.01	1.61	15.95	1.13
4	2821	Timberlake	47	0.0	41	4	0	7	47	0.03	2.43	30.38	1.60
5	2661	Marshall	59	0.8	31	18	9	23	59	0.03	1.79	18.36	0.87
6	3230	Pioneer	76	0.6	29	27	12	37	76	0.03	3.14	32.98	1.95
7	2108	Arkansas	66	1.0	22	34	20	41	66	0.03	2.73	27.23	1.74
8	5394	Mayfield	112	0.8	33	30	21	39	112	0.06	4.74	55.57	2.85
9	2720	Forum	56	0.0	33	15	0	27	56	0.03	2.49	28.74	1.58
10	1852	Sara Jane Pkwy	65	0.8	19	37	21	47	65	0.02	2.68	26.59	1.69
11	453	IH 20 WBFR	11	0.0	28	4	0	9	11	0.01	0.64	5.75	0.50
12	1093	IH 20 EBFR	19	0.0	39	2	0	3	19	0.01	0.98	12.23	0.64
13	887	Bardin	46	1.0	13	32	22	39	46	0.01	1.17	8.68	0.49
14	2504	Claremont	47	0.0	37	9	0	11	47	0.02	2.19	23.92	1.44
15	1040	Fairmont	38	0.4	19	22	11	29	38	0.01	0.81	7.54	0.21
Total	28411			6.2	28	268	129	367	703	0.30	28.56	302.49	17.50
	Т	otal per mile	131	1.2	5	50	24	68	131	0.06	5.31	56.22	3.25

		Redu	ctions	for AM	South	bound	d (Befe	ore-Af	ter)				
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Total Delay (s)	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	16	0.6		17	14	15	16	4E-03	5E-01	3E+00	3E-01
3	2441	Bardin	-9	0.0		-9	-6	-12	-9	-6E-04	-5E-02	-2E-01	9E-02
4	898	IH 20 EBFR	0	0.0		0	0	-5	0	-2E-03	-4E-01	-5E+00	-3E-01
5	1102	IH 20 WBFR	-10	-0.6		-10	-8	-14	-10	-2E-03	-8E-02	1E+00	4E-02
6	446	Sara Jane Pkwy	-5	-0.2		-5	-1	-10	-5	-8E-04	-2E-01	6E-01	-2E-01
7	1829	Forum	-10	-0.4		-10	-8	-14	-10	-3E-03	-4E-01	-3E+00	-3E-01
8	2729	Mayfield	-6	0.0		-6	-10	-11	-6	-4E-03	-5E-01	-6E+00	-3E-01
9	5393	Arkansas	8	0.2		9	1	12	8	1E-04	7E-03	-2E+00	-9E-02
10	2081	Pioneer	-12	-0.2		-12	-16	-11	-12	-2E-03	-8E-02	-8E-01	1E-01
11	3246	Marshall	26	0.8		27	19	26	26	6E-03	5E-01	3E+00	1E-01
12	2715	Timberlake	6	0.4		6	1	13	6	3E-03	5E-01	2E+00	5E-01
13	2800	W.E. Roberts / Sherman	-26	-1.0		-27	-22	-28	-26	-4E-03	-9E-02	2E+00	3E-01
14	1007	Jefferson / Abram	7	0.6		8	4	6	7	-7E-04	-4E-01	-5E+00	-5E-01
15	537	Main St / Division	-8	0.0		-8	-10	-5	-7	5E-04	4E-01	4E+00	5E-01
Total	28411		-23	0.2		-21	-41	-38	-23	-5E-03	-3E-01	-7E+00	2E-01
	Rec	luction per mile	-4	0.0		-4	-8	-7	-4	0.00	-0.05	-1.26	0.04
	q	% Reduction	-3	3		-8	-46	-11	-3	-1	-1	-2	1

		Μ	id Day	South	bound	Befor	e Reti	ming					
Node Number	Length (ft)	Node Names	Travel time (s)		Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	SH 180/Main											
2	613	Jefferson/Abram	43	0.8	10	34	17	43	43	0.01	1.50	10.11	0.92
3	1030	W.E. Roberts/ Sherman	20	0.0	35	4	0	7	20	0.01	1.54	17.14	1.23
4	2795	Timberlake	50	0.2	38	7	1	8	50	0.03	2.08	25.01	1.24
5	2682	Marshall	55	0.4	33	14	6	16	55	0.02	2.01	22.91	1.11
6	3210	Pioneer Pkwy	83	1.0	27	34	16	41	83	0.03	3.25	34.34	1.96
7	2129	Arkansas	40	0.0	37	7	0	14	40	0.02	2.20	25.15	1.55
8	5363	Mayfield	93	0.2	39	11	1	13	93	0.05	3.81	47.35	2.19
9	2699	Forum	54	0.6	34	13	3	15	54	0.03	2.19	24.60	1.33
10	1849	Sara Jane	34	0.0	37	6	0	9	34	0.02	1.63	18.42	1.09
11	447	IH20 WB	36	0.8	8	29	20	35	36	0.01	1.03	7.50	0.51
12	1076	IH20 EB	21	0.0	35	4	0	8	21	0.01	1.26	13.86	0.94
13	915	Bardin	16	0.0	38	2	0	1	16	0.01	0.66	8.19	0.38
14	2483	Claremont	49	0.2	35	11	2	7	49	0.02	1.40	15.44	0.60
15	1054	Fairmont	24	0.4	30	8	2	11	24	0.01	0.94	10.12	0.57
Total	28345		618	4.6	31	184	68	229	618	0.28	25.50	280.14	15.60
	То	otal per mile	115	0.9	6	34	13	43	115	0.05	4.75	52.18	2.91

		N	lid Day	South	nbound	After	Retim	ing					
Node Number	Length (ft)	Node Names	Travel time (s)	# 01	Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Main St / Division											
2	621	Jefferson / Abram	22	0.2	19	12	3	21	22	0.01	1.22	9.91	0.94
3	1036	W.E. Roberts / Sherman	32	0.6	22	16	7	21	32	0.01	1.31	13.15	0.84
4	2789	Timberlake	47	0.0	41	4	0	7	47	0.03	2.56	31.83	1.74
5	2679	Marshall	72	0.6	26	31	23	34	72	0.03	2.04	21.86	0.86
6	3234	Pioneer	85	0.6	26	36	24	44	85	0.04	3.34	37.28	1.94
7	2111	Arkansas	60	1.0	24	28	10	37	60	0.02	2.58	25.12	1.71
8	5412	Mayfield	87	0.0	43	4	0	9	87	0.05	4.03	51.68	2.49
9	2701	Forum	41	0.0	45	0	0	0	41	0.02	1.49	19.85	0.74
10	1838	Sara Jane Pkwy	31	0.2	40	3	0	5	31	0.01	0.92	10.63	0.42
11	452	IH 20 WBFR	15	0.4	21	8	2	12	15	0.01	0.73	5.89	0.55
12	1070	IH 20 EBFR	19	0.0	38	2	0	5	19	0.01	1.04	12.96	0.71
13	926	Bardin	20	0.2	31	6	0	11	20	0.01	0.70	6.36	0.41
14	2465	Claremont	48	0.4	35	11	0	11	48	0.02	1.92	20.67	1.17
15	1032	Fairmont	20	0.0	35	4	0	8	20	0.01	1.10	12.06	0.79
Total	28366			4.2	32	166	69	226	600	0.28	24.98	279.23	15.30
	Т	otal per mile	112	0.8	6	31	13	42	112	0.05	4.65	51.98	2.85

		Reduction	ons for	Mid D	ay Sou	ithbou	ınd (B	efore-	After)				
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	21	0.6		21	14	22	21	4E-03	3E-01	2E-01	-2E-02
3	2441	Bardin	-12	-0.6		-12	-7	-14	-12	-3E-04	2E-01	4E+00	4E-01
4	898	IH 20 EBFR	3	0.2		3	1	1	3	-2E-03	-5E-01	-7E+00	-5E-01
5	1102	IH 20 WBFR	-16	-0.2		-17	-17	-18	-16	-3E-03	-2E-02	1E+00	3E-01
6	446	Sara Jane Pkwy	-3	0.4		-3	-8	-3	-3	-1E-03	-9E-02	-3E+00	2E-02
7	1829 Forum		-21	-1.0		-21	-10	-24	-21	-4E-03	-4E-01	3E-02	-2E-01
8	2729	Mayfield	7	0.2		7	1	4	7	-1E-03	-2E-01	-4E+00	-3E-01
9	5393	Arkansas	13	0.6		13	3	15	13	3E-03	7E-01	5E+00	6E-01
10	2081	Pioneer	3	-0.2		3	0	4	3	2E-03	7E-01	8E+00	7E-01
11	3246	Marshall	21	0.4		22	18	23	21	4E-03	3E-01	2E+00	-5E-02
12	2715	Timberlake	2	0.0		2	0	3	2	9E-04	2E-01	9E-01	2E-01
13	2800	W.E. Roberts / Sherman	-4	-0.2		-4	0	-10	-4	-5E-04	-4E-02	2E+00	-3E-02
14	1007	Jefferson / Abram	0	-0.2		0	2	-4	0	-2E-03	-5E-01	-5E+00	-6E-01
15				0.4		4	2	3	4	0E+00	-2E-01	-2E+00	-2E-01
Total	28411		18	0.4		17	-1	3	18	1E-04	5E-01	9E-01	3E-01
	Rec	luction per mile	4	0.1		3	0	1	4	0.00	0.10	0.21	0.06
	Q	% Reduction	3	8.8		10	-2	1	3	0	2	0	2

			PM So	outhbo	und Be	efore F	Retimir	ng					
Node Number	Length (ft)	Node Names	Travel time (s)	# 01	Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	SH 180/Main											
2	620	Jefferson/Abram	21	0.0	20	11	0	20	21	0.01	1.24	9.90	1.00
3	1029	W.E. Roberts/ Sherman	19	0.0	38	3	0	5	19	0.01	1.16	14.85	0.83
4	2796	Timberlake	51	0.2	37	9	3	10	51	0.02	1.94	23.91	1.06
5	2671	Marshall	59	0.4	31	19	9	23	59	0.03	2.44	26.86	1.48
6	3224	Pioneer Pkwy	93	0.8	24	44	18	53	93	0.04	3.89	41.55	2.43
7	2128	Arkansas	55	0.4	26	23	10	31	55	0.02	2.36	25.59	1.49
8	5373	Mayfield	99	0.4	37	17	5	20	99	0.05	3.84	46.61	2.15
9	2705	Forum	44	0.0	42	3	0	2	44	0.02	2.00	25.64	1.21
10	1826	Sara Jane	57	1.0	22	29	10	37	57	0.02	1.62	13.91	0.78
11	464	IH20 WB	18	0.6	18	11	2	18	18	0.01	1.11	7.77	0.93
12	1074	IH20 EB	20	0.0	37	3	0	5	20	0.01	1.03	12.61	0.70
13	900	Bardin	34	0.6	18	20	8	24	34	0.01	1.19	11.07	0.69
14	2478	Claremont	78	0.6	22	40	24	41	78	0.03	2.51	26.06	1.25
15	1059	Fairmont	25	0.4	29	8	1	11	24	0.01	1.23	12.81	0.86
Total	28347		673	5.4	29	239	91	299	672	0.29	27.55	299.14	16.87
	То	otal per mile	125	1.0	5	44	17	56	125	0.05	5.13	55.72	3.14

			PM Sou	ıthbou	nd Afte	er Reti	ming						
Node Number	Length (ft)	Node Names	Travel time (s)	# of Stops	Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Main St / Division											
2	640	Jefferson / Abram	20	0.0	22	10	0	20	20	0.01	1.07	8.58	0.83
3	1031	W.E. Roberts / Sherman	20	0.0	35	4	0	13	20	0.01	0.95	11.12	0.63
4	2784	Timberlake	46	0.0	41	4	0	6	46	0.02	2.01	26.08	1.20
5	2692	Marshall	61	0.4	30	20	14	22	61	0.03	2.00	22.71	1.00
6	3190	Pioneer	185	2.2	12	136	91	158	185	0.05	5.30	48.41	2.37
7	2126	Arkansas	44	0.4	33	11	1	17	44	0.02	2.21	23.43	1.55
8	5409	Mayfield	84	0.0	44	1	0	1	84	0.05	3.37	45.91	1.84
9	2693	Forum	42	0.0	43	2	0	1	42	0.02	1.27	16.27	0.53
10	1809	Sara Jane Pkwy	120	3.4	10	92	47	107	120	0.03	3.06	25.30	1.24
11	444	IH 20 WBFR	33	0.4	9	26	18	33	33	0.01	1.19	9.86	0.70
12	1078	IH 20 EBFR	29	0.2	26	12	7	17	29	0.01	1.22	13.67	0.75
13	924	Bardin	45	0.6	14	31	21	39	45	0.01	1.44	12.15	0.76
14	2461	Claremont	51	0.4	33	14	3	15	51	0.02	1.98	21.08	1.18
15	1037	Fairmont	20	0.0	35	4	0	7	20	0.01	1.05	11.23	0.76
Total	28318		800	8.0	24	367	201	456	800	0.31	28.14	295.80	15.33
	Т	otal per mile	149	1.5	4	68	38	85	149	0.06	5.25	55.15	2.86

		Redu	ctions	for PM	South	bound	d (Bef	ore-Af	ter)				
Node Number	Length (ft)	Node Names	Travel time (s)		Avg Speed (mph)	Delay	<= 0	Time <= 35 MPH	<= 55	Fuel (gal)	HC (gm)	CO (gm)	NO _x (gm)
1	0	Fairmont											
2	1187	Claremont	1	0.0		1	0	0	1	1E-03	2E-01	1E+00	2E-01
3	2441	Bardin	-2	0.0		-2	0	-8	-2	1E-03	2E-01	4E+00	2E-01
4	898	IH 20 EBFR	5	0.2		5	3	4	5	6E-04	-7E-02	-2E+00	-1E-01
5	1102	IH 20 WBFR	-1	0.0		-1	-5	1	-1	1E-03	4E-01	4E+00	5E-01
6	446	Sara Jane Pkwy	-92	-1.4		-93	-73	-105	-92	-2E-02	-1E+00	-7E+00	6E-02
7	1829	Forum	11	0.0		11	9	14	11	2E-03	2E-01	2E+00	-6E-02
8	2729	Mayfield	15	0.4		16	5	19	15	2E-03	5E-01	7E-01	3E-01
9	5393	Arkansas	2	0.0		1	0	0	2	3E-03	7E-01	9E+00	7E-01
10	2081	Pioneer	-62	-2.4		-62	-37	-71	-62	-1E-02	-1E+00	-1E+01	-5E-01
11	3246	Marshall	-15	0.2		-16	-16	-15	-15	-2E-03	-8E-02	-2E+00	2E-01
12	2715	Timberlake	-9	-0.2		-8	-7	-12	-9	-2E-03	-2E-01	-1E+00	-5E-02
13	2800	W.E. Roberts / Sherman	-11	0.0		-11	-13	-14	-11	-2E-03	-3E-01	-1E+00	-8E-02
14	1007	Jefferson / Abram	27	0.2		26	21	26	27	5E-03	5E-01	5E+00	7E-02
15	537	Main St / Division	5	0.4		4	1	4	5	2E-03	2E-01	2E+00	1E-01
Total	28411		-128	-2.6		-128	-111	-157	-128	-2E-02	-6E-01	3E+00	2E+00
	Rec	luction per mile	-24	0		-24	-21	-29	-24	0.00	-0.11	0.57	0.28
	o	% Reduction	-19	-48		-54	-123	-53	-19	-5	-2	1	9

	AM Eastbound B	efore Retiming						,,				,
Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops	Total Delay (s)		Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	0	West Frwy										
2	1425	Robinson	46	0.8	24	13	31	46	0.02	1.84	17.42	1.15
3	1349	Carrier	46	0.4	26	16	35	46	0.02	1.89	18.34	1.18
4	2490	SW 3rd	44	0.0	6	0	6	44	0.02	2.39	29.13	1.65
5	1534	Corn Valley	67	0.8	43	33	48	67	0.02	1.99	19.06	0.94
6	1153	Acosta	24	0.0	6	0	14	24	0.01	1.69	18.45	1.34
7	1410	Beltline	40	0.6	18	6	25	40	0.02	1.73	16.08	1.17
8	3024	SE 14th	66	0.8	20	9	26	66	0.03	3.03	35.60	1.95
Total	12385		334	3.4	144	77	185	333	0.14	14.55	154.07	9.37
	Total per mile		142	1.4	61	33	79	142	0.06	6.20	65.68	4.00

Detailed Study Statistics for Pioneer Parkway Corridor

AM Eastbound After Retiming

Node		Node	Travel	No. of		Time<= 0 MPH	Time<=35	Time<=55	Fuel	нс		
No.	Length (ft)	Names	Time (s)	Stops	(s)	(s)	MPH (s)	MPH (s)	(gals)		CO (gm)	NO _x (gm)
1	0	W Freeway										
2	1379	Robinson	23	0.0	2	0	4	23	0.01	1.04	12.74	0.65
3	1310	Carrier	23	0.0	3	0	6	23	0.01	1.01	12.45	0.61
4	2437	SW 3rd	38	0.0	0	0	0	38	0.02	1.44	19.42	0.75
5	1505	Corn Valley	23	0.0	0	0	0	23	0.01	0.79	10.49	0.37
6	1147	Acosta	17	0.0	0	0	0	17	0.01	0.54	7.01	0.23
7	1389	Belt Line	22	0.0	1	0	1	22	0.01	0.65	8.21	0.27
8	2949	SE 14th	56	0.2	11	5	11	56	0.03	1.81	22.33	0.86
Total	12116		203	0.2	17	5	23	203	0.10	7.29	92.65	3.73
	Total per mile		88	0.1	7	2	10	88	0.04	3.18	40.38	1.63

	-		-				Lasibound	-				
Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1		W Freeway										
2		Robinson	23	0.8	22	13	26	23	0.01	0.79	4.68	0.50
3		Carrier	23	0.4	23	16	29	23	0.01	0.88	5.88	0.57
4		SW 3rd	6	0.0	5	0	6	6	0.00	0.95	9.71	0.90
5		Corn Valley	43	0.8	43	33	48	43	0.01	1.19	8.57	0.56
6		Acosta	7	0.0	6	0	14	7	0.00	1.15	11.45	1.11
7		Belt Line	18	0.6	17	6	24	18	0.01	1.08	7.87	0.90
8		SE 14th	11	0.6	10	3	15	10	0.01	1.22	13.27	1.10
Total			131	3.2	127	71	162	130	0.04	7.27	61.42	5.64
Red	Reduction per mile		54	1.4	54	30	69	54	0.02	3.03	25.31	2.37
	%reduction		38	94.0	88	93	88	38	26.98	48.83	38.53	59.32

Reductions for AM Eastbound

MD Eastbound Before Retiming

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)	Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	0	West Frwy										
2	1419	Robinson	42	0.6	20	8	28	42	0.0169	1.8098	17.6198	1.1941
3	1379	Carrier	51	0.4	29	9	38	51	0.0184	1.9616	18.8663	1.2098
4	2475	SW 3rd	48	0.2	10	0	17	48	0.0215	1.8941	21.0153	1.1239
5	1536	Corn Valley	38	0.4	14	3	23	38	0.0149	1.3044	11.9813	0.7431
6	1126	Acosta	28	0.4	10	2	14	28	0.0122	1.2735	12.5487	0.8758
7	1455	Beltline	47	0.6	25	8	29	47	0.0182	1.8611	19.0654	1.1428
8	3009	SE 14th	64	0.6	19	2	20	64	0.0281	2.4187	27.1604	1.3935
Total	12399		318	3.2	128	31	169	317	0.1301	12.523	128.257	7.6829
	Total	per mile	135	1.4	55	13	72	135	0.06	5.33	54.62	3.27

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops	Total Delay (s)		Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	5999	W Freeway										
2	1380	Robinson	23	0.0	2	0	0	23	0.0119	0.9711	12.8925	0.5589
3	1334	Carrier	22	0.0	1	0	3	22	0.0109	0.807	10.5349	0.4263
4	2442	SW 3rd	40	0.0	3	0	3	40	0.0208	1.6821	21.7385	0.9735
5	1504	Corn Valley	25	0.0	2	0	1	25	0.0125	0.9392	12.3329	0.4969
6	1116	Acosta	18	0.0	1	0	0	18	0.0092	0.6668	8.7199	0.3417
7	1390	Belt Line	42	0.4	20	13	22	42	0.0149	1.1163	11.4884	0.4408
8	2958	SE 14th	58	0.4	13	5	18	58	0.0263	2.1833	26.6668	1.1972
Total	12124		227	0.8	42	18	46	227	0.11	8.37	104.37	4.44
	Total	per mile	99	0.3	18	8	20	99	0.05	3.64	45.45	1.93

MD Eastbound After Retiming

Reductions	for MID	Eastbound
------------	---------	-----------

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops	Total Delay (s)	Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1		W Freeway										
2		Robinson	19	0.6	18	8	28	19	0.01	0.84	4.73	0.64
3		Carrier	29	0.4	28	9	35	29	0.01	1.15	8.33	0.78
4		SW 3rd	8	0.2	7	0	14	8	0.00	0.21	-0.72	0.15
5		Corn Valley	13	0.4	13	3	22	13	0.00	0.37	-0.35	0.25
6		Acosta	10	0.4	10	2	14	10	0.00	0.61	3.83	0.53
7		Belt Line	5	0.2	5	-5	8	5	0.00	0.74	7.58	0.70
8		SE 14th	6	0.2	6	-4	2	6	0.00	0.24	0.49	0.20
Total			91	2.4	87	13	123	90	0.02	4.16	23.88	3.25
Red	Reduction per mile		36	1.0	36	5	52	36	0.01	1.69	9.16	1.34
	%reduction		27	74.4	67	39	72	27	16.28	31.68	16.78	40.96

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	0	West Frwy										
2	1409	Robinson	56	0.8	34	13	43	56	0.0194	2.0344	18.4846	1.2278
3	1365	Carrier	51	0.8	30	8	42	51	0.0191	2.1954	19.0334	1.5108
4	2451	SW 3rd	66	1.0	29	5	37	66	0.0276	2.8155	27.5099	1.8527
5	1545	Corn Valley	47	0.6	23	5	35	47	0.0197	2.2656	21.5607	1.611
6	1139	Acosta	25	0.2	7	0	12	25	0.0125	1.427	15.5806	1.0491
7	1435	Beltline	28	0.0	6	0	10	28	0.0134	1.2309	12.947	0.8035
8	2995	SE 14th	54	0.2	8	0	9	53	0.0257	2.2242	27.2218	1.3294
Total	12339		326	3.6	137	32	189	325	0.1374	14.193	142.338	9.3844
	Total	per mile	140	1.5	59	14	81	139	0.06	6.07	60.91	4.02

PM Eastbound Before Retiming

PM Eastbound After Retiming

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops	Total Delay (s)	Time<= 0 MPH (s)	Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	5987	W Freeway										
2	1365	Robinson	21	0.0	0	0	2	21	0.0112	0.7064	9.5522	0.3379
3	1349	Carrier	21	0.0	0	0	1	21	0.0114	0.8742	11.8536	0.4966
4	2420	SW 3rd	37	0.0	0	0	0	37	0.0204	1.452	20.2955	0.766
5	1520	Corn Valley	23	0.0	0	0	0	23	0.0126	0.8611	11.9248	0.4353
6	1136	Acosta	17	0.0	0	0	0	17	0.0099	0.7549	10.8576	0.4232
7	1369	Belt Line	22	0.0	1	0	1	22	0.0106	0.6491	8.0326	0.2829
8	2954	SE 14th	53	0.2	9	2	10	53	0.0257	2.0801	27.3972	1.1526
Total	12113		194	0.2	11	2	14	193	0.10	7.38	99.91	3.89
	Total	per mile	85	0.1	5	1	6	84	0.04	3.22	43.55	1.70

	Lasibuu		1		1						1	1
Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)	Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1		W Freeway										
2		Robinson	35	0.8	34	13	41	35	0.01	1.33	8.93	0.89
3		Carrier	30	0.8	29	8	41	30	0.01	1.32	7.18	1.01
4		SW 3rd	29	1.0	28	5	37	29	0.01	1.36	7.21	1.09
5		Corn Valley	24	0.6	23	5	35	24	0.01	1.40	9.64	1.18
6		Acosta	7	0.2	7	0	12	7	0.00	0.67	4.72	0.63
7		Belt Line	6	0.0	5	0	9	6	0.00	0.58	4.91	0.52
8		SE 14th	0	0.0	-1	-2	-1	0	0.00	0.14	-0.18	0.18
Total			132	3.4	126	30	175	132	0.04	6.82	42.42	5.49
Red	Reduction per mile		55	1.5	54	13	75	55	0.01	2.86	17.36	2.32
	%reduction		39	94.3	92	94	92	39	24.53	47.05	28.50	57.73

Reductions for PM Eastbound

AM Westbound Before Retiming

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	0	West Frwy										
2	1287	Robinson	21	0.0	1	0	1	20	0.0109	0.8913	12.2921	0.5203
3	1355	Carrier	23	0.0	2	0	0	23	0.0115	0.9593	12.6846	0.5602
4	2491	SW 3rd	41	0.0	2	0	1	41	0.02	1.4011	18.1756	0.6823
5	1531	Corn Valley	27	0.0	3	0	2	27	0.0132	1.1863	14.3223	0.73
6	1174	Acosta	21	0.0	3	0	6	21	0.0092	0.6358	7.3566	0.2935
7	1419	Beltline	25	0.0	3	0	5	25	0.0162	1.9352	24.1096	1.4987
8	3075	SE 14th	84	1.0	37	22	45	84	0.0377	3.9134	41.4243	2.6103
Total	12332		241	1.0	51	22	59	240	0.1186	10.922	130.365	6.8954
	Total	per mile	103	0.4	22	9	25	103	0.05	4.68	55.82	2.95

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)	Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	5900	W Freeway										
2	1369	Robinson	21	0.0	0	0	0	21	0.0109	0.6949	9.1323	0.3172
3	1346	Carrier	22	0.0	1	0	1	22	0.0132	1.3474	18.0037	0.9331
4	2411	SW 3rd	42	0.2	5	0	6	42	0.0201	1.3964	16.4295	0.7053
5	1540	Corn Valley	27	0.0	3	0	7	27	0.0168	1.9601	24.4702	1.4756
6	1130	Acosta	32	0.6	15	1	21	32	0.0121	1.0195	7.6168	0.5983
7	1398	Belt Line	25	0.0	3	0	7	25	0.0159	1.9371	23.8974	1.501
8	3059	SE 14th	94	1.0	48	24	58	94	0.0394	4.0456	40.4532	2.6087
Total	12253		264	1.8	75	26	101	264	0.13	12.40	140.00	8.14
Т	otal per n	nile	114	0.8	32	11	43	114	0.06	5.34	60.33	3.51

AM Westbound After Retiming

Reductions for AM Westbound

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)	Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1		W Freeway										
2		Robinson	0	0.0	1	0	1	-1	0.00	0.20	3.16	0.20
3		Carrier	0	0.0	0	0	-1	0	0.00	-0.39	-5.32	-0.37
4		SW 3rd	-1	-0.2	-2	0	-6	-1	0.00	0.00	1.75	-0.02
5		Corn Valley	0	0.0	0	0	-5	0	0.00	-0.77	-10.15	-0.75
6		Acosta	-11	-0.6	-12	-1	-15	-11	0.00	-0.38	-0.26	-0.30
7		Belt Line	0	0.0	0	0	-2	0	0.00	0.00	0.21	0.00
8		SE 14th	-11	0.0	-11	-2	-13	-11	0.00	-0.13	0.97	0.00
Total			-23	-0.8	-24	-4	-41	-24	-0.01	-1.48	-9.64	-1.24
Red	luction pe	er mile	-11	-0.3	-10	-2	-18	-11	0.00	-0.67	-4.51	-0.56
	%re	duction	-10	-81.2	-47	-19	-71	-11	-8.96	-14.27	-8.09	-18.80

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	0	West Frwy										
2	1326	Robinson	41	0.6	21	11	22	41	0.0157	1.5467	17.3815	0.8894
3	1362	Carrier	27	0.0	6	0	10	27	0.0123	1.1195	12.0919	0.7052
4	2473	SW 3rd	46	0.2	8	0	9	46	0.0219	1.9254	21.6552	1.1723
5	1544	Corn Valley	36	0.4	13	1	21	36	0.0154	1.5678	15.8152	1.0314
6	1132	Acosta	25	0.2	8	0	14	25	0.0106	0.9583	8.8317	0.5979
7	1442	Beltline	30	0.2	7	0	10	30	0.0156	1.79	19.7866	1.3368
8	3091	SE 14th	87	0.8	40	21	49	87	0.0354	3.4755	36.9014	2.1122
Total	12370		292	2.4	102	34	135	292	0.1268	12.383	132.464	7.8452
	Total	per mile	125	1.0	44	14	58	124	0.05	5.29	56.54	3.35

MID Westbound Before Retiming

MID Westbound After Retiming

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	5878	W Freeway										
2	1358	Robinson	25	0.2	4	2	5	25	0.0125	1.0278	12.947	0.5965
3	1357	Carrier	25	0.0	3	0	6	25	0.014	1.6188	20.5857	1.1896
4	2410	SW 3rd	49	0.4	12	2	18	49	0.0215	1.6627	17.558	0.9135
5	1533	Corn Valley	27	0.0	4	0	9	27	0.0167	2.0001	24.4666	1.5278
6	1129	Acosta	38	1.0	21	5	27	38	0.0135	1.1802	8.8251	0.6658
7	1391	Belt Line	25	0.0	4	0	7	25	0.0157	1.9473	23.9188	1.512
8	3066	SE 14th	98	0.8	51	28	63	98	0.0386	3.9862	40.5226	2.4778
Total	12244		287	2.4	99	37	135	287	0.13	13.42	148.82	8.88
	Total	per mile	124	1.0	43	16	58	124	0.06	5.79	64.18	3.83

Houdo		WID Westb	Jana		-	-				-		
Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1		W Freeway										
2		Robinson	16	0.4	17	9	18	16	0.00	0.52	4.43	0.29
3		Carrier	2	0.0	2	0	4	2	0.00	-0.50	-8.49	-0.48
4		SW 3rd	-2	-0.2	-3	-2	-9	-2	0.00	0.26	4.10	0.26
5		Corn Valley	9	0.4	9	1	12	9	0.00	-0.43	-8.65	-0.50
6		Acosta	-13	-0.8	-13	-5	-13	-13	0.00	-0.22	0.01	-0.07
7		Belt Line	4	0.2	4	0	3	4	0.00	-0.16	-4.13	-0.18
8		SE 14th	-11	0.0	-11	-7	-14	-11	0.00	-0.51	-3.62	-0.37
Total			5	0.0	3	-3	1	5	-0.01	-1.04	-16.36	-1.04
Red	uction pe	er mile	1	0.0	1	-1	0	1	0.00	-0.50	-7.64	-0.48
	%re	duction	1	-1.0	2	-10	-1	1	-5.57	-9.51	-13.51	-14.39

Reductions for MID Westbound

PM Westbound Before Retiming

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	0	West Frwy										
2	1317	Robinson	26	0.2	6	0	12	26	0.0134	1.5029	16.386	1.1116
3	1363	Carrier	62	0.8	41	18	53	62	0.0207	2.2967	20.8133	1.3895
4	2452	SW 3rd	86	1.0	48	18	58	86	0.0302	2.941	28.0392	1.6457
5	1561	Corn Valley	42	0.6	18	5	26	42	0.0168	1.6424	15.3106	1.0384
6	1143	Acosta	21	0.2	4	0	4	21	0.0097	0.761	8.3103	0.4216
7	1412	Beltline	26	0.0	4	0	5	26	0.0139	1.526	18.3896	1.0952
8	3082	SE 14th	89	1.0	42	11	51	89	0.0361	3.6521	37.2159	2.3111
Total	12330		353	3.8	163	52	209	352	0.1408	14.322	144.465	9.0131
	Total	per mile	151	1.6	70	22	90	151	0.06	6.13	61.86	3.86

1 101 00	Colbourn		iiiig									
Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops	Total Delay (s)	Time<= 0 MPH (s)		Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1	5862	W Freeway										
2	1391	Robinson	21	0.0	0	0	0	21	0.0125	1.0724	15.4556	0.6665
3	1339	Carrier	24	0.0	3	0	7	24	0.0144	1.7234	21.9662	1.2872
4	2425	SW 3rd	50	0.4	13	1	19	50	0.0224	1.891	20.7157	1.1078
5	1522	Corn Valley	26	0.0	2	0	2	26	0.0154	1.6722	22.176	1.1928
6	1141	Acosta	29	0.4	11	0	20	29	0.0118	1.1286	9.0337	0.764
7	1375	Belt Line	24	0.0	3	0	6	24	0.016	1.9399	24.7729	1.4944
8	3054	SE 14th	102	1.0	55	32	68	102	0.0397	4.0684	42.1634	2.466
Total	12247		276	1.8	88	33	123	276	0.13	13.50	156.28	8.98
	Total	per mile	119	0.8	38	14	53	119	0.06	5.82	67.38	3.87

PM Westbound After Retiming

Reductions for PM Westbound

Node No.	Length (ft)	Node Names	Travel Time (s)	No. of Stops		Time<= 0 MPH (s)	Time<=35 MPH (s)	Time<=55 MPH (s)	Fuel (gals)	HC (gm)	CO (gm)	NO _x (gm)
1		W Freeway										
2		Robinson	5	0.2	6	0	11	5	0.00	0.43	0.93	0.45
3		Carrier	38	0.8	37	18	46	38	0.01	0.57	-1.15	0.10
4		SW 3rd	36	0.6	35	17	39	36	0.01	1.05	7.32	0.54
5		Corn Valley	16	0.6	16	5	23	16	0.00	-0.03	-6.87	-0.15
6		Acosta	-7	-0.2	-7	0	-16	-7	0.00	-0.37	-0.72	-0.34
7		Belt Line	1	0.0	1	0	-2	1	0.00	-0.41	-6.38	-0.40
8		SE 14th	-13	0.0	-13	-21	-16	-13	0.00	-0.42	-4.95	-0.15
Total			77	2.0	75	18	86	76	0.01	0.83	-11.82	0.03
Red	luction pe	er mile	32	0.9	32	8	36	32	0.00	0.31	-5.51	-0.01
	%reduction	on	21	52.3	46	35	41	21	5.47	5.13	-8.91	-0.29

APPENDIX D

DATA COMPILED FOR INDEPENDENT VARIABLES

Data compiled for independent variables

					Number	Circal	Log (Signal		Mean	St		
Arterial	Start	End	City	Length	of signals	Signal density	density)	lanes	spacing	dev	ADT	FRTIME
Bryant-Irvin	IH-30	Southwest Pkwy	Fort Worth	3.1	7	2.26	0.35	4	0.52	0.43	30146	301
Belt Line	DNT SBFR	Coit	Dallas	3.22	8	2.48	0.40	6	0.46	0.17	47302	353
Illinois	Duncanville	SH 342	Dallas	6.11	17	2.78	0.44	6	0.38	0.23	38875	698
Hampton	Leath	Illinois	Dallas	4.75	15	3.16	0.50	6	0.34	0.14	49228	626
Harry Hines	IH-635	Empire Central	Dallas	6.17	15	2.43	0.39	6	0.44	0.26	51296	596
Abram/Jefferson	Cooper	Great SW Pkwy	Arlington	3.99	13	3.26	0.51	6	0.33	0.28	47779	528
FM 1171	Churchill	IH-35E	Flower Mound, Lewisville	4.16	15	3.61	0.56	2	0.3	0.28	45778	500
University	Camp Bowie	Crestline/Harley	Fort Worth	0.56	4	7.14	0.85	6	0.19	0.12	24744	80
Jupiter	Buckingham	Northwest Hwy	Garland/Dallas	4.61	11	2.39	0.38	6	0.46	0.33	56128	538
Green Oaks SE/SW	Kelly-Elliott	SH 360	Arlington, Grand Prairie	6.91	12	1.74	0.24	4	0.63	0.34	25199	723
Spring Valley	Inwood	Meandering Way	Farmers Branch/Dallas	2.78	7	2.52	0.40	6	0.46	0.33	33729	358
Alpha	Dallas North Tollway	Hillcrest	Dallas	2.05	6	2.93	0.47	5	0.41	0.34	33772	269
Coit	Pres. George Bush	Churchill	Dallas/Richardson/Dallas	5.64	15	2.66	0.42	6	0.4	0.28	59864	347
Northwest Hwy	US 75	Saturn	Dallas	7.56	18	2.38	0.38	6	0.44	0.33	68356	719
Jupiter	PBGT EBFR	Buckingham	Richardson	4.86	11	2.26	0.35	6	0.49	0.27	41738	495
Camp Bowie	SH 183	IH-30	Fort Worth	2.07	7	3.38	0.53	6	0.35	0.23	32116	264
Oaklawn	Blackburn	Highline	Dallas	1.65	11	6.67	0.82	4	0.17	0.14	42529	329
Jupiter	Spring Creek Pkwy	-	Plano	3.72	9	2.42	0.38	6	0.47	0.29	47673	415
US 377	Keller-Hicks		Haltom City, Watauga, Keller	8.46	18	2.13	0.33	4	0.5	0.38	42330	757
Camp Bowie/7th	Montgomery	Stayton	Fort Worth	1.18	6	5.08	0.71	6	0.24	0.08	25664	214
Bryant-Irvin	Southwest Pkwy	Mira Vista	Fort Worth	2.59	10	3.86	0.59	6	0.29	0.23	45451	296
SH 190 (PGBT Frontage Road(EB))	Jupiter Road	Brand	Richardson/Garland	4.5	7	1.56	0.19	6	0.75	0.36	25511	387
Montgomery			Fort Worth	1.22		5.74		_	0.73			

Arterial	Start	End	City	System type	Measured TT	TT at SP Limit	Delay/veh	Delay/ veh/signal	Delay/ veh/mile	#Stops/ veh	# Stops/ veh/ mile	# Stops/ veh/ signal
Bryant-Irvin	IH-30	Southwest Pkwy	Fort Worth	2	547	296	251	35.9	83.7	5.0	1.6	0.7
Belt Line	DNT SBFR	Coit	Dallas	1	458	289	169	21.1	54.4	2.8	0.9	0.3
Illinois	Duncanville	SH 342	Dallas	1	930	570	360	22.5	61.0	7.5	1.2	0.4
Hampton	Leath	Illinois	Dallas	1	742	455	287	17.9	62.3	6.8	1.4	0.5
Harry Hines	IH-635	Empire Central	Dallas	1	742	483	259	17.3	43.9	5.3	0.9	0.4
Abram/Jefferson	Cooper	Great SW Pkwy	Arlington	1	565	372	193	16.1	48.2	4.8	1.2	0.4
FM 1171	Churchill	IH-35E	Flower Mound, Lewisville	1	652	376	276	17.3	65.7	5.8	1.4	0.4
University	Camp Bowie	Crestline/Harley	Fort Worth	1	157	54	103	25.8	172.1	1.8	3.1	0.4
Jupiter	Buckingham	Northwest Hwy	Garland/Dallas	1	617	388	229	14.3	49.8	4.0	0.9	0.4
Green Oaks SE/SW	Kelly-Elliott	SH 360	Arlington, Grand Prairie	1	776	530	246	20.5	37.3	6.3	0.9	0.5
Spring Valley	Inwood	Meandering Way	Farmers Branch/Dallas	1	416	273	143	17.8	52.8	3.3	1.2	0.5
Alpha	Dallas North Tollway	Hillcrest	Dallas	1	343	212	131	18.7	62.4	2.5	1.2	0.4
Coit	Pres. George Bush	Churchill	Dallas/Richardson/Dallas	1	707	486	221	11.6	40.8	5.3	0.9	0.4
Northwest Hwy	US 75	Saturn	Dallas	1	809	613	196	10.3	25.8	5.0	0.7	0.3
Jupiter	PBGT EBFR	Buckingham	Richardson	1	562	422	140	14.0	29.7	3.8	0.8	0.3
Camp Bowie	SH 183	IH-30	Fort Worth	1	346	224	122	15.2	55.3	3.5	1.7	0.5
Oaklawn	Blackburn	Highline	Dallas	1	343	179	164	14.9	109.3	3.0	1.8	0.3
Jupiter	Spring Creek Pkwy	PGBT EBFR	Plano	1	473	347	126	12.6	36.0	3.0	0.8	0.3
US 377	Keller-Hicks	Broadway	Haltom City, Watauga, Keller	3	1094	693	401	21.1	45.1	8.6	1.0	0.5
Camp Bowie/7th	Montgomery	Stayton	Fort Worth	1	237	115	122	20.4	81.5	2.3	1.9	0.4
Bryant-Irvin	Southwest Pkwy	Mira Vista	Fort Worth	2	399	222	177	17.7	70.8	3.0	1.2	0.3
SH 190 (PGBT Frontage Road(EB))	Jupiter Road	Brand	Richardson/Garland	2	492	314	178	25.5	40.5	3.3	0.7	0.5
Montgomery	Camp Bowie	Vickery	Fort Worth	1	256	114	142	20.3	118.1	2.8	2.3	0.4

Arterial	Start	End	City	Length	Number of signals	Signal density	Log (Signal density)	No. of lanes	Mean spacing	St dev	ADT	FRTI ME
Forest	US 75	IH-635	Dallas	2.21	10	4.52	0.66	6	0.25	0.16	49792	274
Belknap/Grapevine Hwy FM 3040/Hebron/Park	Sylvania	Rufe Snow	Fort Worth, Haltom City, NRH	5.18	10	1.93	0.29	4	0.58	0.34	25751	540
Blvd	Edmonds	Lakepointe	Lewisville	2.37	12	5.06	0.70	6	0.22	0.1	43048	310
Harry Hines	Empire Central	Wycliff	Dallas	2.29	9	3.93	0.59	6	0.29	0.25	40883	299
Forest	Harry Hines	US 75	Dallas	7.37	20	2.71	0.43	6	0.39	0.26	47584	908
Collins	Abram	Bardin	Arlington	4.45	12	2.70	0.43	6	0.4	0.22	41977	486
Belt Line	Coit	Jupiter	Richardson	5.09	16	3.14	0.50	6	0.34	0.17	43719	631
Preston	Arapaho	IH-635	Dallas	2.56	10	3.91	0.59	6	0.28	0.18	37008	262
Inwood	Alpha	Mockingbird	Dallas	6.67	15	2.25	0.35	4	0.48	0.28	33706	808
Pioneer Pkwy (Spur 303)	Susan	SE 14 th	Grand Prairie	4.25	10	2.35	0.37	6	0.47	0.32	35351	388
First	Buckingham	Avenue D	Garland	1.51	5	3.31	0.52	6	0.38	0.4	47205	235
Pleasant Run	Hampton	IH-35E	Desoto	2.02	7	3.47	0.54	4	0.34	0.2	22460	235
Royal	US 75	IH-635	Dallas	3.45	8	2.32	0.37	6	0.49	0.29	27056	476
Great Southwest Pkwy	Division/Main	Fairmont	Grand Prairie	5.3	15	2.83	0.45	4	0.38	0.25	20328	560
SH 78	Naaman School	Castle	Garland	1.8	4	2.22	0.35	6	0.6	0.03	40627	147
Division/Main	Bowen	Great SW Pkwy	Arlington	6.09	13	2.13	0.33	4	0.51	0.29	24094	703
Wabash/Granbury	Seminary	Gorman/Wedgemont	Fort Worth	1.39	7	5.04	0.70	4	0.23	0.11	27645	136
Rowlett Road	Castle	Roan	Rowlett	5.54	9	1.62	0.21	4	0.69	0.32	40613	464
Belknap/Grapevine Hwy	Rufe Snow	Precinct Line	Haltom City, NRH	4.1	12	2.93	0.47	4	0.37	0.26	35709	301
FM 1709	US 377	SH 114	Keller, Southlake	9.12	21	2.30	0.36	4	0.46	0.24	47162	750
Marsh/Lemmon	Almazon	US 75	Dallas	5.75	21	3.65	0.56	6	0.29	0.19	55994	766
Irving Blvd	Willowcreek	Norwood	Irving	4.81	16	3.33	0.52	4	0.32	0.19	30590	782
SH 183	Ridgmar Mall	SH 199	Fort Worth	4.31	9	2.09	0.32	4	0.54	0.34	35244	361
Frankford	Campbell	Coit	Dallas	2.18	6	2.75	0.44	6	0.44	0.23	38080	269
Valley View Ln	Senlac	Alpha	Farmers Branch	3.69	14	3.79	0.58	4	0.28	0.25	35059	560
Arapaho	US 75	Jupiter	Richardson	2.66	9	3.38	0.53	6	0.33	0.28	44044	
Inwood	Mockingbird	Conveyor	Dallas	2.78	11	3.96	0.60	6	0.28	0.14	58072	419
Preston	PGBT	Arapaho	Dallas	3.47	9	2.59	0.41	6	0.43	0.17	65325	342

Arterial	Start	End	City	System type	Measured TT	TT at SP Limit	Delay/ veh	Delay/ veh/ signal	Delay/ veh/ mile	#Stops/ veh	# Stops/ veh/ mile	# Stops/ veh/ signal
Forest	US 75	IH-635	Dallas	1	309	195	114	12.6	51.6	2.0	0.9	0.2
Belknap/Grapevine Hwy	Sylvania	Rufe Snow	Fort Worth, Haltom City	3	771	493	278	27.8	53.4	6.0	1.2	0.6
FM 3040/Park Blvd	Edmonds	Lakepointe	Lewisville	2	379	186	193	14.8	80.4	5.8	2.4	0.5
Harry Hines	Empire Central	Wycliff	Dallas	1	305	188	117	13.0	51.0	2.8	1.2	0.3
Forest	Harry Hines	US 75	Dallas	1	921	669	252	12.0	35.4	5.5	0.7	0.3
Collins	Abram	Bardin	Arlington	2	552	381	171	14.3	38.9	5.5	1.2	0.5
Belt Line	Coit	Jupiter	Richardson	1	734	527	207	12.9	40.5	4.0	0.8	0.3
Preston	Arapaho	IH-635	Dallas	1	365	204	161	16.1	62.0	1.8	0.7	0.2
Inwood	Alpha	Mockingbird	Dallas	1	827	622	205	13.6	32.5	4.8	0.7	0.3
Pioneer Pkwy	Susan	SE 14 th	Grand Prairie	1	426	326	100	11.1	23.8	3.5	0.8	0.4
First	Buckingham	Avenue D	Garland	1	169	127	42	10.5	28.0	1.0	0.7	0.2
Pleasant Run	Hampton	IH-35E	Desoto	2	338	170	168	23.9	88.2	3.0	1.5	0.4
Royal	US 75	IH-635	Dallas	1	479	346	133	16.6	39.1	2.3	0.7	0.3
Great Southwest Pkwy	Division/Main	Fairmont	Grand Prairie	1	750	424	326	21.7	63.9	4.0	0.8	0.3
SH 78	Naaman School	Castle	Garland	1	174	124	50	12.4	29.3	0.8	0.4	0.2
Division/Main	Bowen	Great SW Pkwy	Arlington	1	777	570	207	13.0	33.4	6.0	1.0	0.5
Wabash/Granbury	Seminary	Gorman/Wedgemont	Fort Worth	2	274	114	160	20.0	122.9	2.8	2.0	0.4
Rowlett Road	Castle	Roan	Rowlett	3	545	426	119	17.0	23.8	3.0	0.5	0.3
Belknap/Grapevine Hwy	Rufe Snow	Precinct Line	Haltom City, NRH	3	580	338	242	18.6	59.1	5.8	1.4	0.5
FM 1709	US 377	SH 114	Keller, Southlake	1	947	757	190	9.0	21.1	4.8	0.5	0.2
Marsh/Lemmon	Almazon	US 75	Dallas	1	714	536	178	8.5	32.9	3.5	0.6	0.2
Irving Blvd	Willowcreek	Norwood	Irving	2	847	555	292	17.2	47.1	5.8	1.2	0.4
SH 183	Ridgmar Mall	SH 199	Fort Worth	2	511	340	171	15.5	38.0	3.3	0.8	0.4
Frankford	Campbell	Coit	Dallas	1	250	191	59	9.8	28.0	1.5	0.7	0.3
Valley View Ln	Senlac	Alpha	Farmers Branch	1	497	360	137	9.8	37.0	3.8	1.0	0.3
Arapaho	US 75	Jupiter	Richardson	1	322	226	96	9.6	38.5	1.8	0.7	0.2
Inwood	Mockingbird	Conveyor	Dallas	1	347	264	83	6.3	30.6	3.0	1.1	0.3
Preston	PGBT	Arapaho	Dallas	1	319	274	45	5.6	12.9	1.8	0.5	0.2

REFERENCES

Institute of Transportation Engineers. Traffic Signal Timing.

http://www.ite.org/signal/index.asp, Accessed on February 16, 2006.

Sunkari, Srinivasa. (2004). The Benefits of Retiming Traffic Signals, <u>ITE</u> Journal, April, 26-29.

Husch, David and Albeck, John. (2004). <u>Synchro 6 User Guide</u>, Trafficware. Turochy, R E. (2001). Prioritizing Proposed Transportation Improvements:
Methods, Evaluation, and Research needs. <u>Transportation Research Record</u>, 1777, 123-128.

Witkowski, James M. (1992). Prioritizing signalized intersection operational deficiencies. <u>Transportation Research Record</u>, 1360, 4-12.

Guegan, D P, Martin, P T, Cottrell, W D. (2000). Prioritizing Traffic Calming Projects using the Analytic Hierarchy Process. <u>Transportation Research Record</u>, 1708, 61-67.

Tindale, Steven A., and Peter Hsu. (2005). Crash Data and Signal Coordination: a One-Way Pair Study. <u>Journal of Safety Research- Traffic Records Forum</u> <u>Proceedings</u>, 36 (5), 481-482.

McShane, William R., Roess, Roger P., Prassas Elena S. (1998). <u>Traffic</u> <u>Engineering</u>, 2nd edition, Prentice Hall,

City of Arlington. (2002). <u>Pioneer and Arkansas Timing Project Report</u>, 1-6.
City of Arlington. (2002). <u>South Cooper Street Timing Project Report</u>, 1-6.
Jamar Technologies Inc. (2004). <u>PC-Travel for Windows Manual.</u>

Rupangi Munshi. (2005). <u>Impacts of Signal Synchronization on Vehicular</u> <u>Emissions – an On-Board Measurement Case Study</u>, M.S. Thesis, The University of Texas at Arlington,

NCTCOG. (2000) <u>Dallas-Fort Worth Regional Travel Model (DFWRTM):</u> Description of the Multimodal Forecasting Process, V-1 to V-5.

Mattingly, S. P., A. Upayokin, and J. Li (2004). A Driver's Dilemma: Main Lane or HOT Lane. <u>Proceedings of the 4th International Conference on Decision</u> <u>Making in Urban and Civil Engineering</u>, CD.

American Automobile Association (2006). Today's Regional Gasoline

Averages. http://www.fuelcostcalculator.com/, Accessed on April 06, 2006.

Zabrowsky, Peter. Evolution Markets LLC (2006). E-mail Response.

http://www.evomarkets.com/, Accessed on February 15, 2006.

Texas Commission on Environmental Quality (TCEQ). Archived Emissions Banking. Transactions. http://www.tceq.state.tx.us/permitting/air/banking/ ebanktransarchive.html, accessed on April 26, 2006.

Texas Commission on Environmental Quality (TCEQ). ERC Transactions. http://www.tceq.state.tx.us/permitting/air/banking/erctrades_985340.pdf, accessed on April 26, 2006.

BIOGRAPHICAL INFORMATION

Pulipati Sasanka Bhushan was born in Andhra Pradesh state in India on 25th May 1981. He obtained his Bachelor's degree in Civil Engineering from Birla Institute of Technology and Science (BITS), Pilani, Rajasthan, India. He worked as a Highway Engineer with RITES Ltd, New Delhi, India for two years (2002-2004).

During his stay at RITES Ltd, he took part in one of the prestigious highway projects in India, the North – South – East – West Corridor project. He also worked in Afghanistan for the detailed field survey and soil investigation for transmission line between Kabul and Phul-E-Khumri, a rehabilitation project.

Sasanka earned his Master of Science in Civil Engineering from the University of Texas Arlington. Transportation Engineering was his specialization. During his study at UT Arlington, he served as a Graduate Teaching Assistant in the Department of Civil and Environmental Engineering where he taught Geodesy Lab.

Pulipati's research interests are in the field of transportation planning. His master's research is focused on the "Regional prioritization of corridors for traffic signal retiming". He proposes a new methodology based on estimated benefits to prioritize retiming projects.

As the president of ITE (Institute of Transportation Engineers) Student Chapter at UTA, he made the chapter to be recognized as an active student chapter in Texas. He received the "Outstanding student award" by the TexITE (Texas Institute of Transportation Engineers) at the summer meeting, 2005. He was also initiated to Tau Beta Pi, an all engineering honors society in November, 2005.

Pulipati aims at returning to research in Transportation Engineering after a few years of experience in the field.