

2005 Rio Grande Valley Travel Time and Delay Survey Technical Summary



Prepared by the
Texas Transportation Institute
July 2006

2005 Rio Grande Valley Travel Time and Delay Survey

TECHNICAL SUMMARY

Texas Department of Transportation Travel Survey Program

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July 2006

Acknowledgements

There were a number of individuals who contributed to, and assisted with, this study and the preparation of the summary. Charlie Hall, the TxDOT project director, provided guidance and assistance throughout the duration of the study. Gary Lobaugh, of the Texas Transportation Institute, helped with the preparation of the report. The contributions of these individuals are acknowledged and appreciated.

INTRODUCTION

The purpose of this technical summary is to describe the results of the analysis of data collected as part of the travel time and delay survey conducted in McAllen, Harlingen, and Brownsville, Texas in November and December of 2005. This summary is organized into four sections. The first provides an overview of the study area. The second presents the data collection methodology. The third section discusses the results of the data analysis, and the final section provides summary information. Detailed speed tables and profiles are provided in the report appendix.

AREA DESCRIPTION

The Rio Grande Valley study area is located in Hidalgo and Cameron counties on the U.S.-Mexico border in southern Texas. According to a 2005 Census estimate (1), approximately 1,057,000 people lived within the 2,476 square miles that comprise the two counties. The U.S. Census Bureau also estimates that Hidalgo and Cameron counties had population growth rates of approximately 19 percent and 13 percent respectively between 2000 and 2005. Figure 1 shows Metropolitan Planning Organization (MPO) boundaries within the Rio Grande Valley study area.

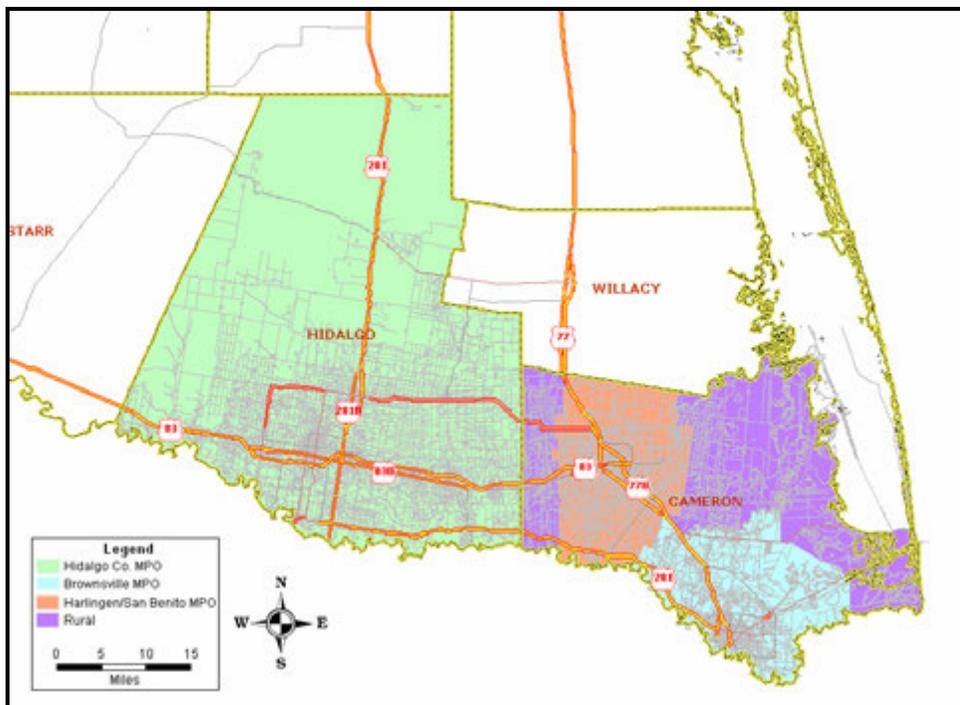


Figure 1. Rio Grande Valley Study Area.

¹ <http://quickfacts.census.gov/qfd/states/48/48215.html>

METHODOLOGY

To the general public, travel time, or the amount of time required to traverse a route between two points, is a basic concept that influences their daily lives. To transportation engineers and planners, travel time data can provide valuable insights into the operating characteristics of a roadway network within an urbanized area. Results obtained from travel time and delay studies can assist in the validation of travel demand models, and enable air quality modeling and emissions estimates. The results can also be of value in the planning and prioritization of transportation maintenance and improvement projects.

The primary objective of collecting travel time and delay data was to measure average speeds during peak and off-peak periods for roadways in the study area stratified by the functional classification of the roadway and the area that the roadway traversed. The functional classification of a roadway is based on the importance of movement and access functions assigned to that facility. The different functional classes analyzed in the Rio Grande Valley were:

- Freeway (limited access to property with traffic movement and mobility as primary function);
- Arterial (highly continuous roads with inter-community and intra-metropolitan traffic movement as primary function);
- Collector (primary function is to distribute traffic between arterial and local streets); and
- Local (primary function is to provide access to property).

Urban areas are typically divided into small geographic sections called traffic analysis zones (TAZs). Each zone is normally bounded by transportation facilities and/or geographic features (e.g., bodies of water, parks, etc.), and the activity that occurs within that area is typically homogenous. Zones are categorized by the density of activity associated with them. This is measured in terms of population and employment relative to the zone's size in acres. The following formula is used to determine the activity density.

$$\text{Activity Density} = (\text{Population} + (X \times \text{Employment})) / \text{Area}$$

In this formula, "X" denotes the population/employment ratio for the entire study area. This density categorization is referred to as area type, and there are typically five to six area types within an urban area. It is important to note that the activity densities for each area type, as well as the number of area types, vary from one urban area to another. The five area types in the Rio Grande Valley are:

- Central Business District [CBD] (activity density ≥ 50);
- CBD Fringe (activity density between 15 and 50);
- Urban (activity density between 10 and 15);
- Suburban (activity density between 1 and 10); and
- Rural (activity density < 1).

Route Development and Scheduling

Caliper® TransCAD software was used to identify area types and functional classifications on maps of the study area. The paths of most routes were randomly devised and structured to cover a variety of functional classification and area type combinations. There were three routes developed to reflect potential travel patterns between local activity centers. Table 1 shows a breakdown of the number of route segments traversed during the entire Rio Grande Valley Travel Time Study.

Each of the 15 travel routes developed were comprised of route segments of varying lengths. Determination of where one segment ended and another began was based on two factors. A new segment began when there was a:

- change in the functional classification of the roadway along a route; or
- change in the area type being traversed by the route.

Traveling onto a new street did not constitute a segment change unless one or more of the above criteria were met. Because the Freeway functional classification did not traverse the CBD Fringe area type in the Rio Grande Valley, no data could be collected for that combination.

Table 1. Number of Route Segment Area Type – Functional Class Combinations.

Functional Class Area Type	Freeway Segments	Arterial Segments	Collector Segments	Local Segments	Total
CBD	12	42	30	66	150
CBD Fringe	0	60	36	42	138
Urban	84	240	84	78	486
Suburban	84	330	144	156	714
Rural	36	48	84	120	288
Total	216	720	378	462	1776

Route paths were plotted using DeLorme Street Atlas USA® 7.0 software. The length of non-activity center routes enabled completion of two routes per day. Activity center routes were longer and took one day each. This schedule allowed sufficient time for a driver to travel the routes 12 times at a speed consistent with that of surrounding traffic, without passing or being passed by the majority of other vehicles on the roadway (floating car method of data collection). A total of 15 routes were developed and data were collected between 7 a.m. and 6 p.m., Monday through Friday. There were five routes plotted in and around each of the three major cities in the study area:

- McAllen in Hidalgo County (routes 1-5);
- Harlingen in Cameron County (routes 6-10); and
- Brownsville in Cameron County (routes 11-15).

The 12 runs conducted for each route were split equally by direction so that six were in the A-to-B direction and six were in the B-to-A direction. On routes 10 and 12, portions of the driver’s path in the BA direction differed slightly from that of the AB direction due to one-way streets. For each group of six runs, three were during the peak periods (7-9 a.m. and 4-6 p.m.) and three were during the off-peak periods (9 a.m.-12 p.m. and 1-4 p.m.). Additionally, the number of runs was balanced so that equal amounts of peak and off-peak data were collected during both the AM and PM periods. Table 2 shows a sample daily data collection schedule.

Table 2. Sample Daily Travel Time Data Collection Schedule – Rio Grande Valley.

Date: Tuesday, November 29, 2005

Area: McAllen, TX

Routes: 1, 2

Period	Route-Run	Direction	Time Slot
Peak Morning (7-9 a.m.)	1-1	1A > 1B	7:00 a.m. - 7:20 a.m.
	1-2	1B > 1A	7:20 a.m. - 7:40 a.m.
	1-3	1A > 1B	7:40 a.m. - 8:00 a.m.
	2-1	2A > 2B	8:00 a.m. - 8:20 a.m.
	2-2	2B > 2A	8:20 a.m. - 8:40 a.m.
	2-3	2A > 2B	8:40 a.m. - 9:00 a.m.
Off-Peak Morning (9-11 a.m.)	2-4	2B > 2A	9:00 a.m. - 9:20 a.m.
	2-5	2A > 2B	9:20 a.m. - 9:40 a.m.
	2-6	2B > 2A	9:40 a.m. - 10:00 a.m.
	1-4	1B > 1A	10:00 a.m. - 10:20 a.m.
	1-5	1A > 1B	10:20 a.m. - 10:40 a.m.
	1-6	1B > 1A	10:40 a.m. - 11:00 a.m.
11 a.m.-12 p.m. Buffer (redo a.m. off-peak runs affected by incidents)			
12 p.m.-1 p.m. Lunch			
Off-Peak Afternoon (1-3 p.m.)	1-7	1A > 1B	1:00 p.m. - 1:20 p.m.
	1-8	1B > 1A	1:20 p.m. - 1:40 p.m.
	1-9	1A > 1B	1:40 p.m. - 2:00 p.m.
	2-7	2A > 2B	2:00 p.m. - 2:20 p.m.
	2-8	2B > 2A	2:20 p.m. - 2:40 p.m.
	2-9	2A > 2B	2:40 p.m. - 3:00 p.m.
3-4 p.m. Buffer (redo p.m. off-peak runs affected by incidents)			
Peak Afternoon (4-6 p.m.)	2-10	2B > 2A	4:00 p.m. - 4:20 p.m.
	2-11	2A > 2B	4:20 p.m. - 4:40 p.m.
	2-12	2B > 2A	4:40 p.m. - 5:00 p.m.
	1-10	1B > 1A	5:00 p.m. - 5:20 p.m.
	1-11	1A > 1B	5:20 p.m. - 5:40 p.m.
	1-12	1B > 1A	5:40 p.m. - 6:00 p.m.

Route Description

For each city group of five routes, four were considered “traditional” routes, having non-specific beginning and end points. These were randomly devised and not intended to replicate local trips or provide the shortest or fastest route between points A and B. The one remaining route had an activity center as its origin and destination.

Activity centers are areas that have unique trip generating capabilities. While similar land use types typically generate similar levels of traffic, activity centers have the ability to produce relatively large and varying amounts of traffic. Examples of activity centers used in the Rio Grande Valley include South Padre Island International Airport, the Valley Regional Medical Center, and Valle Vista Mall. Route 5 in each city group was designated as the activity center route for that area. Figures 2 through 4 show schematics of all 15 Rio Grande Valley routes.

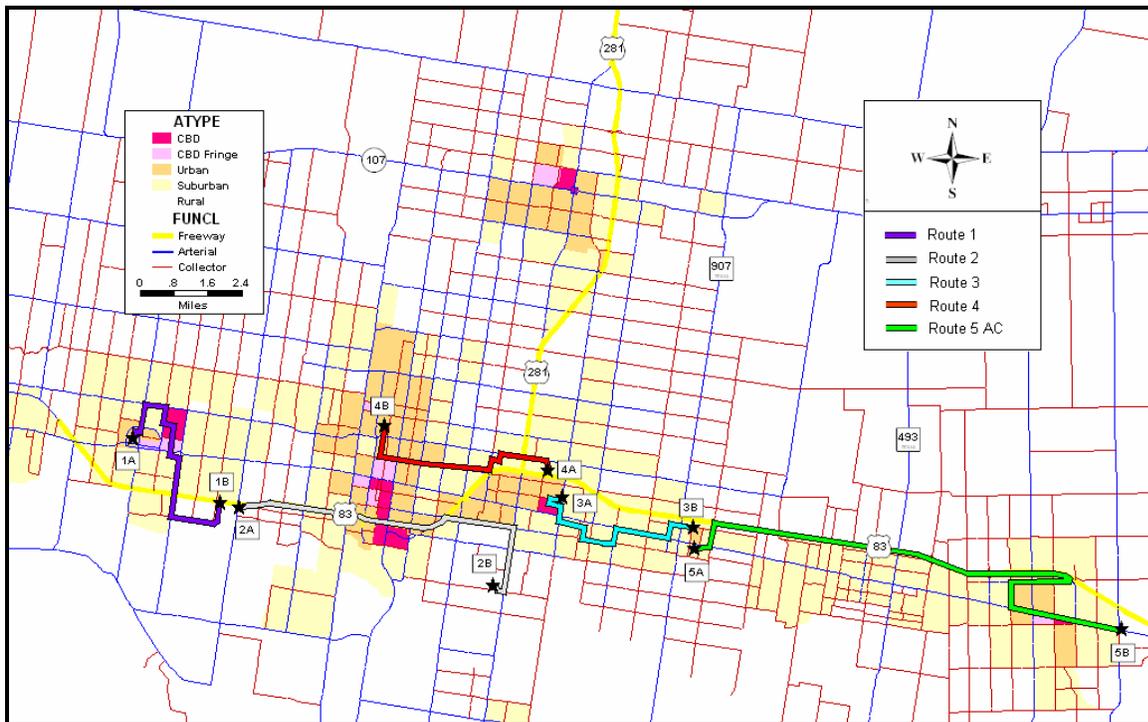


Figure 2. McAllen Area Routes.

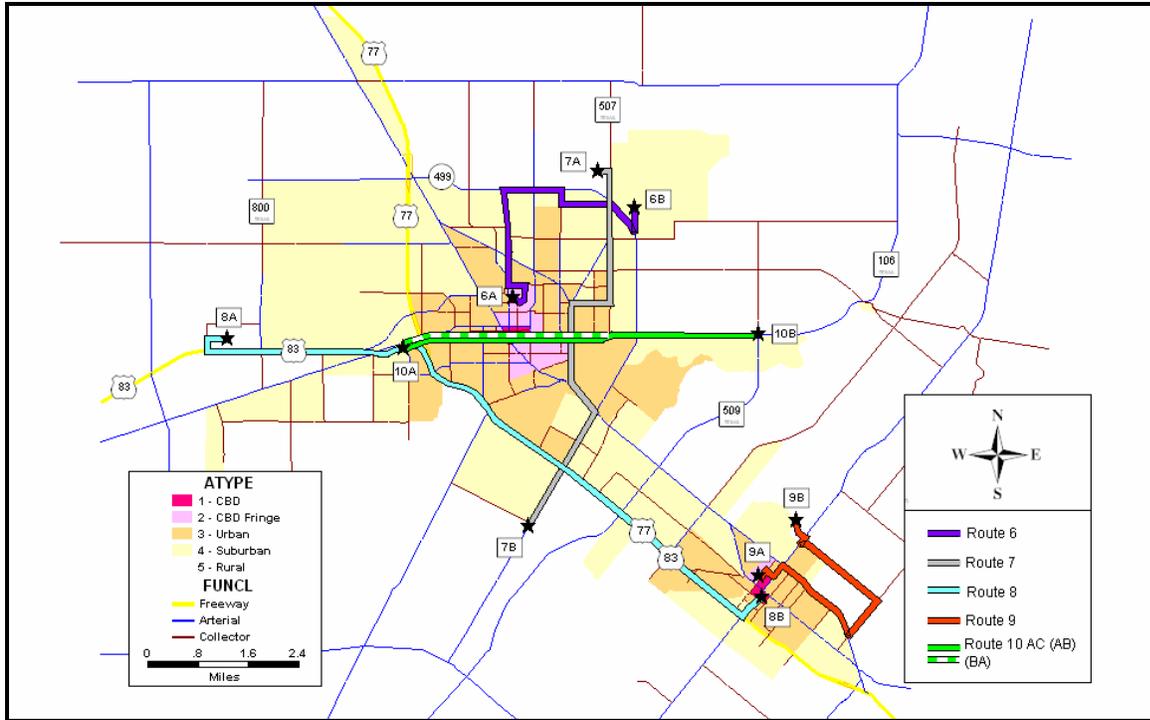


Figure 3. Harlingen Area Routes.

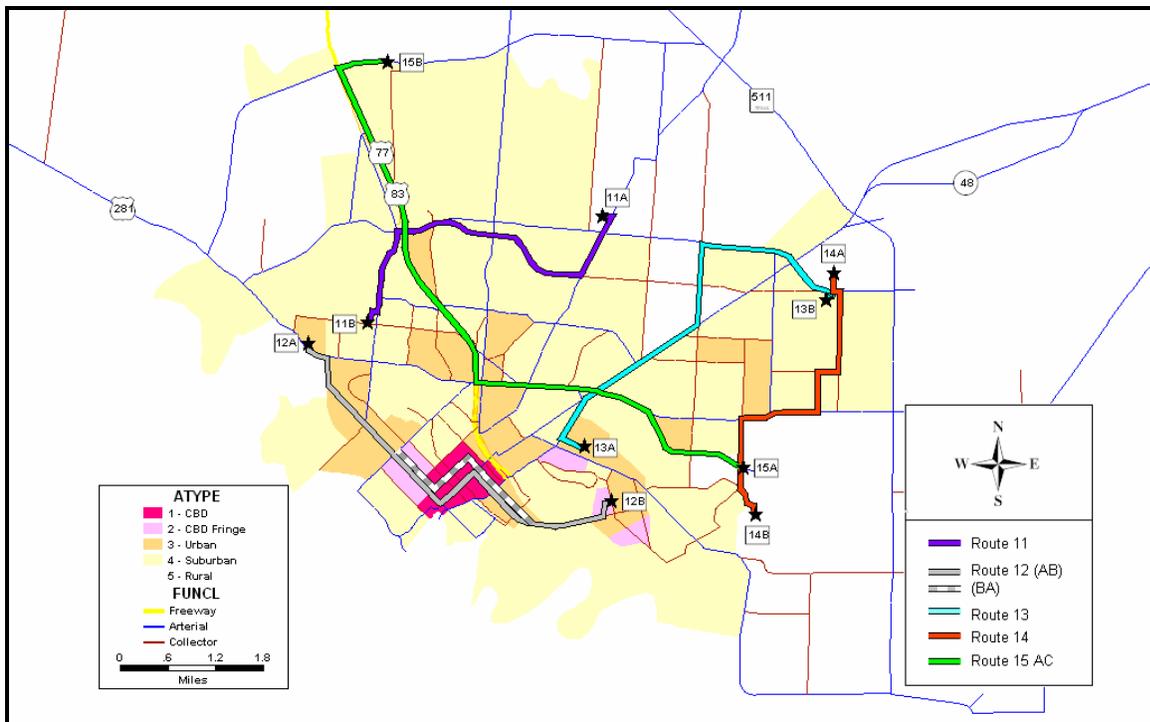


Figure 4. Brownsville Area Routes.

To facilitate an understanding of the route paths, Table 3 provides detailed descriptions of each route, including functional class and area type information, and separate lines for each distinct street traversed along the route. Note that the data analysis contained in the remainder of this report is based on route segments and entire routes, rather than individual streets within route segments.

Table 3. Rio Grande Valley Route Descriptions by Street.

	Roadway	From	To	Functional Class	Area Type
Route 1	<i>Begin route at intersection of Perkins and 12th</i>				
	Perkins	BEGIN ROUTE	14th	Local	Urban
	14 th	Perkins	Conway	Local	Urban
	Conway	14 th	18th	Arterial	Urban
	Conway	18th	Griffin	Arterial	Suburban
	Griffin	Conway	Mayberry	Arterial	Suburban
	Mayberry	Griffin	Country Club	Collector	CBD
	Country Club	Mayberry	Highland Park	Local	CBD
	Highland Park	Country Club	Bryce	Local	CBD
	Highland Park	Bryce	US 83 Bus	Local	CBD Fringe
	Fulgencio Velasco	US 83 Bus	8th	Local	Suburban
	8th	Highland Park	Bryan	Local	Suburban
	Bryan	8th	US 83	Arterial	Suburban
	Bryan	US 83	Trinity	Arterial	Suburban
	Trinity	Bryan	Glasscock	Collector	Rural
	Glasscock	Trinity	Rio Grande	Local	Rural
	Rio Grande	Glasscock	Cimarron	Local	Rural
	Cimarron	Rio Grande	Brazos St	Local	Rural
	Brazos St	Cimarron	Brazos Cir	Local	Rural
	Brazos Cir	Brazos St	END ROUTE	Local	Rural
<i>End route on Brazos Circle</i>					
Route 2	<i>Begin route at intersection of Cimarron and Colorado</i>				
	Cimarron	BEGIN ROUTE	Shary	Local	Rural
	Shary	Cimarron	US 83	Arterial	Rural
	US 83	Shary	Ware	Freeway	Rural
	US 83	Ware	23 rd	Freeway	Suburban
	US 83	23rd	Main	Freeway	Urban
	US 83	Main	Col Rowe	Freeway	CBD
	US 83	Col Rowe	Jackson	Freeway	Urban
	Jackson	US 83	Sam Houston	Arterial	Urban
	Sam Houston	Jackson	Cage	Arterial	Urban
	Cage	Sam Houston	Ridge	Arterial	Suburban
	Cage	Ridge	Hall Acres	Arterial	Rural
	Hall Acres	Cage	Sailfish	Local	Rural
	Sailfish	Hall Acres	Marlin	Local	Rural
	Marlin	Sailfish	END ROUTE	Local	Rural
<i>End route at intersection of Marlin and Yellowfin</i>					

Table 3. Rio Grande Valley Route Descriptions by Street (Continued).

	Roadway	From	To	Functional Class	Area Type
Route 3	<i>Begin route at intersection of 9th and Duranta</i>				
	Duranta	BEGIN ROUTE	13 th	Collector	Suburban
	13 th	Duranta	US 83 Bus	Arterial	Suburban
	US 83 Bus	13 th	Stewart	Arterial	Suburban
	Stewart	US 83 Bus	Sam Houston	Arterial	Suburban
	Sam Houston	Stewart	Wyoming	Collector	Suburban
	11 th	Wyoming	Standard	Collector	Suburban
	Standard	11 th	7 th	Local	Suburban
	7 th	Standard	I	Local	Suburban
	I	7 th	US 83 Bus	Arterial	Suburban
	I	US 83 Bus	Hawk	Arterial	CBD
	Hawk	I	Kumquat	Local	CBD
	Kumquat	Hawk	Bell	Local	CBD
	Bell	Kumquat	END ROUTE	Local	CBD
<i>End route at intersection of Bell and I</i>					
Route 4	<i>Begin route at intersection of Alan and Juniper</i>				
	Alan	BEGIN ROUTE	Gumwood	Local	Suburban
	Gumwood	Bagwell	Ferguson	Local	Suburban
	Ferguson	Gumwood	Hibiscus	Arterial	Suburban
	Hibiscus	Ferguson	Warren	Local	Suburban
	Warren	Hibiscus	Sugar	Local	Suburban
	Sugar	Warren	Jackson	Arterial	Suburban
	Polk	Jackson	Hackberry	Arterial	Suburban
	Hackberry	Polk	McColl	Arterial	Suburban
	Hackberry	McColl	Col Rowe	Arterial	Urban
	Hackberry	Col Rowe	10 th	Collector	Urban
	Hackberry	10 th	16 th	Collector	CBD Fringe
16 th	Hackberry	END ROUTE	Local	Urban	
<i>End route at intersection of 16th and Tamarack</i>					
Route 5 (AC)	<i>Begin route at intersection of FM 1015 and Business US 83(Texas A&M Ag Station)</i>				
	US 83 Bus	Begin Route	Airport (Mile 4)	Arterial	Suburban
	US 83 Bus	Airport (Mile 4)	Bridge (Mile 4 ½)	Arterial	CBD
	US 83 Bus	Bridge (Mile 4 ½)	Texas (FM 88)	Arterial	CBD Fringe
	US 83 Bus	Texas (FM 88)	Border	Arterial	Urban
	Border	US 83 Bus	Pike	Arterial	Urban
	Pike	Border	Bridge (Mile 4 ½)	Arterial	Urban
	Pike	Bridge (Mile 4 ½)	Airport (Mile 4)	Arterial	Suburban
	Airport	Pike	US 83	Arterial	Suburban
	US 83	Airport	Bridge	Freeway	Suburban
	US 83	Bridge	Border	Freeway	Urban
	US 83	Border	FM 1423	Freeway	Suburban
	US 83	FM 1423	Tower	Freeway	Rural
	Tower	US 83	US 83 Bus	Arterial	Suburban
	US 83 Bus	Tower	7 th Street	Arterial	Suburban
	US 83 Bus	7 th Street	7 th Place	Arterial	Urban
	7 th Place	US 83 Bus	END ROUTE	Local	Suburban
<i>End route at intersection of 7th Place and Bowie (Bowie Elem. School and Catholic Diocese)</i>					

Table 3. Rio Grande Valley Route Descriptions by Street (Continued).

	Roadway	From	To	Functional Class	Area Type
Route 6	<i>Begin route at intersection of 2nd and Lee</i>				
	2 nd	BEGIN ROUTE	Washington	Local	CBD Fringe
	Washington	2 nd	Woodland	Collector	CBD Fringe
	5 th	Woodland	Austin	Collector	CBD Fringe
	Austin	5 th	1 st	Collector	Urban
	1 st	Austin	US 77 Bus	Arterial	Urban
	1 st	US 77 Bus	Matz	Collector	Suburban
	Matz	1 st	Breedlove	Collector	Suburban
	Breedlove	Matz	Ed Carey	Local	Suburban
	Ed Carey	Breedlove	13 th	Arterial	Suburban
	13 th	Ed Carey	Vinson	Collector	Suburban
	Vinson	13 th	N 25th	Local	Suburban
	N 25th	Vinson	Oak	Arterial	Suburban
	Oak	N 25th	Loop 499	Local	Suburban
	Loop 499	Oak	Airport	Arterial	Suburban
	Airport	Loop 499	END ROUTE	Local	Suburban
<i>End route at intersection of Airport and Raintree</i>					
Route 7	<i>Begin route at intersection of Briar and 24th</i>				
	Briar	BEGIN ROUTE	25 th	Local	Rural
	25 th	Briar	Ed Carey	Collector	Suburban
	25 th	Ed Carey	Rio Hondo	Arterial	Suburban
	25 th	Rio Hondo	Grimes	Collector	Suburban
	25 th	Grimes	Washington	Collector	Urban
	Washington	25 th	US 77 Bus	Collector	Urban
	US 77 Bus	Washington	Harrison	Arterial	Urban
	US 77 Bus	Harrison	Little Creek	Arterial	CBD Fringe
	US 77 Bus	Little Creek	Ed Carey	Arterial	Urban
	Ed Carey	US 77 Bus	Hale	Arterial	Suburban
	Ed Carey	Hale	US 77	Arterial	Urban
	Ed Carey	US 77	END ROUTE	Arterial	Suburban
<i>End route at intersection of Ed Carey and Morris</i>					
Route 8	<i>Begin route at intersection of Orange and Tangelo</i>				
	Orange	BEGIN ROUTE	Altas Palmas	Local	Rural
	Altas Palmas	Orange	US 83	Collector	Rural
	US 83	Altas Palmas	Stuart Place	Freeway	Rural
	US 83	Stuart Place	US 77	Freeway	Suburban
	US 77	US 83	Ed Carey	Freeway	Urban
	US 77	Ed Carey	Williams	Freeway	Suburban
	US 77	Williams	Sam Houston	Freeway	Urban
	Sam Houston	US 77	Swanson	Arterial	Urban
	Swanson	Sam Houston	Reagan	Local	Urban
	Reagan	Swanson	Robertson	Local	Urban
	Reagan	Robertson	END ROUTE	Local	CBD
<i>End Route at intersection of Reagan and Rowson</i>					

Table 3. Rio Grande Valley Route Descriptions by Street (Continued).

	Roadway	From	To	Functional Class	Area Type
Route 9	<i>Begin route at intersection of Hicks and Bowie</i>				
	Bowie	BEGIN ROUTE	Adele	Collector	CBD
	Adele	Bowie	Sam Houston	Local	CBD
	Adele	Sam Houston	Crockett	Local	Urban
	Crockett	Adele	US 77 Bus	Collector	Urban
	US 77 Bus	Crockett	Stookey	Arterial	Urban
	US 77 Bus	Stookey	Line M	Arterial	Suburban
	Line M	US 77 Bus	San Jose Ranch	Collector	Rural
	San Jose Ranch	Line M	Norma Linda	Collector	Rural
	Norma Linda	San Jose Ranch	Line 17	Local	Rural
	Line 17	Norma Linda	McCullough	Collector	Rural
	Line 17	McCullough	Bonham	Collector	Suburban
	Line 17	Bonham	Sam Houston	Collector	Urban
	Sam Houston	Line 17	Resaca Shores	Arterial	Rural
	Resaca Shores	Sam Houston	END ROUTE	Local	Rural
<i>End route at intersection of Resaca Shores and Meadowbrook</i>					
10 (AC) A→B	<i>Begin route at intersection of Dixieland and Tyler (Valle Vista Mall)</i>				
	Tyler	BEGIN ROUTE	C St	Arterial	Urban
	Tyler	C St	Commerce	Arterial	CBD Fringe
	Tyler	Commerce	6 th	Arterial	CBD
	Tyler	6 th	US 77 Bus	Arterial	CBD Fringe
	Tyler	US 77 Bus	27 th	Arterial	Urban
	Harrison	27 th	Ed Carey	Arterial	Urban
	Harrison	Ed Carey	FM 509	Arterial	Suburban
<i>End route at intersection of Harrison and FM 509 (Fruit of the Loom)</i>					
10 (AC) B→A	<i>Begin route at intersection of Harrison and FM 509 (Fruit of the Loom)</i>				
	Harrison	BEGIN ROUTE	Ed Carey	Arterial	Suburban
	Harrison	Ed Carey	US 77 Bus	Arterial	Urban
	Harrison	US 77 Bus	6 th	Arterial	CBD Fringe
	Harrison	6 th	Commerce	Arterial	CBD
	Harrison	Commerce	C	Arterial	CBD Fringe
	Harrison	C	US 77	Arterial	Urban
	Harrison	US 77	END ROUTE	Arterial	Suburban
<i>End route at intersection of Harrison and Dixieland (Valle Vista Mall)</i>					

Table 3. Rio Grande Valley Route Descriptions by Street (Continued).

	Roadway	From	To	Functional Class	Area Type
Route 11	<i>Begin route at intersection of Kingsway and Banburg</i>				
	Kingsway	BEGIN ROUTE	Old Port Isabel	Local	Rural
	Old Port Isabel	Kingsway	Ruben Torres	Arterial	Rural
	Old Port Isabel	Ruben Torres	Coffeeport	Arterial	Suburban
	Coffeeport	Old Port Isabel	Old Alice	Collector	Suburban
	Ruben Torres	Old Alice	US Bus 77	Arterial	Urban
	Ruben Torres	US Bus 77	Central	Arterial	Suburban
	Central	Ruben Torres	Stoval	Arterial	Suburban
	Stoval	Central	Russell	Local	Suburban
	Russell	Stoval	END ROUTE	Local	Suburban
<i>End route at intersection of Russell and Del Mar</i>					
Route 12 A→B	<i>Begin route at intersection of Camino del Rey and Avenida Imperial</i>				
	Camino del Rey	BEGIN ROUTE	Military Hwy	Local	Urban
	Military Hwy	Camino del Rey	Old Military Rd	Arterial	Urban
	Old Military Rd	Military Hwy	Elizabeth	Collector	Urban
	Elizabeth	Old Military Rd	Central	Collector	Urban
	Elizabeth	Central	Palm	Arterial	Urban
	Elizabeth	Palm	E 7 th	Arterial	CBD Fringe
	Elizabeth	E 7 th	E 13 th	Arterial	CBD
	E 13 th	Elizabeth	Tyler	Arterial	CBD
	Tyler	E 13 th	International	Local	CBD
	Tyler	International	East	Collector	Urban
	East	Tyler	Taylor	Collector	Urban
	East	Taylor	Elena	Collector	Suburban
	East	Elena	Margarita	Collector	CBD Fringe
Margarita	East	END ROUTE	Local	CBD Fringe	
<i>End route at intersection of Margarita and Jessica</i>					
Route 12 B→A	<i>Begin route at intersection of Margarita and Jessica</i>				
	Margarita	BEGIN ROUTE	East	Local	CBD Fringe
	East	Margarita	Elena	Collector	CBD Fringe
	East	Elena	Taylor	Collector	Suburban
	East	Taylor	Polk	Collector	Urban
	Polk	East	International	Local	Urban
	Polk	International	E 16 th	Local	CBD
	E 16 th	Polk	Tyler	Local	CBD
	Tyler	E 16 th	E 10 th	Local	CBD
	E 10 th	Tyler	Jackson	Local	CBD
	E 10 th	Jackson	Washington	Collector	CBD
	Washington	E 10 th	E 7 th	Local	CBD
	Washington	E 7 th	Palm	Local	CBD Fringe
	Palm	Washington	Elizabeth	Arterial	CBD Fringe
	Elizabeth	Palm	Central	Arterial	Urban
	Elizabeth	Central	Old Military Rd	Collector	Urban
	Old Military Rd	Elizabeth	Military Hwy	Collector	Urban
Military Hwy	Old Military Rd	Camino Del Rey	Arterial	Urban	
Camino del Rey	Military Hwy	END ROUTE	Local	Urban	
<i>End Route at Intersection of Camino del Rey and Avenida Imperial</i>					

Table 3. Rio Grande Valley Route Descriptions by Street (Continued).

	Roadway	From	To	Functional Class	Area Type
Route 13	<i>Begin route at intersection of Coolidge and 25th</i>				
	Coolidge	BEGIN ROUTE	International	Local	Urban
	International	Coolidge	14 th	Arterial	Urban
	International	14th	South Padre Island	Arterial	Suburban
	South Padre Island	International	Central	Arterial	Suburban
	Central	South Padre Island	Coffeeport	Collector	Rural
	Central	Coffeeport	FM 802	Collector	Suburban
	FM 802	Central	Coffeeport	Arterial	Suburban
	Las Palmas	Coffeeport	Princess Palm	Local	Suburban
	Princess Palm	Las Palmas	END ROUTE	Local	Suburban
<i>End route at intersection of Princess Palm and Royal Palm</i>					
Route 14	<i>Begin route at intersection of Autumn Sage and Woodstone</i>				
	Autumn Sage	BEGIN ROUTE	Coffeeport	Local	Rural
	Coffeeport	Autumn Sage	Vermillion	Arterial	Suburban
	Vermillion	Coffeeport	Houston	Collector	Suburban
	Houston	Vermillion	N Dakota	Collector	Suburban
	N Dakota	Houston	Boca Chica	Local	Suburban
	Boca Chica	N Dakota	Minnesota	Arterial	Suburban
	Boca Chica	Minnesota	Iowa	Arterial	Urban
	Iowa	Boca Chica	Les Mauldin	Collector	Suburban
	Iowa (Jose Colunga)	Les Mauldin	Morningside	Collector	Rural
	Morningside	Iowa	Norton	Local	Suburban
	Norton	Morningside	Minnesota	Local	Rural
	Minnesota	Norton	END ROUTE	Local	Rural
<i>End route at intersection of Minnesota and Zafiro</i>					
Route 15 (AC)	<i>Begin route at intersection of Billy Mitchell and Iowa (South Padre Island International Airport)</i>				
	Billy Mitchell	BEGIN ROUTE	Les Mauldin	Arterial	Rural
	Billy Mitchell	Les Mauldin	Central	Arterial	Suburban
	Billy Mitchell	Central	Boca Chica	Arterial	Urban
	Boca Chica	Billy Mitchell	Old Port Isabel	Arterial	Suburban
	Boca Chica	Old Port Isabel	US 77	Arterial	Urban
	US 77	Boca Chica	Los Ebanos	Freeway	Urban
	US 77	Los Ebanos	Price	Freeway	Suburban
	US 77	Price	Coffeeport	Freeway	Urban
	US 77	Coffeeport	Alton Gloor	Freeway	Suburban
	Alton Gloor	US 77	END ROUTE	Arterial	Suburban
<i>End route at intersection of Alton Gloor and Windwood (Valley Regional Medical Center)</i>					

Data Collection Setup

Rio Grande Valley travel time and delay data were collected over a two-week period in November and December 2005. Equipment used included a vehicle, a Global Positioning System (GPS) satellite receiver, a laptop computer, and a voice recorder. The satellite receiver was the GPS 35/36 TracPakTM manufactured by the Garmin Corporation. This particular GPS antenna collects various streams of data on a second-by-second basis. The data includes longitude, latitude, time, date, and speed. For the GPS data to be collected and archived properly, various platforms of software were installed on the laptop.

Maptitude, a geographic information system (GIS) software package capable of archiving the GPS data stream received, was the primary data collection software program. A program called NMEATime©, distributed by Apollocom, was also used to synchronize the laptop computer's internal clock and the atomic clocks used in the GPS satellites. Finally, a small voice recorder was used to record speed signage along the route and log the time, location and duration of any non-recurring incidents.

Data Processing

After the data collection was completed, the raw data were processed into a format that allowed for easier manipulation during analysis. The data collected using the GPS receiver and Maptitude® included more information than was needed for the analysis. Therefore, the raw GPS data was processed through a simple FORTRAN program that removed all extraneous lines of data from each individual file. At this point, the data were imported into a Microsoft® Excel spreadsheet, where the longitude and latitude values were converted from a degrees-minutes-seconds format to a decimal degrees format. The Excel GPS files were then imported into a Microsoft® Access database.

The X-Y coordinate information in the Access database was loaded into ESRI ArcGISTM to facilitate visual determination of the X-Y coordinates of segment start/end points. A bar was drawn across the route at these locations and polygons were constructed around them so that delay due to turning maneuvers or traffic control devices at segment transitions could be identified. The segment start/end points represent a change in functional class or area type. The size of the polygons drawn around the transition points was dependent on the amount of delay or stop time at that location. Polygons were constructed to encompass the largest amount of delay time experienced on any run.

Figure 5 is a screenshot from the GIS software showing start/end points (solid bars) and transition areas (shaded polygons) for a portion of one route. The per-second longitude and latitude readings recorded by the GPS unit appear as individual dots forming the route path. Dots that are increasingly closer together represent slowing. Dots further apart represent higher speeds and less delay.

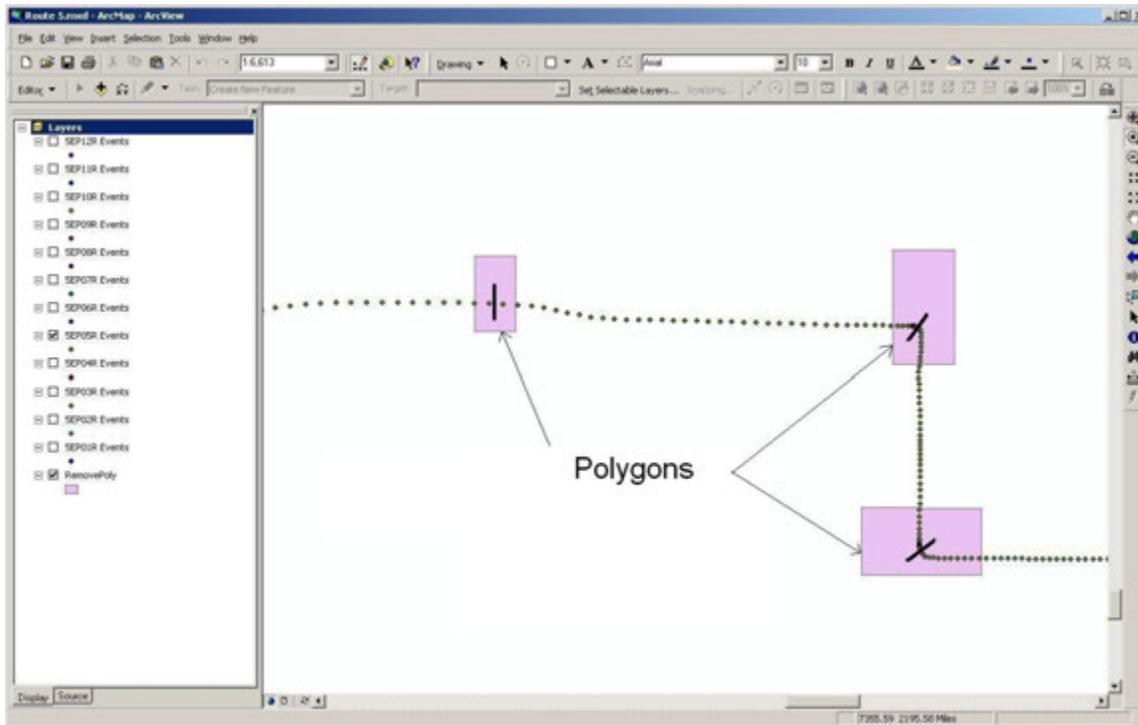


Figure 5. Data Processing in ArcGIS®.

DATA ANALYSIS

After the raw data was reduced and imported into ArcGIS, it was analyzed to obtain the average speed for each segment along a given route. Average speed per segment was determined using the following formula:

$$Speed = \frac{Distance (miles)}{Time (seconds) / 3600}$$

The data analysis incorporated two methods in determining the average speed per segment. Differentiation between the two methods was based on how the segment beginning and end points were determined. A brief explanation of both methods is provided below:

- A) *Travel Time Unimpeded* – was determined by using the buffer polygons (shaded areas in Figure 5) developed for each route. The distance between the borders of individual polygons and the time required to traverse that distance were measured. With the segment transitions (shaded areas within polygons) removed, the result was often a higher average speed per segment. This method was useful in ascertaining the speeds at which vehicles can travel on various roads or portions of roads within an urban area.

- B) *Travel Time with Delay* – was determined by using the entire distance between segment endpoints (e.g., solid line within each polygon in Figure 5) and the amount of time needed to travel between the two points. The average speed that results is representative of actual driving conditions and is usually lower than the average speed obtained using the unimpeded method. The delay approach accounts for various levels of congestion created at the friction areas that sometimes exist when traveling between area types of differing densities and distinct functional classes. These transition zones are often characterized by signalized intersections and other traffic control devices.

The concept of comparing two travel time analysis methods was implemented to provide a correlation between the actual operational conditions of a road segment (travel time with delay) and conditions that might exist if travel at segment transitions was excluded (travel time unimpeded).

For both methods of analysis, average speeds for roads are cross-classified by area type and functional classification. As expected, the travel time unimpeded approach generally resulted in speeds that were faster than those obtained when the travel time delay method of analysis was used. Specifically, of the 1,776 segment runs conducted in the study, 1,523 (86 percent) were faster using the unimpeded method of analysis. While the delay method provides more accurate information on average (operational) speeds for various road segments within an area, the unimpeded method enables estimates of what average speeds could be if measures are taken to preserve the integrity of the transportation network. Both methods are useful depending on the planning application.

Analysis of the data from the Rio Grande Valley Travel Time and Delay Study is presented in the following sections. The average speed per segment along individual routes is provided in the appendix to this report. Segment endpoints are shown in the left-hand column and the functional classification (FUNCL), area type (ATYPE), segment length, average speeds (for both the unimpeded and delay analysis methods), and posted speed limits are included in each of the appendix tables. Segment averages were also determined by peak/off-peak period and by direction.

After compiling the segment average speeds, a review of the data tables was conducted to identify speeds that were unusually low or high. For those segments with speeds that were considered outside the typical range of values, a determination was made as to why the speed varied. This determination was based on a review of recorded observations for each run and whether the unusual speed was a result of a recurring or non-recurring event.

If the unusual speed reading was the result of recurring events such as a traffic control devices (e.g., traffic signal, stop sign, school zone signage, speed bumps) or trains, then the data were not excluded from the analysis. However, if the low speed was the result of an event that was not recurring (such as a crash, disabled vehicle, construction on the travel lanes, or power outage

affecting stoplight operations), the data were excluded. Runs disrupted by non-recurring incidents were re-done whenever possible, reducing the need to exclude any data from analysis.

Summary of Unimpeded Method of Travel Time Analysis

Delay at segment transitions can sometimes be caused by queuing at traffic control devices or turning movements. The unimpeded analysis method does not remove all causes of delay because many segments traverse multiple intersections while maintaining the same functional classification and area type. The unimpeded method of analysis provides an average speed for segments that excludes travel at segment start/end points and includes travel between segment transitions. Tables 4 through 6 present a summary of average unimpeded speeds for routes in each of the three study cities by peak and off-peak period. Tables 1a through 15d in the appendix provide a more detailed breakdown of the average speed per segment for each route using the travel time unimpeded and the travel time delay methods.

Table 4. Average Speed Summary for McAllen Routes – Unimpeded Method.

Route	Peak Period			Off-Peak Period		
	Average Speed		Overall Average	Average Speed		Overall Average
1	24.8	23.3*	24.1	23.9	23.6*	23.8
2	41.3	42.0*	41.7	42.4	42.0*	42.2
3	20.8	21.7*	21.3	23.4	22.4*	22.9
4	20.9	24.0*	22.5	19.9	23.1*	21.5
5	36.8	33.0*	34.9	35.5	36.9*	36.2

Figures in miles per hour * Route traversed in reverse direction (B to A)

Table 5. Average Speed Summary for Harlingen Routes – Unimpeded Method.

Route	Peak Period			Off-Peak Period		
	Average Speed		Overall Average	Average Speed		Overall Average
6	24.1	24.8*	24.5	25.0	25.1*	25.1
7	29.2	28.5*	28.9	28.9	31.0*	30.0
8	50.5	47.8*	49.2	51.0	48.6*	49.8
9	32.3	33.2*	32.8	33.6	33.7*	33.7
10	33.5	32.1*	32.8	34.8	34.9*	34.9

Figures in miles per hour * Route traversed in reverse direction (B to A)

Table 6. Average Speed Summary for Brownsville Routes – Unimpeded Method.

Route	Peak Period			Off-Peak Period		
	Average Speed		Overall Average	Average Speed		Overall Average
11	21.9	17.2*	19.6	24.4	24.7*	24.6
12	19.5	20.6*	20.1	18.1	20.9*	19.5
13	24.1	21.4*	22.8	24.7	26.5*	25.6
14	24.4	24.1*	24.3	23.9	24.6*	24.3
15	38.3	38.0*	38.2	36.6	38.9*	37.8

Figures in miles per hour * Route traversed in reverse direction (B to A)

After the data for each route were compiled into a format similar to that used in the appendix, the information was further aggregated into tables showing summary information for the entire study area.

Table 7 provides an example of the aggregated speed data. The example shows how average speeds (bold value in the bottom row of each table) are calculated for functional classification (FUNCL) and area type (ATYPE) combinations by peak (P) and off-peak (OP) periods.

Table 7. Example of Aggregated Speed Summary Data.

FUNCL ATYPE	1 - Freeway 3 - Urban		1 - Freeway 3 - Urban		1 - Freeway 4 - Suburban		1 - Freeway 4 - Suburban	
	Peak		Off-Peak		Peak		Off-Peak	
P or OP	Length (miles)	Time (sec)	Length (miles)	Time (sec)	Length (miles)	Time (sec)	Length (miles)	Time (sec)
	1.40	84	1.40	83	1.60	106	1.60	100
	1.27	76	1.27	76	1.48	94	1.48	91
	1.40	82	1.40	85	1.60	98	1.60	111
	1.27	76	1.27	75	1.48	96	1.48	87
	1.40	82	1.40	81	1.60	101	1.60	97
	1.27	75	1.27	76	1.48	90	1.48	89
	0.78	48	0.78	48				
	0.78	55	0.78	50				
	0.78	51	0.78	48				
	0.78	50	0.78	48				
	0.78	52	0.78	45				
	0.78	49	0.78	48				
Totals	12.69	780	12.69	763	9.24	585	9.24	575
Speed (mph)	58.6		59.9		56.9		57.9	

The average speed value is the average of all the readings in each column. It is derived using the following equation:

$$\text{Average Speed (mph)} = \frac{\text{Total Distance (miles)}}{\text{Total Time (seconds)} / 3600}$$

Figures 6 through 10 show the results of aggregating the speed data into groups according to functional classification and peak or off-peak period (using the unimpeded method of analysis). In each figure, the average peak and off-peak speeds for every functional classification within the specified area type are identified. The Freeway functional classification did not traverse the CBD Fringe area type in the Rio Grande Valley study area, therefore no data appears in that portion of Figure 7.

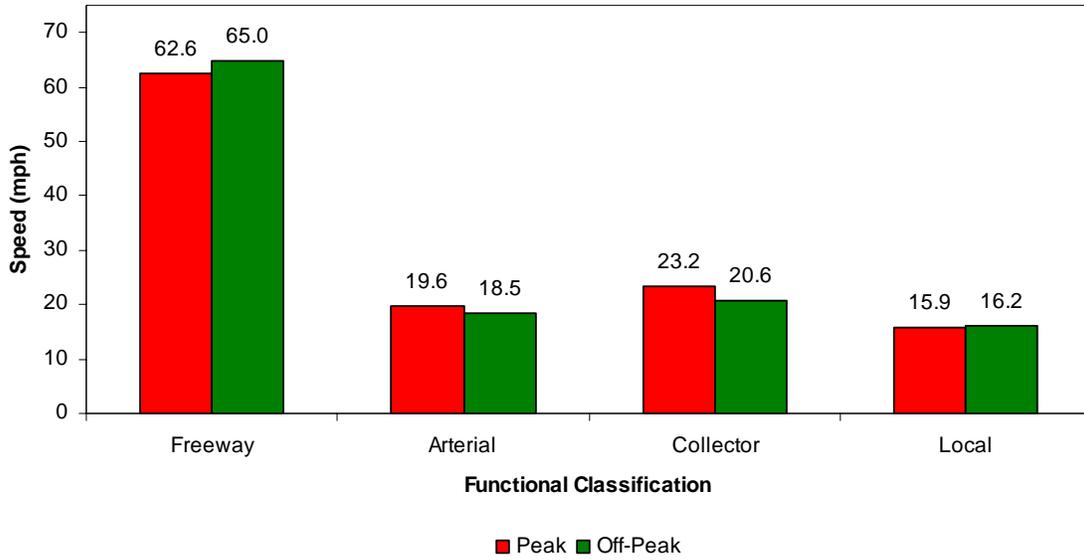


Figure 6. CBD Peak vs. Off-Peak Average Speeds – Unimpeded Method.

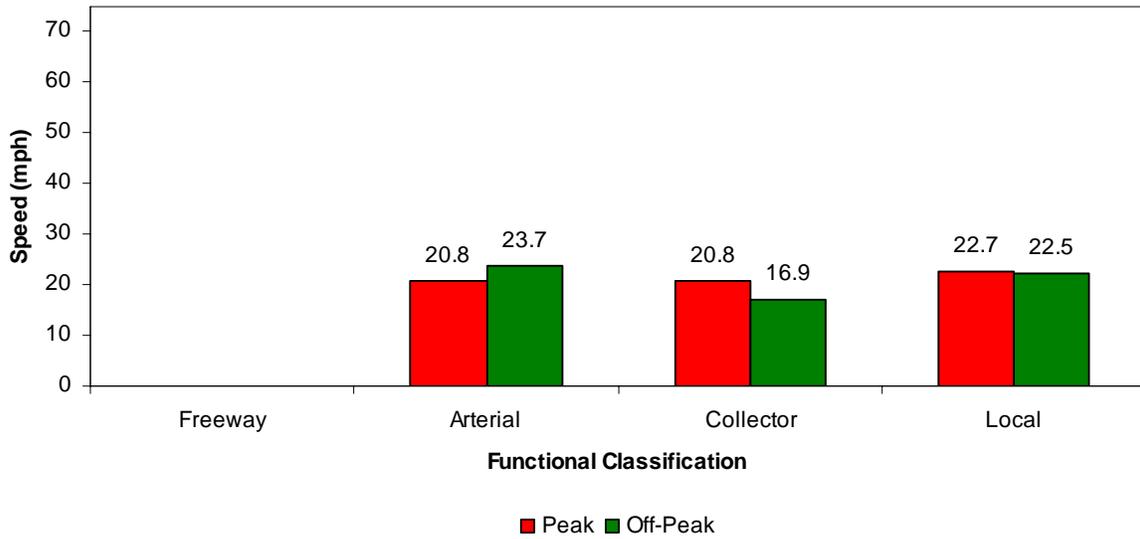


Figure 7. CBD Fringe Peak vs. Off-Peak Average Speeds – Unimpeded Method.

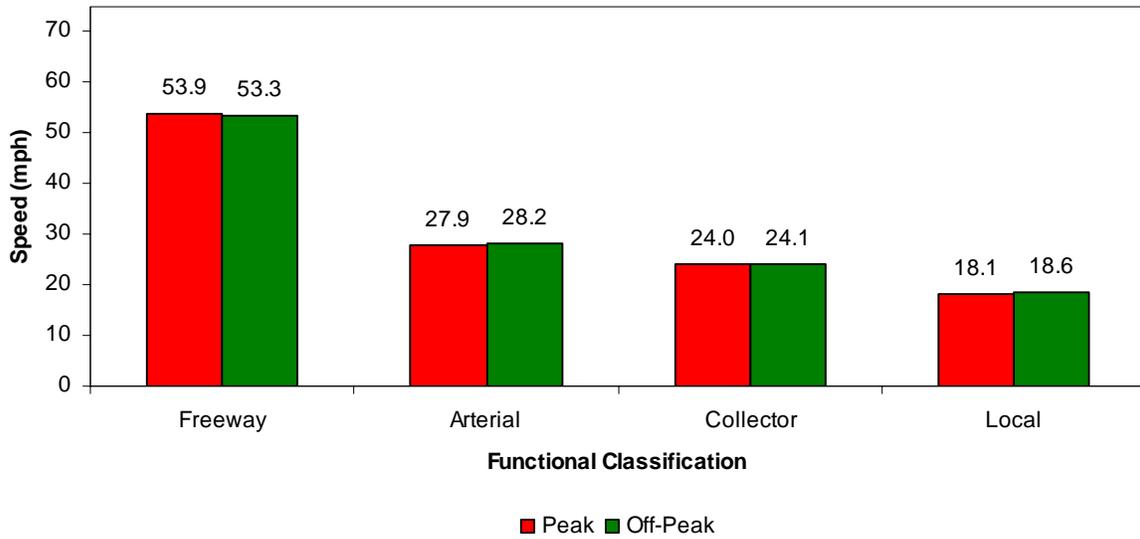


Figure 8. Urban Peak vs. Off-Peak Average Speeds – Unimpeded Method.

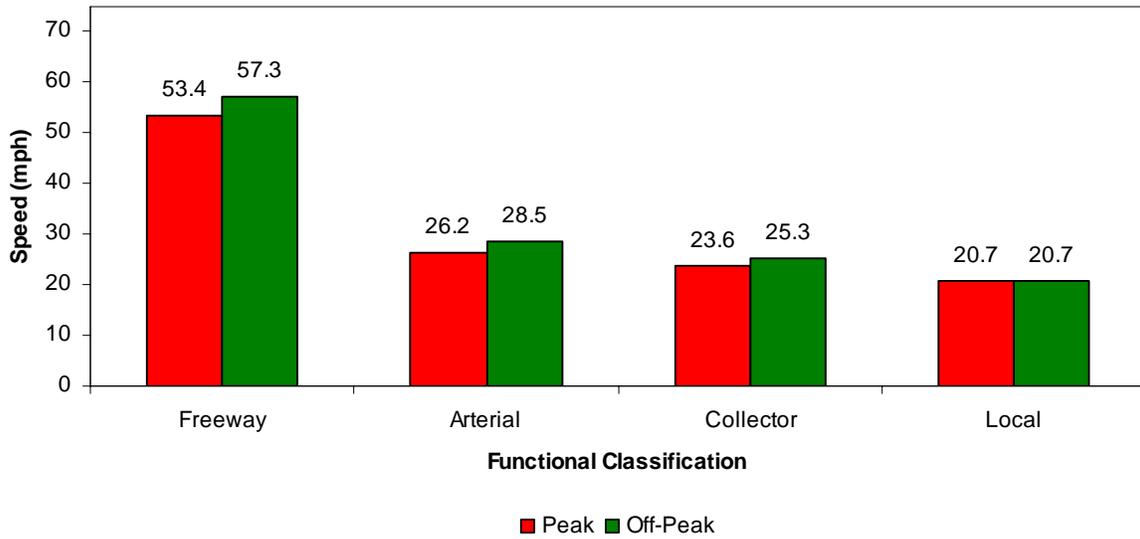


Figure 9. Suburban Peak vs. Off-Peak Average Speeds – Unimpeded Method.

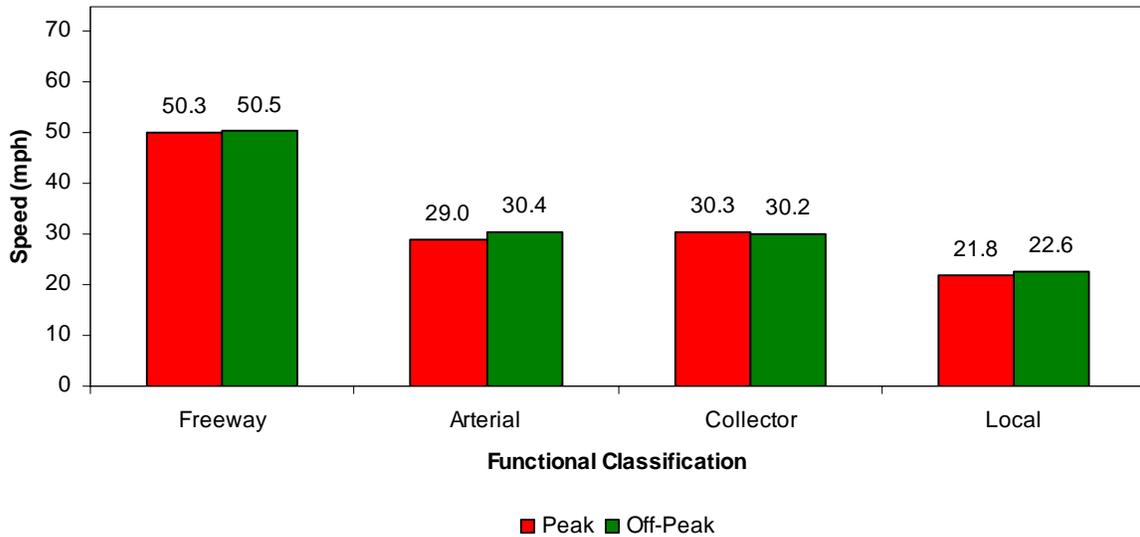


Figure 10. Rural Peak vs. Off-Peak Average Speeds – Unimpeded Method.

To assess the significance of average speed information obtained through the data collection effort, posted speed limits for the roadways on each route are needed. Table 8 provides the posted speed limit or range of speed limits for each functional classification and area type combination encountered in the study. Due to variability in segment lengths, certain speed-limit ranges are larger than others. An asterisk is used to denote routes whose speed limits were affected by the presence of school zones or speed bumps. A double asterisk indicates lower posted speed limits due to construction on adjacent lanes.

Table 8. Posted Speed Limits.

	Freeway	Arterial	Collector	Local
CBD	NP	30-45	30	20*
CBD Fringe	N/A	20*-35	20*-30	30
Urban	50**-60	20*-45	20*-30	20-30
Suburban	45**-60	25*-55	20*-45	20*-45
Rural	55**-65	30-55	30-55	15*-30

Figures in miles per hour * School Zone ** Construction on adjacent lane(s) NP - Not Posted

The average segment length in miles for each area type – functional class combination was also determined. Table 9 presents these results using the unimpeded method of analysis, which *excludes* travel at segment transition areas.

Table 9. Average Length of Segments – Unimpeded Method.

Functional Class Area Type	Freeway		Arterial		Collector		Local	
	# of Segments	Avg. Length (miles)						
CBD	12	0.80	42	0.40	30	0.27	66	0.27
CBD Fringe	0	N/A	60	0.34	36	0.28	42	0.17
Urban	84	1.11	240	0.62	84	0.51	78	0.31
Suburban	84	2.15	330	0.87	144	0.66	156	0.37
Rural	36	1.31	48	0.42	84	0.67	120	0.29

Summary of Delay Method of Travel Time Analysis

The delay method of analyzing travel time data incorporates all delay encountered while traveling along a route. Therefore, all slowdowns associated with queuing at traffic control devices or turning at intersections (both at segment start/end points and points in between) was included in the analysis. Tables 10 through 12 provide a summary of average speeds for every route in the tri-city study area, in both directions, by peak and off-peak period. Tables 1a through 15d in the appendix provide a detailed breakdown of the average speed per segment for individual runs on each route as determined using the travel time with delay and travel time unimpeded methods.

Table 10. Average Speed Summary for McAllen Routes – Delay Method.

Route	Peak Period			Off-Peak Period		
	Average Speed	Overall Average		Average Speed	Overall Average	
1	22.9	20.7*	21.8	22.2	22.1*	22.2
2	36.2	34.9*	35.6	35.8	34.2*	35.0
3	18.5	19.2*	18.9	21.5	20.7*	21.1
4	18.1	21.1*	19.6	17.2	20.8*	19.0
5	31.9	28.5*	30.2	31.8	30.5*	31.2

Figures in miles per hour * Reverse direction (B to A)

Table 11. Average Speed Summary for Harlingen Routes – Delay Method.

Route	Peak Period			Off-Peak Period		
	Average Speed		Overall Average	Average Speed		Overall Average
6	22.4	21.9*	22.2	23.2	22.8*	23.0
7	23.9	24.9*	24.4	23.8	26.5*	25.2
8	42.7	44.9*	43.8	46.8	45.6*	46.2
9	29.2	29.0*	29.1	29.9	30.6*	30.3
10	32.2	28.3*	30.3	31.8	33.5*	32.7

Figures in miles per hour * Reverse direction (B to A)

Table 12. Average Speed Summary for Brownsville Routes – Delay Method.

Route	Peak Period			Off-Peak Period		
	Average Speed		Overall Average	Average Speed		Overall Average
11	20.1	16.0*	18.1	20.9	20.9*	20.9
12	18.0	17.8*	17.9	16.6	18.0*	17.3
13	22.9	19.0*	21.0	21.5	24.6*	23.1
14	20.9	21.1*	21.0	21.0	20.2*	20.6
15	31.4	30.4*	30.9	31.0	32.5*	31.8

Figures in miles per hour * Reverse direction (B to A)

After the data for each route was compiled, the information was further aggregated into tables that provided a summary for all routes in the Rio Grande Study Area (see the example in Table 7). The speed summaries provide average speeds for each functional classification by area type and by peak and off-peak periods. The average speed value is derived by using the following equation:

$$\text{Average Speed (mph)} = \frac{\text{Total Distance (miles)}}{\text{Total Time (seconds)} / 3600}$$

Figures 11 through 15 show the results of aggregating the speed data into groups according to functional classification and peak or off-peak period (using the delay method of analysis). In each figure, the average peak and off-peak speeds for every functional classification within the specified area type are identified. The Freeway functional classification did not traverse the CBD Fringe area type in the Rio Grande Valley study area, therefore no data appears in that portion of Figure 12.

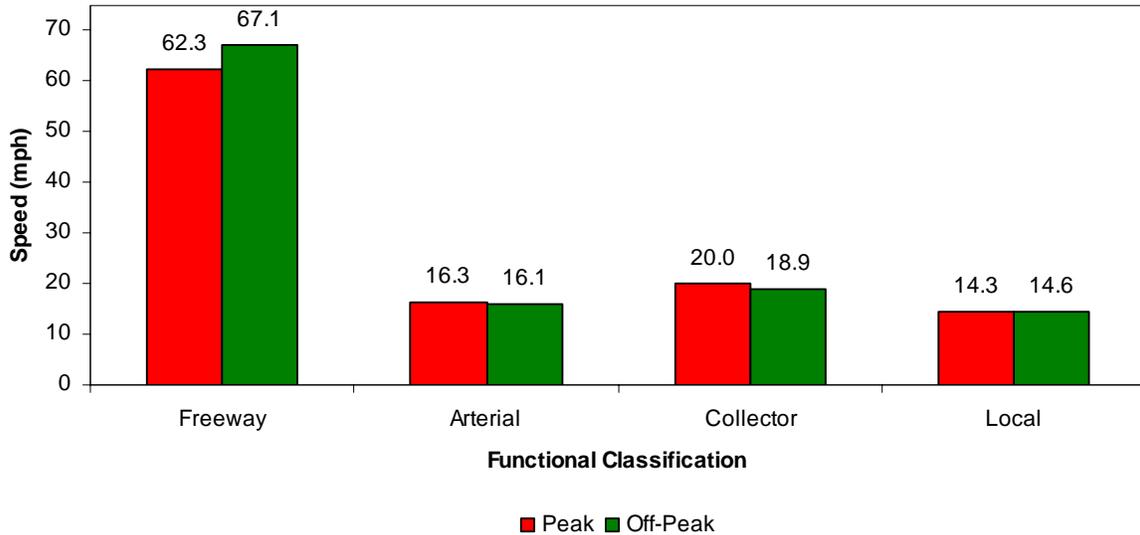


Figure 11. CBD Peak vs. Off-Peak Average Speeds – Delay Method.

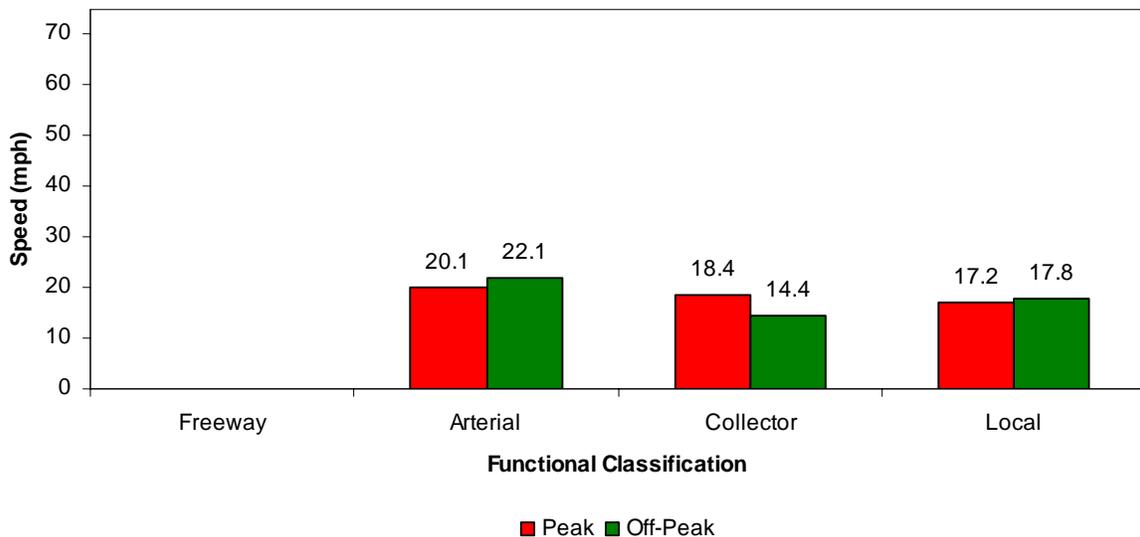


Figure 12. CBD Fringe Peak vs. Off-Peak Average Speeds – Delay Method.

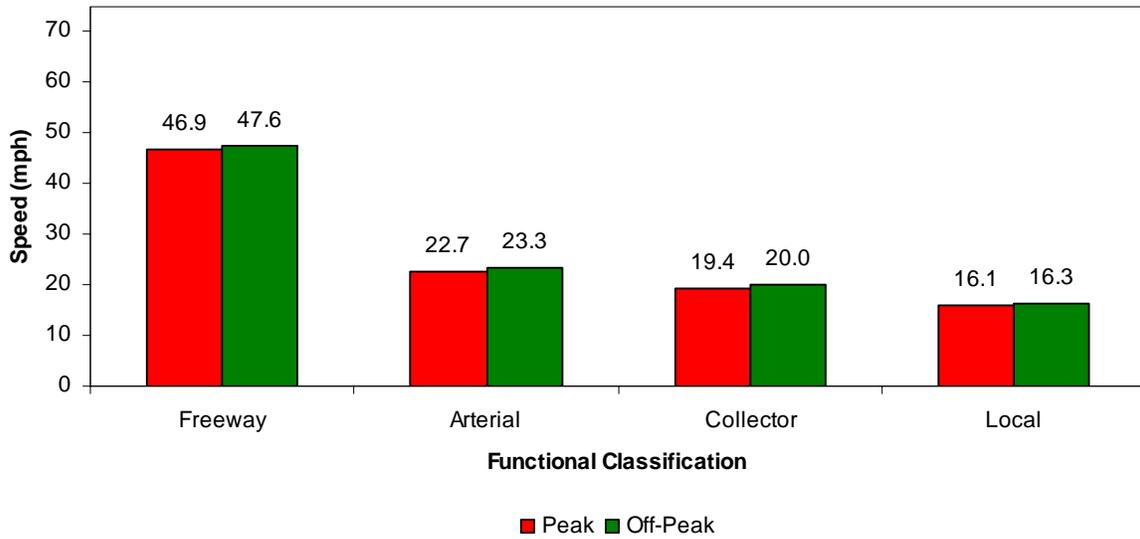


Figure 13. Urban Peak vs. Off-Peak Average Speeds – Delay Method.

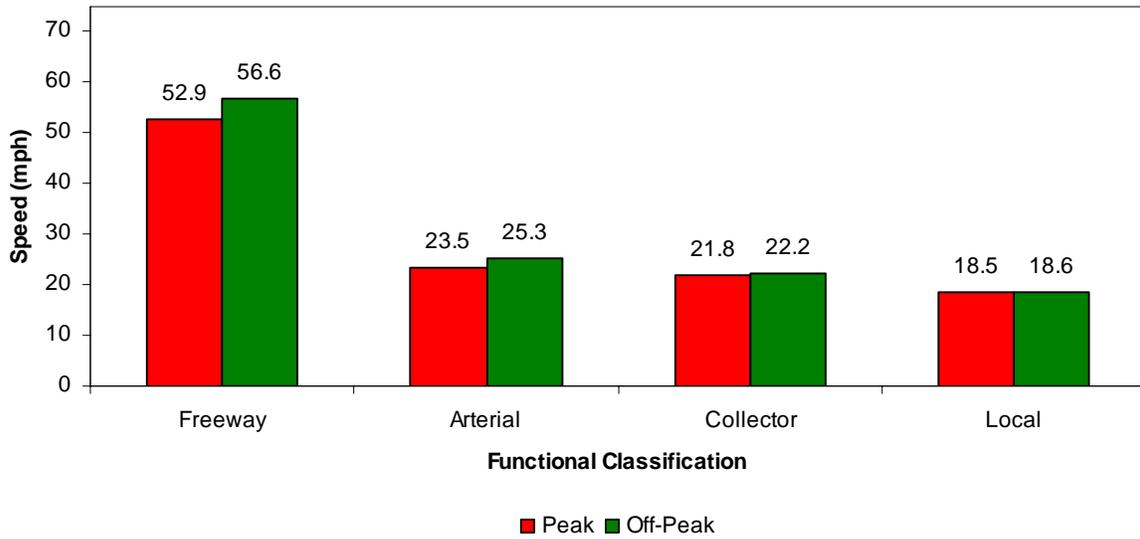


Figure 14. Suburban Peak vs. Off-Peak Average Speeds – Delay Method.

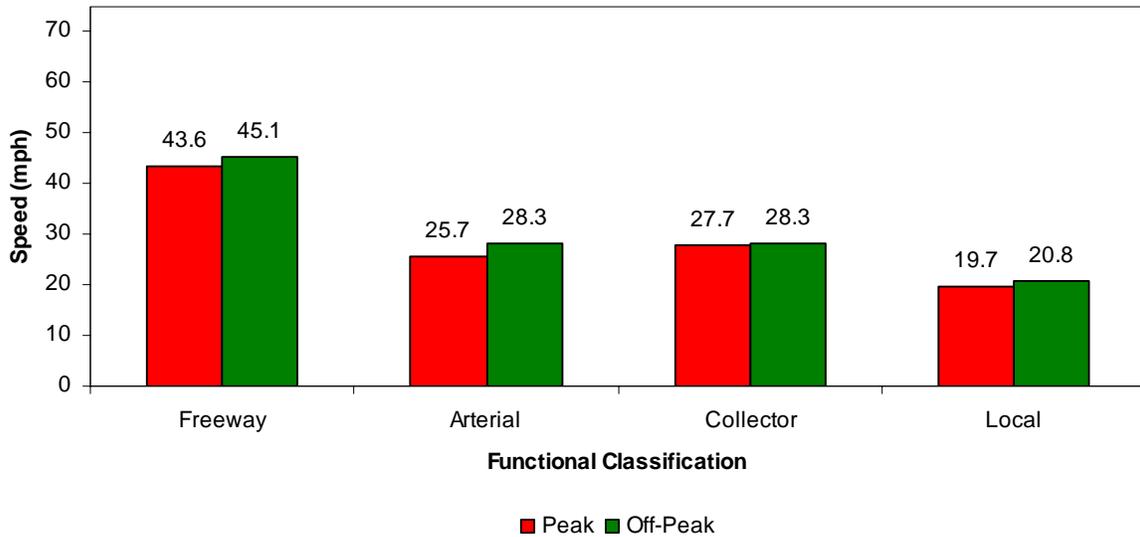


Figure 15. Rural Peak vs. Off-Peak Average Speeds – Delay Method.

As expected, the delay method (Figures 11 through 15) yielded peak and off-peak average speeds that were usually lower than those obtained using the unimpeded approach (Figures 6 through 10). Off-peak speeds on most functional classifications were slightly higher than peak-period speeds for both methods of analysis, though the difference was always less than 5 mph. A notable exception was the Collector functional class, which exhibited faster speeds during the peak period in two out of five area types. While this finding may appear counter intuitive, it is consistent with data collector observations indicating drivers often appeared to be in more of a “rush” during peak periods, driving faster than in off-peak periods.

Also note that most instances in which average peak period speeds exceeded average off-peak period speeds occurred in the CBD and CBD Fringe area types. Traffic in the downtown commercial areas of Brownsville and elsewhere did not appear to pick up appreciably until after 9a.m., creating congestion in the morning off-peak period as opposed to the peak period.

Overall, average speeds among non-freeway functional classes in a given area type were relatively consistent, differing by less than 10 mph. Speeds in the Rural area type were slightly higher than speeds recorded in other areas. The lone exception to this was the Freeway functional classification, which exhibited relatively slow speeds in Rural areas. The lowest average speeds were recorded in the CBDs. Again, however, the Freeway functional class contradicted this trend by exhibiting average speeds that were higher than those recorded in other area types.

To assess the significance of average speed information obtained through the data collection effort, posted speed limits for the roadways on each route are needed. Table 13 provides the posted speed limit or range of speed limits posted for each functional classification and area type combination encountered in the study. Due to variability in segment lengths, certain speed-limit

ranges are larger than others. An asterisk is used to denote routes whose speed limits were affected by the presence of school zones or speed bumps. A double asterisk indicates lower posted speed limits due to construction on adjacent lanes.

Table 13. Posted Speed Limits.

	Freeway	Arterial	Collector	Local
CBD	NP	30-45	30	20*
CBD Fringe	N/A	20*-35	20*-30	30
Urban	50**-60	20*-45	20*-30	20-30
Suburban	45**-60	25*-55	20*-45	20*-45
Rural	55**-65	30-55	30-55	15*-30

Figures in miles per hour * School Zone ** Construction on adjacent lane(s) NP - Not Posted

The average segment length in miles for each area type – functional class combination was also determined. Table 14 presents the results using the delay method of analysis, which *includes* travel at segment transition areas.

Table 14. Average Length of Segments – Delay Method.

Functional Class Area Type	Freeway		Arterial		Collector		Local	
	# of Segments	Avg. Length (miles)						
CBD	12	0.83	42	0.45	30	0.30	66	0.30
CBD Fringe	0	N/A	60	0.40	36	0.30	42	0.19
Urban	84	1.13	240	0.69	84	0.54	78	0.33
Suburban	84	2.16	330	0.91	144	0.70	156	0.39
Rural	36	1.33	48	0.44	84	0.70	120	0.31

Comparison of Unimpeded Versus Delay Method of Travel Time Analysis

To compare the two methods of travel time analysis used, tables were prepared that summarize the average speeds for each functional classification and area type pair. Figures 16 through 20 show the average peak period speeds for each functional classification within a particular area type for both analysis methods. The figures indicate a significant difference between speeds on freeways and other functional classes. This is due to higher speed limits and less access to property than the other types of roadways.

For most functional classes in the Rio Grande Valley study area, the peak-period speed differential between the unimpeded and delay methods of analysis was less than 5 mph. Exceptions include local streets in the CBD Fringe area type, arterials in the Urban area type, and freeways in Urban and Rural areas. These combinations exhibited speed differentials of 5-to-10 mph, indicating slightly larger delays at segment transition points.

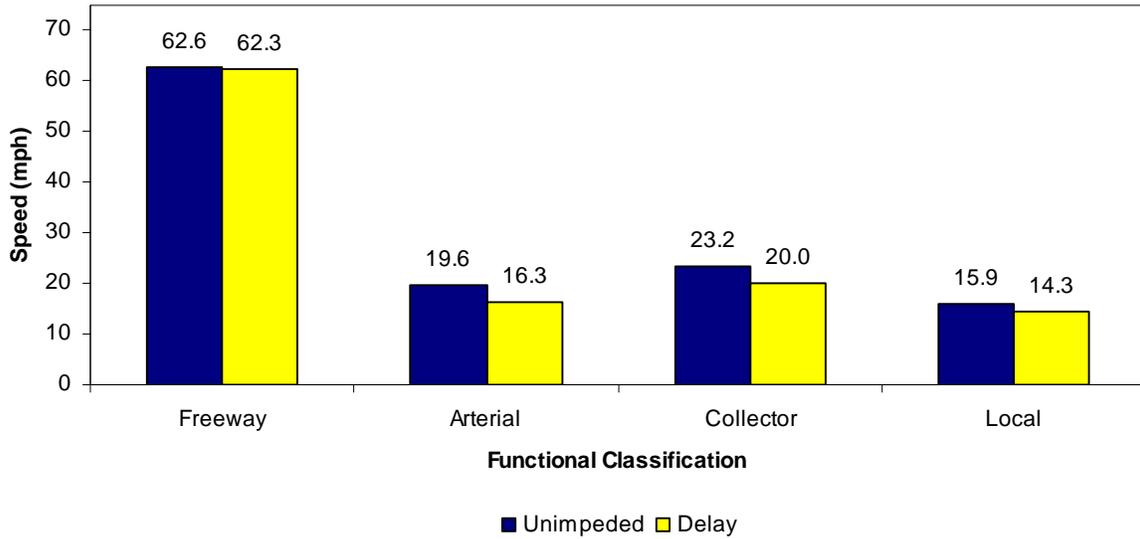


Figure 16. Comparison of Average Peak Period Speed – CBD.

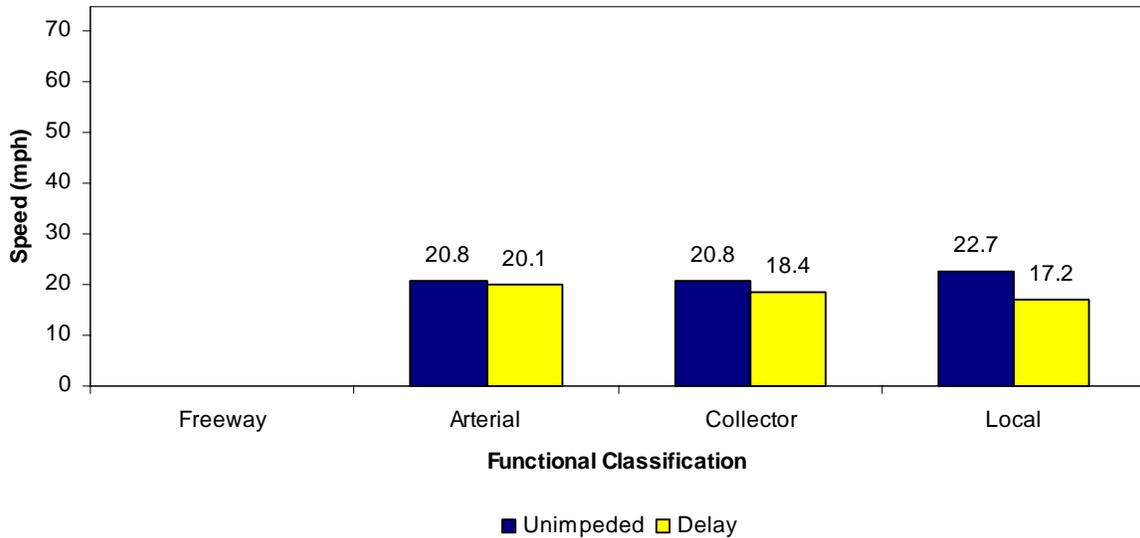


Figure 17. Comparison of Average Peak Period Speed – CBD Fringe.

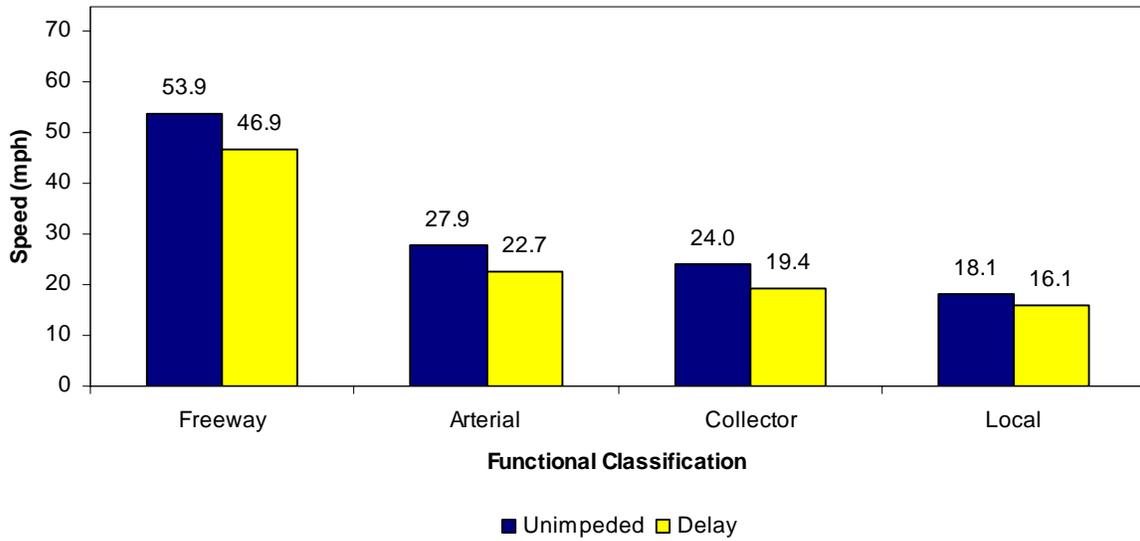


Figure 18. Comparison of Average Peak Period Speed – Urban.

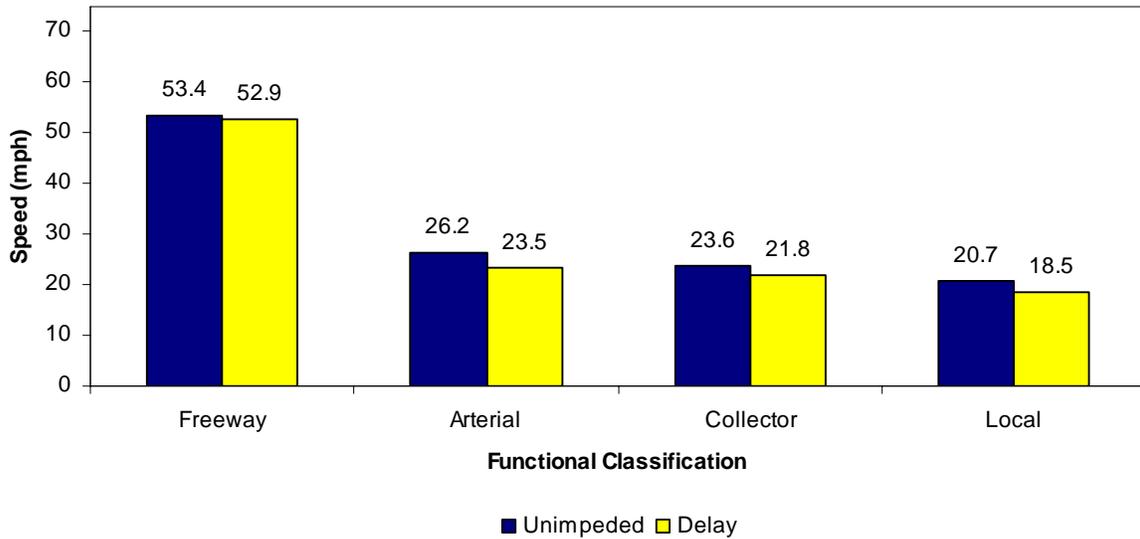


Figure 19. Comparison of Average Peak Period Speed – Suburban.

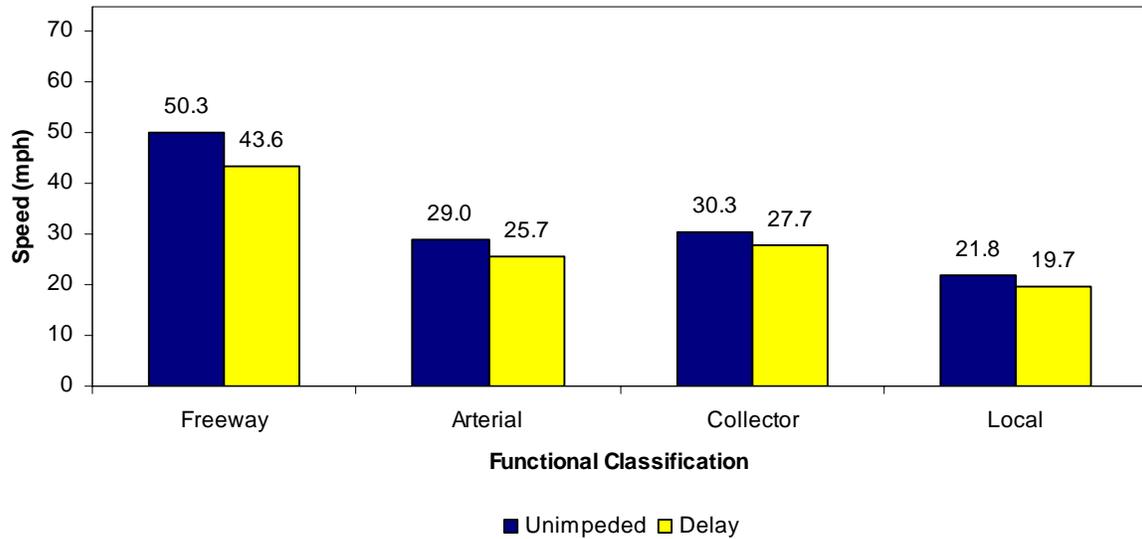


Figure 20. Comparison of Average Peak Period Speed – Rural.

While Figures 16 through 20 provided a summary of peak period average speeds, Figures 21 through 25 provide a comparison of the average off-peak period speeds for each functional classification within a particular area type according to the two methods of analysis employed. Note in Figure 21 the higher freeway speed obtained in the CBD area type using the delay method. This result may be explained by the removal of small portions of segment transitions in the unimpeded method of analysis. In some cases, high speeds and free-flowing traffic conditions encountered on CBD freeways during the off-peak period resulted in no slowing at segment transitions. The exclusion of small, high-speed portions of travel yielded marginally slower unimpeded travel times.

Overall speed values and trends for the off-peak period shown in the figures were similar to those obtained for the peak period. For the Urban, Suburban and Rural area types, speeds decreased slightly as the functional classification moved from arterial to local. In CBDs, speeds were generally more consistent across non-freeway functional classes. Some of the slowest average speeds recorded in the off-peak period were on collectors in the CBD Fringe area type. Note that speed limit signage for this functional class – area type combination was among the lowest encountered in the study.

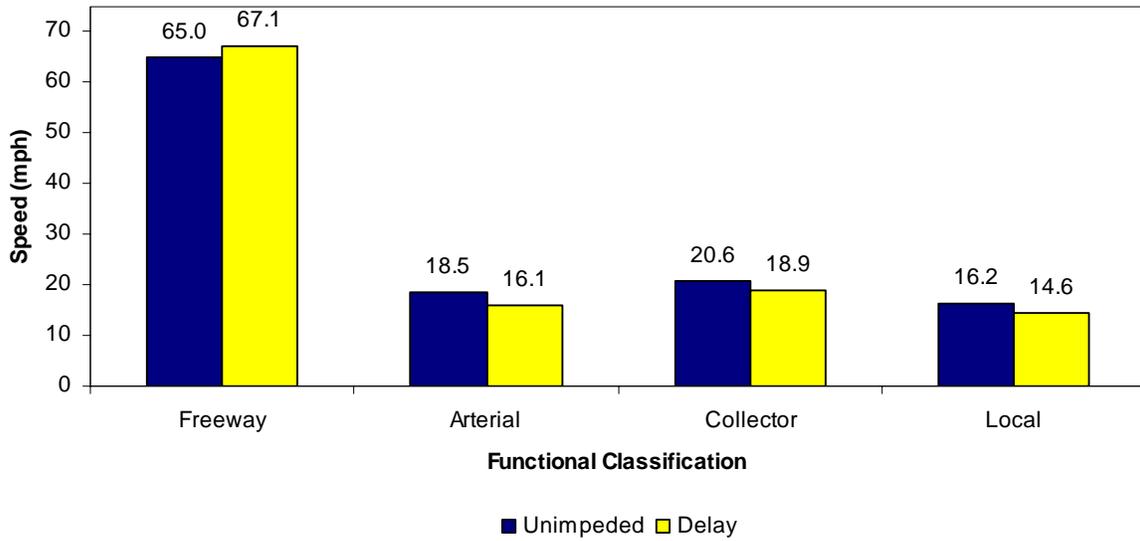


Figure 21. Comparison of Average Off-Peak Period Speed – CBD.

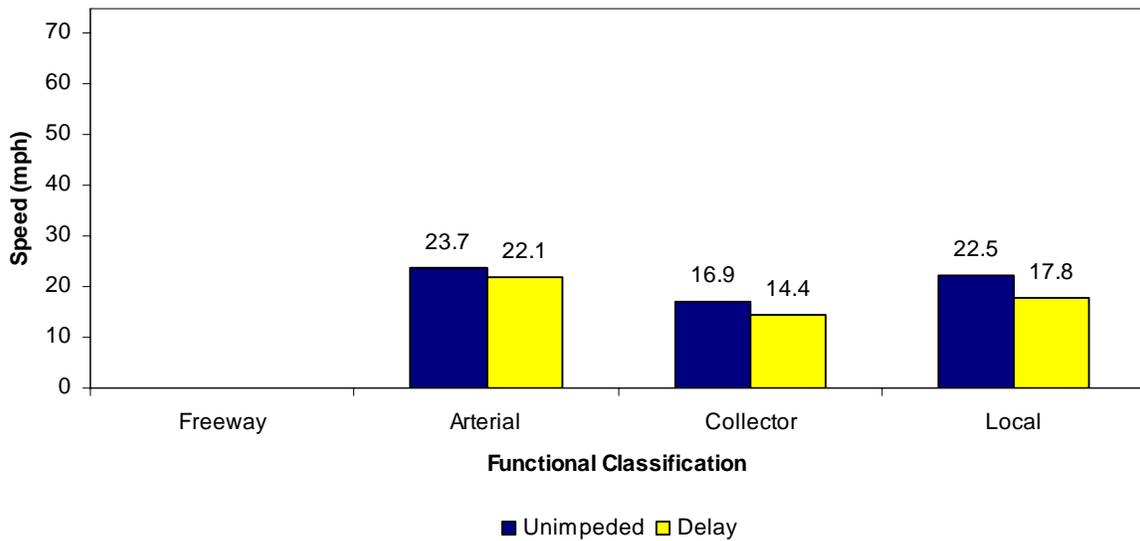


Figure 22. Comparison of Average Off-Peak Period Speed – CBD Fringe.

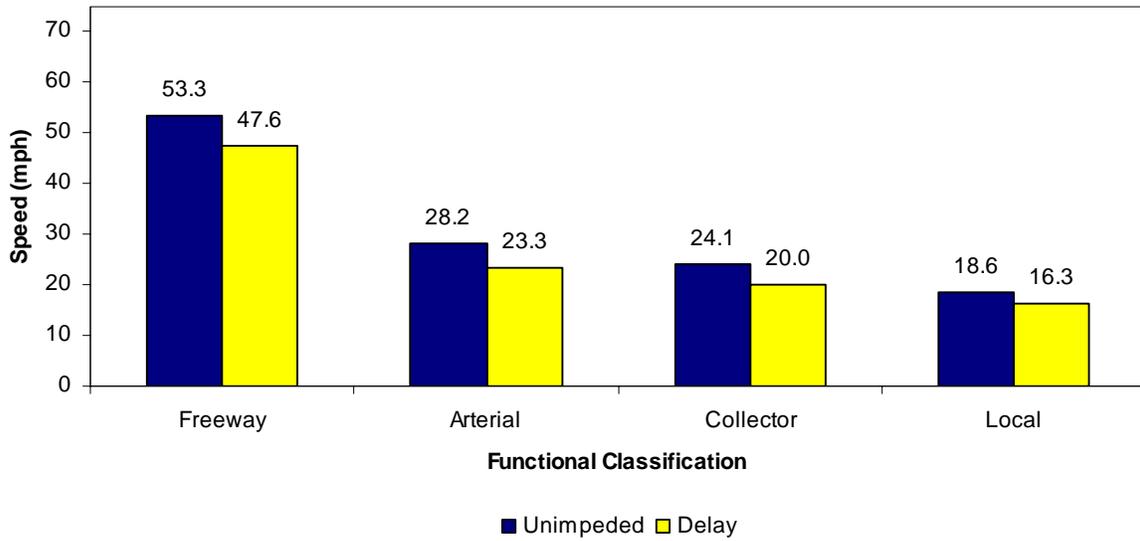


Figure 23. Comparison of Average Off-Peak Period Speed – Urban.

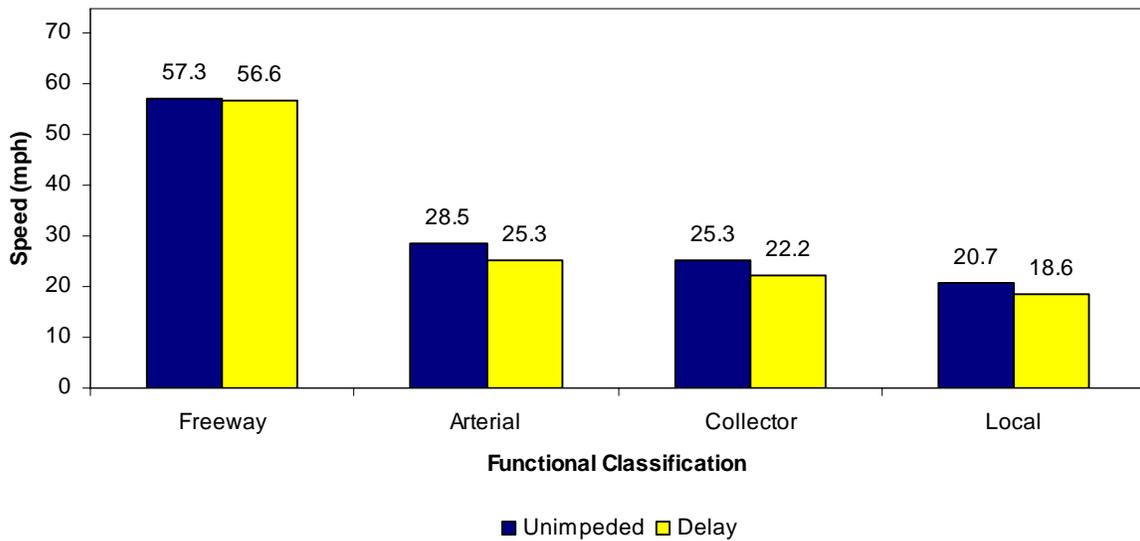


Figure 24. Comparison of Average Off-Peak Period Speed – Suburban.

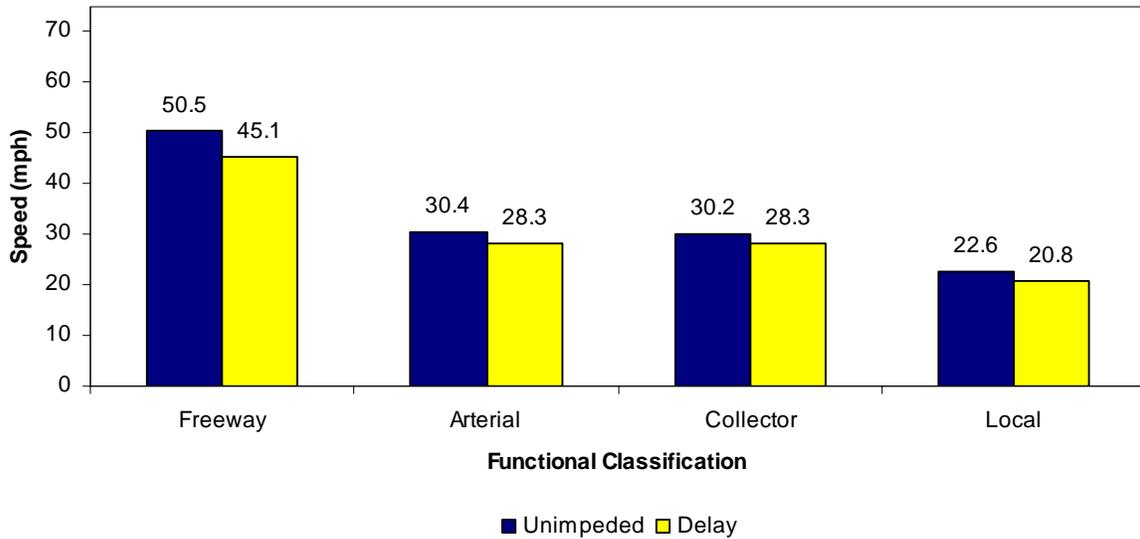


Figure 25. Comparison of Average Off-Peak Period Speed – Rural.

Figures 26 through 30 combine average speeds for peak and off-peak periods for each functional classification within a particular area type. This information can be useful in providing a general overview of the difference in average speeds when factoring in delay. Trends for the combined (peak and off-peak) average speeds are consistent with those presented for the two periods individually.

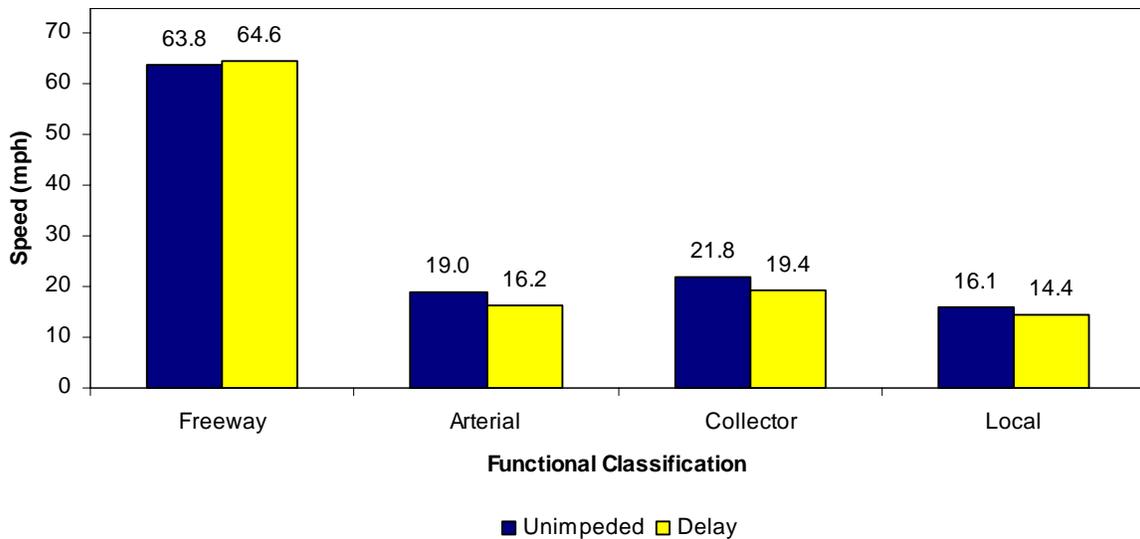


Figure 26. Comparison of Combined (Peak and Off-Peak) Period Speed – CBD.

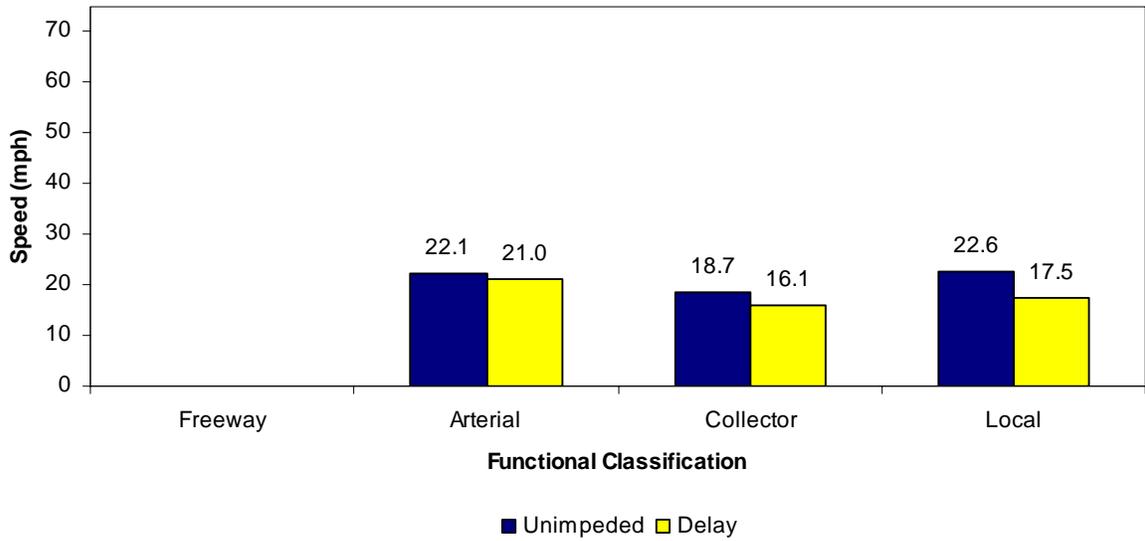


Figure 27. Comparison of Combined (Peak and Off-Peak) Period Speed – CBD Fringe.

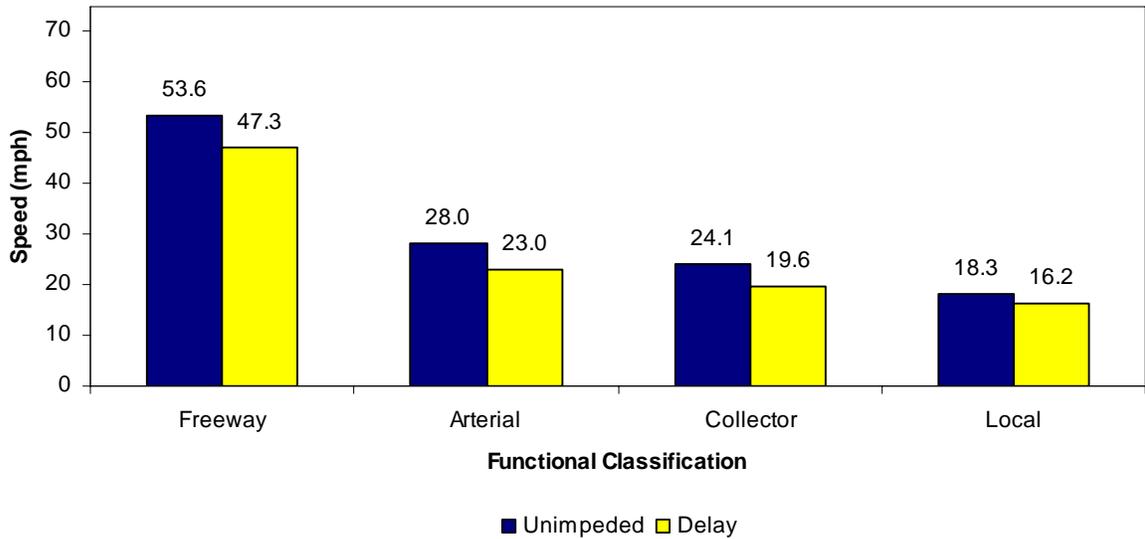


Figure 28. Comparison of Combined (Peak and Off-Peak) Period Speed – Urban.

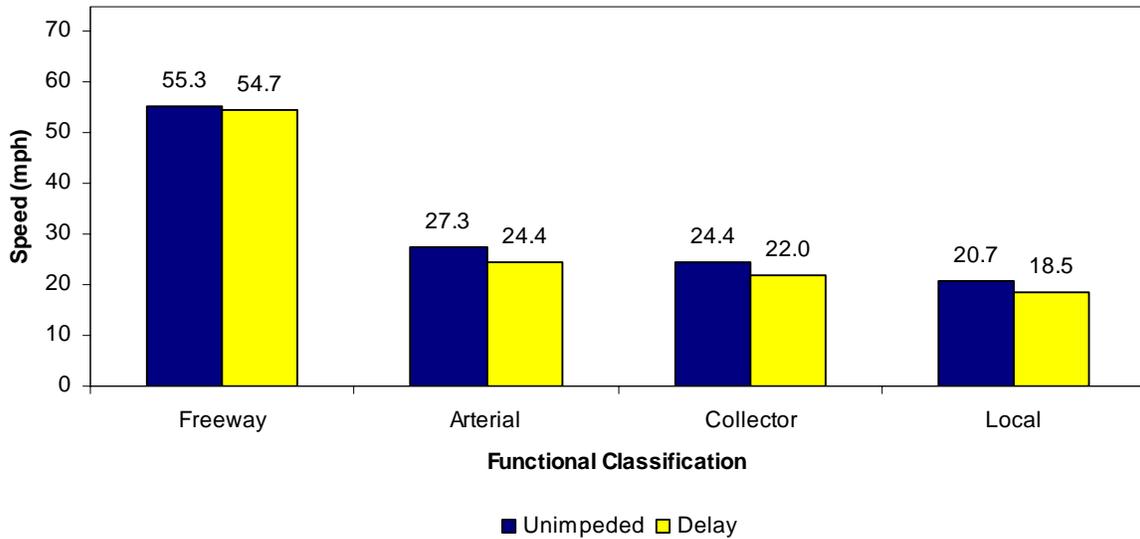


Figure 29. Comparison of Combined (Peak and Off-Peak) Period Speed – Suburban.

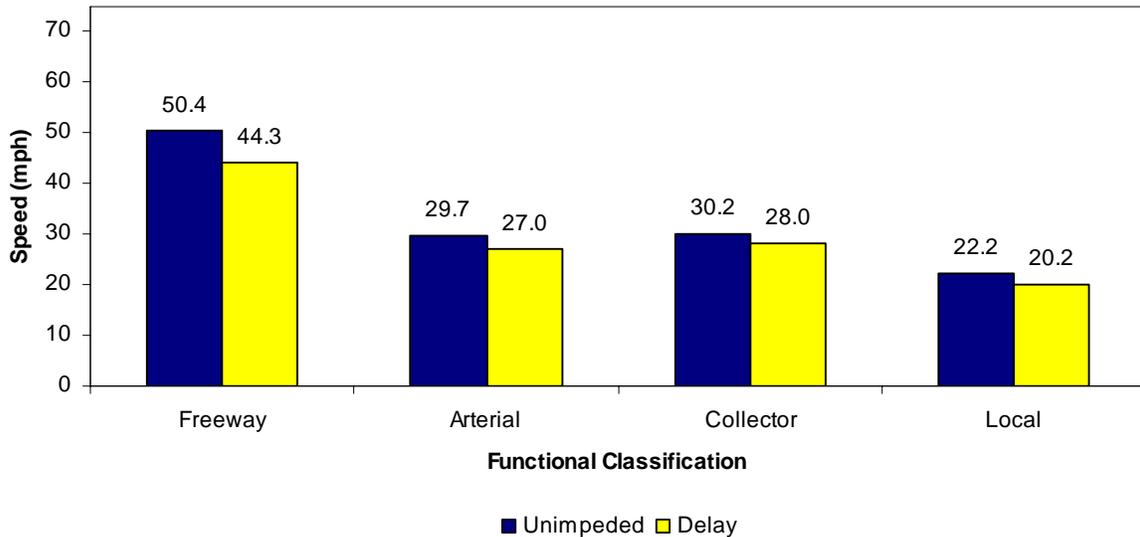


Figure 30. Comparison of Combined (Peak and Off-Peak) Period Speed – Rural.

As with the average speeds for different functional classifications within an individual area type, trends are present when reviewing speed differences for a specific functional classification in various area types. With the exception of freeways, each of the functionally classified groups below show a general increase in average speed as the area type moves from high density (CBD) to low density (Rural). Figures 31 and 32 provide an illustration of this for both the unimpeded and delay methods during the off-peak periods.

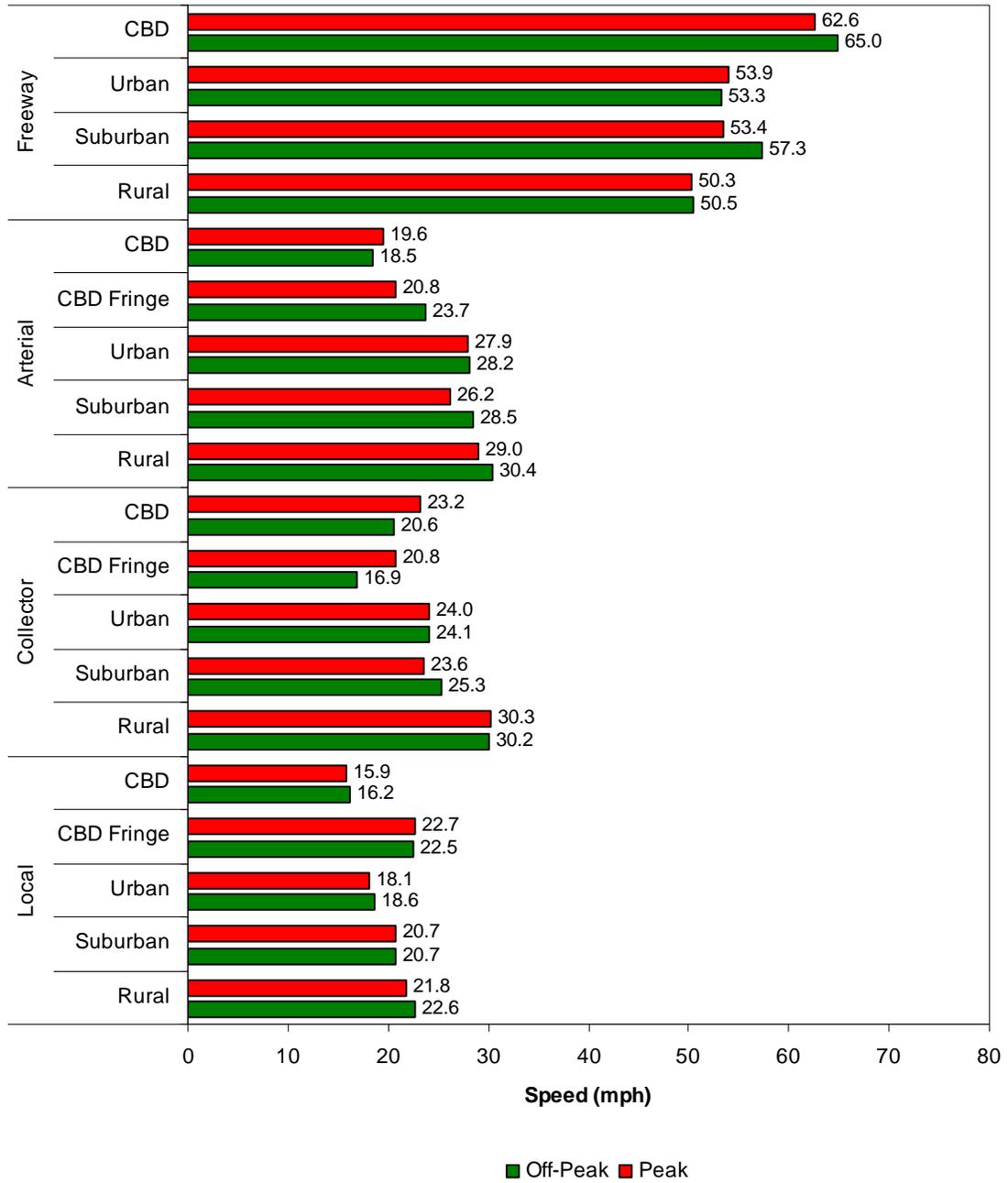


Figure 31. Comparison of Average Speeds - Unimpeded Method.

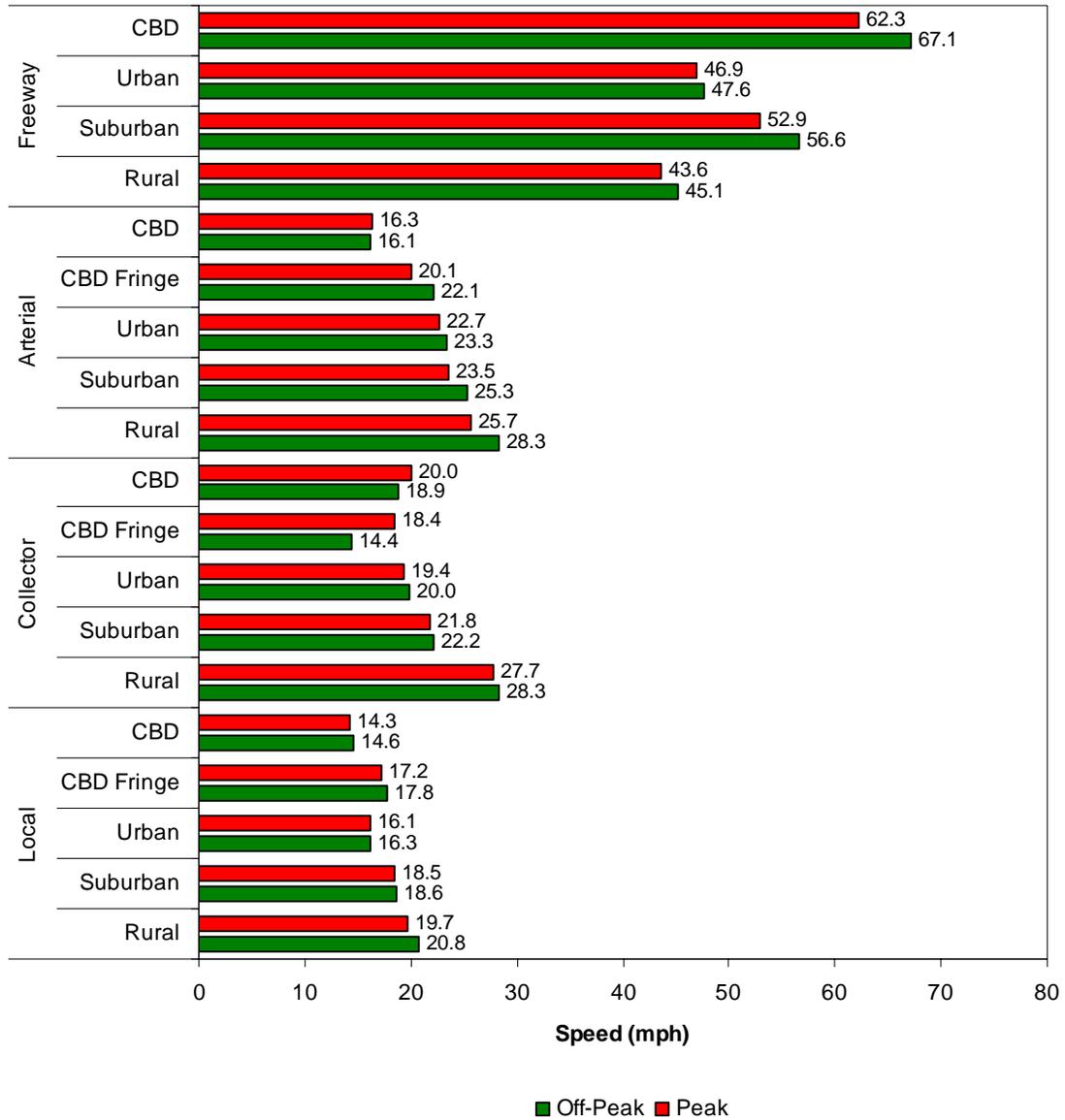


Figure 32. Comparison of Average Speeds - Delay Method.

The variation in average speeds within individual functional classes in the Rio Grande Valley was generally 5-to-51 mph. The greatest variation in speed was observed on the Freeway classification. This may have been due to construction on adjacent lanes and lower-than-normal speed limits along certain portions of these routes. The limited number of freeways and extensive freeway construction in the study area required collection of some travel time data on freeway lanes that were adjacent to construction.

The most consistent speeds across all area types were recorded on local streets. Average speeds for this functional class were generally in the 15-to-20 mph range for both the unimpeded and delay methods of analysis.

To facilitate a comparison of average speeds for the two methods, the data are also presented in table format. The values in Table 15 were generated by subtracting the average speed obtained through the delay method of analysis from the average speed obtained using the unimpeded method. The differential for each functional classification and area type combination is shown in miles per hour.

Table 15. Speed Differential Between Unimpeded and Delay Methods of Analysis.

	Freeway	Arterial	Collector	Local
CBD	-0.9	2.8	2.5	1.6
CBD Fringe	N/A	1.1	2.5	5.1
Urban	6.4	5.0	4.4	2.1
Suburban	0.6	2.9	2.5	2.2
Rural	6.0	2.7	2.2	2.0

Figures in miles per hour

In all but one instance the unimpeded method produced a higher average speed. This result is expected result since delay associated with travel through segment transitions has been removed. Removing travel at segment transition points should generally result in higher average speeds per segment due to the traffic control devices that are typically encountered at those locations. The one category in which a higher average speed for the unimpeded method did not result was the CBD-Freeway combination.

As previously mentioned, removal of small segment transition points on the CBD-Freeway combination yielded marginally slower unimpeded travel time due to the high rate of speed recorded at these locations. Figure 33 illustrates the data in Table 15. The trend of decreasing speed differentials as the functional class moves from arterial to local is valid for all area types except the CBD Fringe. The data anomalies in that area type may be attributed to small sample sizes.

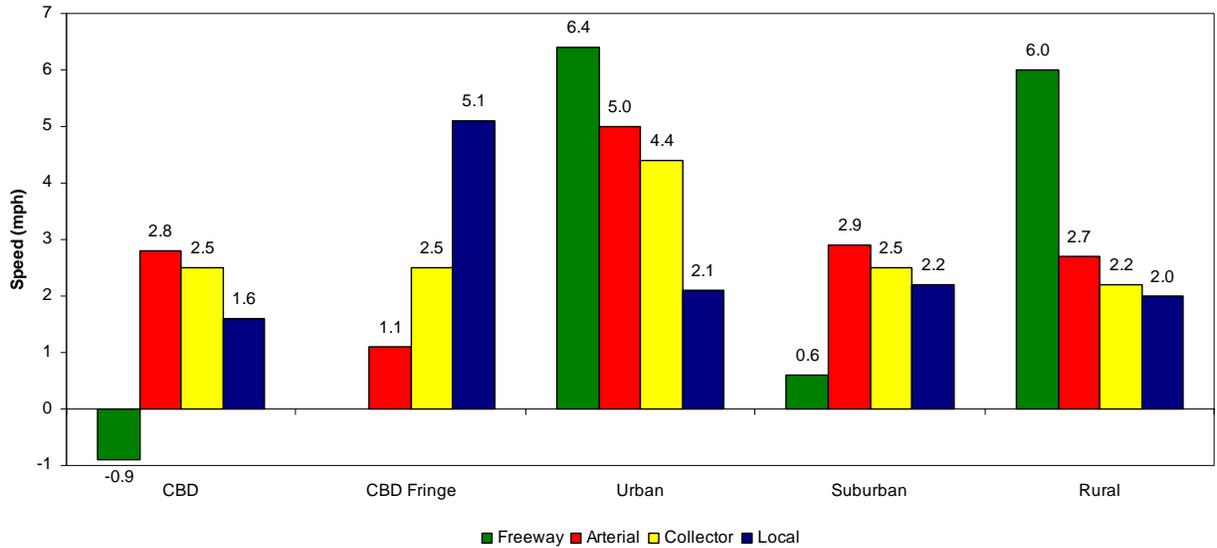


Figure 33. Speed Differential (Unimpeded – Delay).

In addition to analyzing the travel time data by functional class, area type, peak and off-peak period, and direction, a city-to-city comparison was conducted. Figure 34 shows average peak-period speeds using the delay method of analysis for all functional classes in the three major urban areas included in the study. Travel speeds in McAllen and Brownsville were very similar, while speeds for Harlingen were approximately 3-to-5 mph faster for all roadway types.

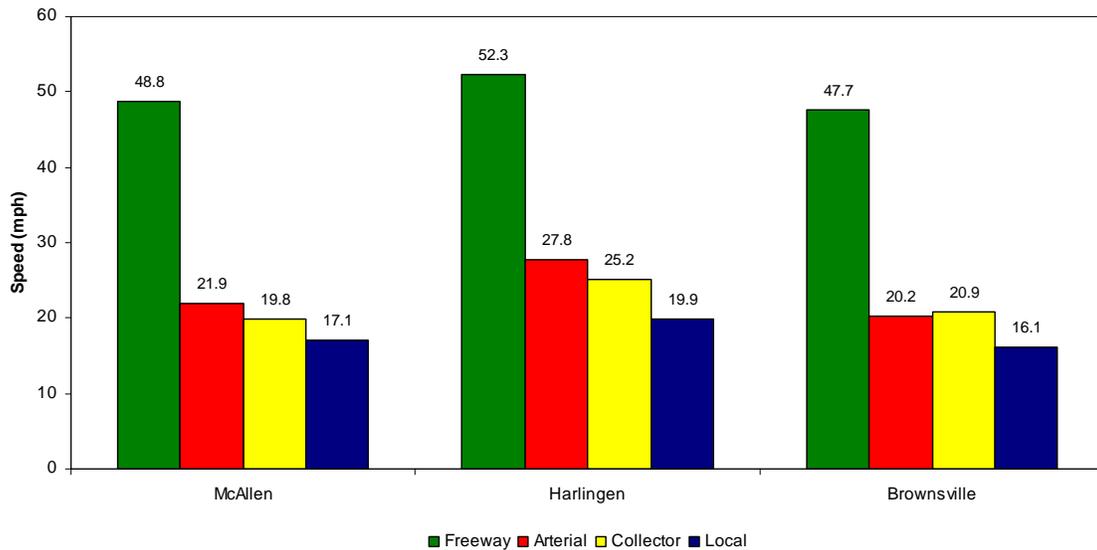


Figure 34. Comparison of Average Speeds by City (Peak Period, Delay Method).

Finally, a comparison of AM and PM speed data using the delay method was made for every route. Figure 35 presents this data. Although speeds only varied by 1 or 2 mph in most cases, AM travel times were faster on all but two of the 15 routes.

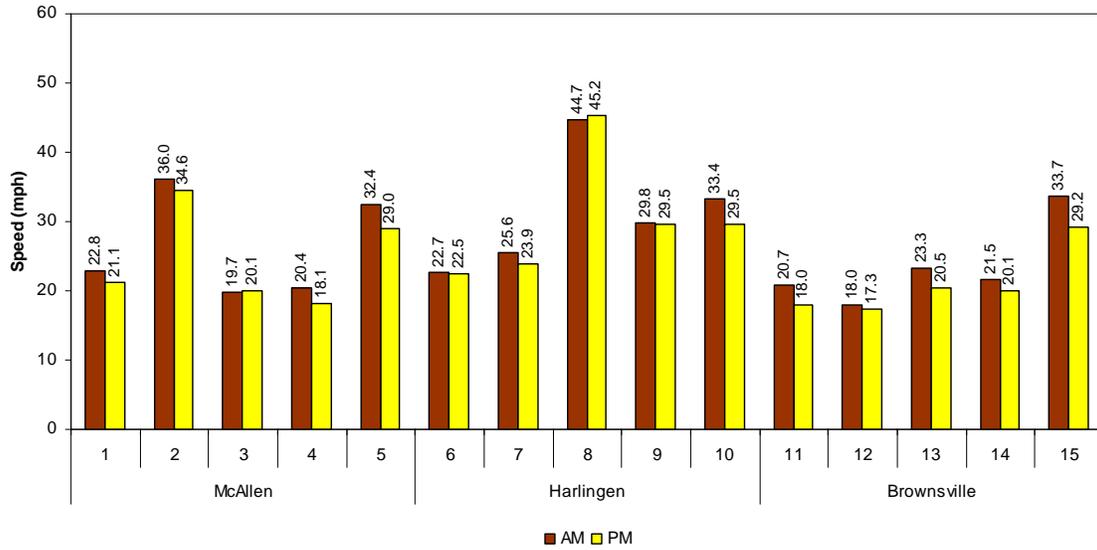


Figure 35. Comparison of AM and PM Speeds (Delay Method).

SUMMARY

The travel time and delay information collected in the Rio Grande Valley provides a general overview of the operating conditions of various functionally classified roadways in that area. The data was collected in a fashion that accounted for peak and off-peak operating conditions, as well as the direction of travel. However, there are certain issues that should be considered when interpreting the results.

First, the posted speed limits for the functional classification groups varied. The largest disparity existed in the arterial/suburban group, where there was a difference of 30 mph between the highest and lowest posted speed limits. Therefore, consideration should be given to the overall quality of the average speeds provided in this technical summary.

A second issue to consider is the impact that traffic control devices and traffic calming measures have on the speeds. Traffic signals, stop and yield signs, signs indicating school zones, and speed bumps were all encountered during the data collection effort. These devices, along with trains, pedestrians, parked cars, and other impediments to vehicular movement can significantly alter speeds outside of segment transition areas.

Third, signs welcoming “Winter Texans” and a significant number of mobile home/RV parks, and northern U.S. and Canadian license plates were noted during the Rio Grande Valley data collection effort in November and December of 2005. The potential for a seasonal component to traffic in this region must be acknowledged when using the travel time data presented in this report.

The data analysis incorporated two methods of determining the average speed for each segment of every route studied. The “unimpeded” approach excluded travel time at segment transitions, while the “delay” approach measured travel time throughout the route including segment transitions. An examination of peak and off-peak data shows that average speeds using the unimpeded approach (Figures 6 through 10) were generally higher than those obtained using the delay approach (Figures 11 through 15). This result was expected since the delay often associated with travel through segment transition areas has been removed.

Average off-peak speeds on most functional classifications were found to be slightly higher than peak-period speeds for both methods of analysis, though the difference was always less than 5 mph. An exception was the collector functional classification, which exhibited higher average speeds during the peak period on several occasions. This finding reflects a willingness on the part of drivers to travel faster in peak periods than in off-peak periods if conditions permit. Also note that the instances where average peak period speeds exceeded average off-peak period speeds were concentrated in the CBD and CBD Fringe area types.

Overall, average speeds among non-freeway functional classes in a given area type were relatively consistent. There appears to be no clear distinction between peak and off-peak period values, making freeway traveling speeds inelastic with regard to time of day. Speeds in the Rural area type were slightly higher than those recorded in other areas.

With respect to freeway data, off-peak average speeds were higher than peak-period average speeds in virtually all area types. This indicates elasticity for traveling speed with regard to peak or off-peak period, and shows that freeways in the Rio Grande Valley are somewhat more susceptible than other functional classes to the effects of peak-period traffic.

For a direct comparison of the results of the unimpeded and delay methods of travel time analysis, tables and figures were prepared to summarize average speeds for each functional classification and area type combination. Figures 16 through 20 indicate that for most functional classes, the peak-period speed differential between the unimpeded and delay methods of analysis was less than 5 mph. Exceptions include local streets in the CBD Fringe area type, arterials in the Urban area type, and freeways in Urban and Rural areas. These combinations exhibited speed differentials of 5-to-10 mph, indicating somewhat larger delays at segment transitions.

Figures 21 through 25 show that overall trends for the off-peak period are similar to those obtained for the peak period (Figures 16 through 20). For the Urban, Suburban, and Rural area types, speeds decreased slightly as the functional classification moved from arterial to local. In CBDs, speeds were generally more consistent across non-freeway functional classes. Some of the slowest average speeds recorded in the off-peak period were on collectors in the CBD Fringe area type. This result coincides with speed limit signage on that functional class – area type combination, which was among the lowest in the study area.

Figure 21 shows a higher freeway speed obtained in the CBD area type using the delay method. This result may be explained by the removal of small portions of segment transitions in the unimpeded method of analysis. In certain cases, high speeds and free-flowing traffic conditions encountered on CBD freeways during the off-peak period resulted in no slowing or delay at segment transitions. The exclusion of high-speed portions of travel therefore yielded marginally slower unimpeded travel times.

As with the average speeds for different functional classifications within an individual area type, trends are present when reviewing speed differences for a specific functional classification in various area types. With the exception of freeways, each functional classification showed a general increase in average speed as the area type moved from the high-density CBD area type to the low-density Rural area type (Figures 31 and 32).

Speeds for individual functional classes typically exhibited a range of 5-to-15 mph. The greatest speed disparity was observed on freeways. This may have been due to construction on adjacent

lanes and lower-than-normal speed limits along certain portions of freeway routes in the Rio Grande Valley during the data collection effort.

Finally, a comparison of AM and PM speed data using the delay method was conducted for every route. The data, presented in Figure 35, indicate that although morning and afternoon speeds were relatively consistent, AM travel times were faster on all but two of the 15 routes conducted in the study area.

APPENDIX A

Table 1a. Average Speed per Segment – Route 1 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Perkins-14th-Conway	4	3	0.23	0.25	18.4	18.8	20.2	18.4	19.7	17.0	19.4	18.0	NP
Conway-18th	2	3	0.24	0.29	22.7	15.1	26.2	24.9	13.3	14.3	20.7	18.1	30
Conway-Griffin-Mayberry	2	4	0.85	0.87	29.4	29.3	25.1	25.1	21.5	21.5	25.4	25.3	30-40
Mayberry-Country Club	3	1	0.51	0.54	32.2	29.5	34.0	31.4	29.6	27.4	31.9	29.4	30
Country Club-Highland Park-Bryce	4	1	0.38	0.41	21.7	19.9	21.7	18.2	19.8	18.2	21.1	18.8	NP
Highland Park-US 83 Business	4	2	0.26	0.31	24.6	12.3	26.0	15.5	25.3	22.8	25.3	16.8	NP
Highland Park-8th-Bryan	4	4	0.31	0.35	24.3	22.1	27.2	25.2	21.9	18.5	24.5	21.9	20*-45
Bryan-Trinity	2	4	1.35	1.38	33.8	31.4	27.0	26.4	25.2	24.1	28.6	27.3	35
Trinity-Glasscock	3	5	0.96	1.00	26.8	25.9	29.5	28.6	24.3	23.5	26.9	26.0	30
Glasscock-Rio Grande-Cimarron-Brazos Street-Brazos Circle	4	5	0.66	0.66	20.8	20.7	20.7	20.3	19.8	19.5	20.4	20.1	30
Total			5.75	6.06	26.6	23.6	25.8	23.9	22.4	21.3	24.8	22.9	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 1b. Average Speed per Segment – Route 1 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Perkins-14th-Conway	4	3	0.23	0.25	20.2	11.7	17.6	12.3	18.4	18.0	18.7	14.0	NP
Conway-18th	2	3	0.24	0.29	29.8	28.2	13.3	13.6	11.7	12.9	18.3	18.2	30
Conway-Griffin-Mayberry	2	4	0.85	0.87	24.5	24.3	25.3	25.3	27.6	27.0	25.8	25.5	30-40
Mayberry-Country Club	3	1	0.51	0.54	32.8	30.4	31.7	29.5	28.7	27.4	31.0	29.1	30
Country Club-Highland Park-Bryce	4	1	0.38	0.41	21.7	19.9	20.7	18.9	19.8	18.5	20.8	19.1	NP
Highland Park-US 83 Business	4	2	0.26	0.31	22.8	14.9	24.0	18.3	24.0	18.9	23.6	17.4	NP
Highland Park-8th-Bryan	4	4	0.31	0.35	22.3	21.0	21.1	15.8	21.1	19.1	21.5	18.6	20*-45
Bryan-Trinity	2	4	1.35	1.38	26.9	26.4	30.0	28.2	27.5	26.7	28.1	27.1	35
Trinity-Glasscock	3	5	0.96	1.00	26.0	25.2	24.5	23.8	26.0	25.0	25.5	24.7	30
Glasscock-Rio Grande-Cimarron-Brazos Street-Brazos Circle	4	5	0.66	0.66	20.1	19.8	19.0	18.7	20.5	20.1	19.9	19.5	30
Total			5.75	6.06	24.7	22.6	23.6	21.5	23.5	22.5	23.9	22.2	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 1c. Average Speed per Segment – Route 1 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed	
Brazos Circle-Brazos St-Cimarron-Rio Grande-Glasscock-Trinity	4	5	0.65	0.65	20.7	20.5	18.0	17.7	19.2	18.9	19.3	19.0	30	
Trinity-Bryan	3	5	0.96	1.00	26.6	25.4	24.7	23.4	26.2	24.2	25.8	24.3	30	
Bryan-US 83-8th	2	4	1.35	1.38	29.8	29.4	36.0	35.0	25.7	23.2	30.5	29.2	35	
8th-Highland Park-US 83 Business	4	4	0.31	0.35	23.7	11.2	21.1	12.6	21.5	11.8	22.1	11.8	20*-45	
Highland Park-Bryce	4	2	0.26	0.31	25.3	22.3	24.0	20.7	22.8	19.9	24.0	21.0	NP	
Highland Park-Country Club-Mayberry	4	1	0.38	0.41	21.4	20.2	20.4	19.4	19.5	18.7	20.4	19.4	NP	
Mayberry-Griffin	3	1	0.51	0.54	29.6	23.1	29.1	28.6	29.1	14.7	29.3	22.2	30	
Griffin-Conway-18th	2	4	0.84	0.86	21.1	20.2	21.0	18.4	17.2	15.8	19.8	18.2	30-40	
Conway-14th	2	3	0.28	0.33	22.9	25.3	16.8	18.9	16.5	18.6	18.7	20.9	30	
14th-Perkins-12th	4	3	0.24	0.26	21.1	20.8	19.2	18.7	17.6	18.0	19.3	19.2	NP	
Total			5.78	6.09	24.7	22.1	23.8	21.8	21.8	18.7	23.3	20.7		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 1d. Average Speed per Segment – Route 1 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed	
Brazos Circle-Brazos St-Cimarron-Rio Grande-Glasscock-Trinity	4	5	0.65	0.65	18.1	18.0	20.0	19.8	20.3	20.0	19.5	19.3	30	
Trinity-Bryan	3	5	0.96	1.00	26.2	25.0	26.4	25.5	25.8	25.2	26.1	25.2	30	
Bryan-US 83-8th	2	4	1.35	1.38	27.0	26.6	26.6	23.0	27.9	27.4	27.2	25.7	35	
8th-Highland Park-US 83 Business	4	4	0.31	0.35	19.9	19.1	21.9	20.7	21.1	12.5	21.0	17.4	20*-45	
Highland Park-Bryce	4	2	0.26	0.31	23.4	18.9	24.0	21.9	24.6	21.5	24.0	20.8	NP	
Highland Park-Country Club-Mayberry	4	1	0.38	0.41	17.5	19.2	20.4	19.4	19.8	18.7	19.3	19.1	NP	
Mayberry-Griffin	3	1	0.51	0.54	28.2	24.9	29.1	25.9	30.6	19.6	29.3	23.5	30	
Griffin-Conway-18 th	2	4	0.84	0.86	22.9	20.5	25.4	24.4	23.3	22.3	23.9	22.4	30-40	
Conway-14 th	2	3	0.28	0.33	18.7	21.2	24.0	26.4	18.0	20.1	20.2	22.6	30	
14th-Perkins-12 th	4	3	0.24	0.26	18.8	18.7	20.6	20.3	17.6	17.7	19.0	18.9	NP	
Total			5.78	6.09	22.8	22.0	24.4	22.9	23.7	21.4	23.6	22.1		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 2a. Average Speed per Segment – Route 2 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Cimarron-Shary	4	5	0.01	0.03	1.7	1.6	12.0	2.4	9.0	13.5	7.6	5.8	30
Shary-US 83	3	5	0.11	0.14	26.4	17.4	28.3	24.0	28.3	10.5	27.7	17.3	30-55
US 83-Ware	1	5	1.56	1.56	51.1	50.1	57.3	56.2	53.0	52.0	53.8	52.8	65
US 83-23 rd	1	4	1.36	1.38	55.6	55.2	62.8	62.1	63.6	63.7	60.7	60.3	NP
US 83-Main	1	3	0.25	0.27	52.9	51.2	64.3	60.8	64.3	60.8	60.5	57.6	NP
US 83-Col Rowe	1	1	0.80	0.83	54.3	54.3	64.0	63.6	56.5	56.4	58.3	58.1	NP
US 83-Jackson	1	3	0.91	0.95	46.8	36.4	52.0	46.2	45.5	36.4	48.1	39.7	NP
Jackson-Sam Houston-Cage	2	3	1.42	1.55	34.1	32.8	24.9	25.1	33.0	31.5	30.7	29.8	30
Cage-Ridge	2	4	0.41	0.49	31.4	20.0	35.1	30.4	29.5	19.0	32.0	23.1	30
Cage-Hall Acres	2	5	0.95	1.00	31.1	30.8	41.7	40.4	37.2	36.4	36.7	35.9	30-55
Hall Acres-Sailfish-Marlin-Yellowfin	4	5	0.21	0.23	18.4	18.0	17.6	17.3	16.8	16.6	17.6	17.3	30
Total			7.99	8.43	39.8	34.1	41.9	37.9	42.3	36.8	41.3	36.2	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 2b. Average Speed per Segment – Route 2 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Cimarron-Shary	4	5	0.01	0.03	12.0	4.3	6.0	10.8	12.0	9.0	10.0	8.0	30
Shary-US 83	3	5	0.11	0.14	24.8	14.8	26.4	15.8	28.3	26.5	26.5	19.0	30-55
US 83-Ware	1	5	1.56	1.56	53.5	53.0	49.3	48.8	52.0	51.5	51.6	51.1	65
US 83-23 rd	1	4	1.36	1.38	62.8	62.1	64.4	63.7	62.0	54.6	63.1	60.1	NP
US 83-Main	1	3	0.25	0.27	64.3	64.8	64.3	60.8	69.2	194.4	65.9	106.7	NP
US 83-Col Rowe	1	1	0.80	0.83	58.8	57.5	62.6	62.3	67.0	66.4	62.8	62.0	NP
US 83-Jackson	1	3	0.91	0.95	52.8	40.7	52.0	36.0	34.5	33.9	46.4	36.9	NP
Jackson-Sam Houston-Cage	2	3	1.42	1.55	37.6	32.3	36.3	27.8	24.2	21.1	32.7	27.0	30
Cage-Ridge	2	4	0.41	0.49	30.8	22.9	34.3	16.2	31.4	15.3	32.2	18.1	30
Cage-Hall Acres	2	5	0.95	1.00	34.9	34.0	41.2	40.0	41.2	40.0	39.1	38.0	30-55
Hall Acres-Sailfish-Marlin-Yellowfin	4	5	0.21	0.23	18.0	17.6	17.6	16.9	17.6	16.9	17.7	17.1	30
Total			7.99	8.43	44.2	38.0	44.7	36.0	38.9	33.7	42.4	35.8	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 2c. Average Speed per Segment – Route2 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Marlin-Sailfish-Hall Acres-Moore	4	5	0.21	0.23	17.6	13.6	15.8	15.6	16.8	9.3	16.7	12.8	30
Cage-Ridge	2	5	0.95	1.00	40.7	24.3	36.8	36.7	33.9	22.8	37.1	27.9	30-55
Cage-Sam Houston	2	4	0.38	0.50	33.4	27.3	36.0	28.6	32.6	27.3	34.0	27.7	30
Sam Houston-Jackson-US 83	2	3	1.45	1.63	39.2	33.3	26.5	23.9	26.8	23.4	30.8	26.9	30
US 83-Col Rowe	1	3	0.87	0.89	49.7	49.3	50.5	50.9	45.4	45.1	48.5	48.4	NP
US 83-Main	1	1	0.80	0.83	70.2	69.5	68.6	67.9	65.5	65.0	68.1	67.5	NP
US 83-23rd	1	3	0.25	0.27	75.0	74.8	69.2	69.4	69.2	64.8	71.2	69.7	NP
US 83-Ware	1	4	1.36	1.38	63.6	63.7	62.0	62.1	60.4	60.6	62.0	62.1	NP
US 83-Shary	1	5	1.52	1.59	54.7	31.5	53.6	40.6	50.2	45.4	52.9	39.2	65
Shary-Cimarron	3	5	0.16	0.16	19.9	18.6	28.8	26.2	27.4	26.2	25.4	23.6	30-55
Cimarron-Colorado	4	5	0.01	0.02	12.0	14.4	12.0	14.4	12.0	18.0	12.0	15.6	30
Total			7.96	8.50	45.8	35.3	41.1	36.9	39.6	32.9	42.0	34.9	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 2d. Average Speed per Segment – Route 2 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Marlin-Sailfish-Hall Acres-Moore	4	5	0.21	0.23	13.5	8.7	17.6	17.3	15.4	11.5	15.5	12.5	30
Cage-Ridge	2	5	0.95	1.00	38.9	38.3	39.3	25.9	35.6	35.6	37.9	33.3	30-55
Cage-Sam Houston	2	4	0.38	0.50	42.8	34.0	37.0	25.4	33.4	16.1	37.7	25.1	30
Sam Houston-Jackson-US 83	2	3	1.45	1.63	27.0	22.3	32.0	27.0	25.7	18.3	28.3	22.6	30
US 83-Col Rowe	1	3	0.87	0.89	52.2	51.7	51.3	50.1	51.3	50.9	51.6	50.9	NP
US 83-Main	1	1	0.80	0.83	67.0	87.9	68.6	67.9	67.0	67.9	67.5	74.6	NP
US 83-23rd	1	3	0.25	0.27	69.2	38.9	64.3	64.8	69.2	64.8	67.6	56.2	NP
US 83-Ware	1	4	1.36	1.38	63.6	62.9	59.7	59.9	67.1	67.1	63.5	63.3	NP
US 83-Shary	1	5	1.52	1.59	52.6	38.9	47.2	44.0	60.1	41.5	53.3	41.5	65
Shary-Cimarron	3	5	0.16	0.16	27.4	25.0	30.3	27.4	32.0	30.3	29.9	27.6	30-55
Cimarron-Colorado	4	5	0.01	0.02	12.0	12.0	12.0	14.4	18.0	14.4	14.0	13.6	30
Total			7.96	8.50	41.5	34.7	43.0	36.6	41.5	31.8	42.0	34.2	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 3a. Average Speed per Segment – Route 3 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Duranta-13th	3	4	0.46	0.50	20.0	20.5	19.0	19.8	17.6	18.4	18.9	19.5	30
13th-US 83 Business-Stewart-Sam Houston	2	4	1.93	1.96	21.9	21.6	22.6	21.8	23.9	23.6	22.8	22.3	30-50
Sam Houston-Wyoming-11th-Standard	3	4	0.72	0.74	21.8	20.8	18.9	18.4	24.0	24.9	21.6	21.4	20*-30
Standard-7th-I Street	4	4	0.80	0.84	18.0	17.7	19.2	19.0	20.4	19.0	19.2	18.6	20*-25*
I Street-US 83 Business	2	4	0.15	0.18	23.5	6.9	25.7	6.1	27.0	7.0	25.4	6.7	30
I Street-Hawk	2	1	0.18	0.23	27.0	15.9	28.2	10.5	28.2	25.9	27.8	17.4	30
Hawk-Kumquat-Bell-I Street	4	1	0.42	0.44	15.1	14.9	16.8	16.7	15.0	14.9	15.6	15.5	NP
Total			4.66	4.89	20.3	18.2	20.6	17.6	21.6	19.7	20.8	18.5	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 3b. Average Speed per Segment – Route 3 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Duranta-13 th	3	4	0.46	0.50	16.9	17.1	16.7	17.5	17.6	18.2	17.1	17.6	30
13th-US 83 Business-Stewart-Sam Houston	2	4	1.93	1.96	29.0	28.2	32.6	31.8	27.1	26.5	29.6	28.8	30-50
Sam Houston-Wyoming-11th-Standard	3	4	0.72	0.74	25.7	24.4	25.7	24.2	24.2	23.4	25.2	24.0	20*-30
Standard-7th-I Street	4	4	0.80	0.84	20.1	19.9	18.8	18.7	18.9	18.8	19.3	19.1	20*-25*
I Street-US 83 Business	2	4	0.15	0.18	22.5	19.6	25.7	6.3	27.0	7.5	25.1	11.2	30
I Street-Hawk	2	1	0.18	0.23	25.9	22.4	28.2	23.7	29.5	25.9	27.8	24.0	30
Hawk-Kumquat-Bell-I Street	4	1	0.42	0.44	16.4	16.5	17.2	17.2	18.2	18.0	17.3	17.2	NP
Total			4.66	4.89	23.2	22.5	24.0	21.3	22.9	20.8	23.4	21.5	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 3c. Average Speed per Segment – Route 3 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed	
Bell-Kumquat-Hawk-I Street	4	1	0.42	0.44	17.8	15.2	16.4	15.8	16.4	12.8	16.9	14.6	NP	
I Street-US 83 Business	2	1	0.18	0.22	23.1	21.4	25.9	8.4	15.4	6.3	21.5	12.1	30	
I Street-7th	2	4	0.15	0.19	27.0	22.8	24.5	24.4	28.4	16.7	26.7	21.3	30	
7th-Standard-11th	4	4	0.80	0.83	19.3	18.4	20.6	19.7	19.5	18.8	19.8	19.0	20*-25*	
11th-Wyoming-Sam Houston-Stewart	3	4	0.72	0.74	22.0	16.3	24.2	21.7	24.7	23.4	23.6	20.5	20*-30	
Stewart-US 83 Business-13th-Duranta	2	4	1.94	1.96	21.8	21.4	25.2	24.9	31.2	30.4	26.0	25.6	30-50	
Duranta-9th	3	4	0.48	0.49	17.1	16.8	15.4	15.2	16.0	15.6	16.2	15.9	30	
Total			4.69	4.87	20.5	18.9	21.8	19.6	22.9	19.3	21.7	19.2		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 3d. Average Speed per Segment – Route 3 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed	
Bell-Kumquat-Hawk-I Street	4	1	0.42	0.44	14.4	14.4	17.0	16.5	17.4	16.9	16.3	15.9	NP	
I Street-US 83 Business	2	1	0.18	0.22	15.8	15.2	30.9	27.3	27.0	7.3	24.6	16.6	30	
I Street-7th	2	4	0.15	0.19	27.0	25.3	28.4	26.3	28.4	27.4	27.9	26.3	30	
7th-Standard-11th	4	4	0.80	0.83	18.8	18.3	18.7	18.0	19.3	18.8	19.0	18.4	20*-25*	
11th-Wyoming-Sam Houston-Stewart	3	4	0.72	0.74	23.8	20.2	24.9	20.7	24.0	20.5	24.2	20.4	20*-30	
Stewart-US 83 Business-13th-Duranta	2	4	1.94	1.96	29.1	28.2	27.4	27.0	28.7	28.1	28.4	27.8	30-50	
Duranta-9th	3	4	0.48	0.49	14.4	14.5	18.2	17.6	15.7	15.6	16.1	15.9	30	
Total			4.69	4.87	21.4	20.5	22.9	21.7	22.8	19.9	22.4	20.7		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 4a. Average Speed per Segment – Route 4 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Alan-Gumwood-Ferguson	4	4	0.23	0.26	16.6	15.9	18.8	17.3	18.4	16.7	17.9	16.6	NP
Ferguson-Hibiscus	2	4	1.21	1.24	20.4	20.3	17.8	18.0	17.1	15.6	18.4	17.9	25*-45
Hibiscus-Warren-Sugar	4	4	0.33	0.36	11.5	11.1	17.5	15.6	18.3	16.8	15.8	14.5	NP
Sugar-Jackson-Polk-Hackberry-McColl	2	4	1.24	1.28	28.1	23.8	29.8	29.7	19.8	19.8	25.9	24.4	NP
Hackberry-Colonel Rowe	2	3	0.49	0.53	27.6	25.4	33.9	17.7	34.6	19.3	32.0	20.8	20*-35
Hackberry-10th	3	3	0.50	0.56	20.9	12.3	26.1	12.8	25.4	13.5	24.1	12.9	NP
Hackberry-16th	3	2	0.38	0.41	20.1	20.2	28.5	27.3	19.8	17.2	22.8	21.6	20*-30
16th-Tamarack	4	3	0.72	0.73	17.1	16.7	17.3	17.0	19.2	18.9	17.8	17.5	30
Total			5.10	5.37	20.5	18.3	22.2	19.1	20.0	17.2	20.9	18.1	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 4b. Average Speed per Segment – Route 4 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Alan-Gumwood-Ferguson	4	4	0.23	0.26	16.6	16.1	17.6	14.0	18.0	16.4	17.4	15.5	NP
Ferguson-Hibiscus	2	4	1.21	1.24	20.6	20.6	24.3	23.5	17.1	16.8	20.7	20.3	25*-45
Hibiscus-Warren-Sugar	4	4	0.33	0.36	17.7	15.8	16.3	15.1	18.3	12.6	17.4	14.5	NP
Sugar-Jackson-Polk-Hackberry-McColl	2	4	1.24	1.28	24.8	24.6	23.0	18.5	21.4	18.3	23.1	20.5	NP
Hackberry-Colonel Rowe	2	3	0.49	0.53	35.3	34.1	25.2	15.8	25.9	16.0	28.8	22.0	20*-35
Hackberry-10th	3	3	0.50	0.56	21.4	15.5	22.0	11.9	26.1	13.2	23.2	13.5	NP
Hackberry-16th	3	2	0.38	0.41	22.4	22.0	5.3	5.5	25.3	21.4	17.7	16.3	20*-30
16th-Tamarack	4	3	0.72	0.73	21.4	21.2	20.1	19.8	18.4	18.1	20.0	19.7	30
Total			5.10	5.37	22.3	21.0	17.8	15.1	20.3	16.6	19.9	17.2	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 4c. Average Speed per Segment – Route 4 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
16th-Hackberry	4	3	0.72	0.73	18.0	16.4	25.7	25.5	21.8	21.7	21.8	21.2	30
Hackberry-10th	3	2	0.38	0.41	21.7	20.8	17.3	10.0	19.5	16.8	19.5	15.9	20*-30
Hackberry-Colonel Rowe	3	3	0.50	0.56	26.9	17.8	25.0	14.7	24.7	18.3	25.5	17.0	NP
Hackberry-McColl	2	3	0.49	0.53	27.6	26.5	25.2	12.1	37.5	31.3	30.1	23.3	20*-35
Hackberry-Polk-Jackson-Sugar-Warren	2	4	1.24	1.28	21.4	21.2	33.1	33.2	21.8	22.3	25.4	25.5	NP
Warren-Hibiscus-Ferguson	4	4	0.33	0.36	17.0	17.5	19.5	18.8	17.7	16.6	18.1	17.6	NP
Ferguson-Gumwood	2	4	1.20	1.23	32.2	32.3	30.9	30.8	27.5	27.5	30.2	30.2	25*-45
Gumwood-Bagwell-Alan-Juniper	4	4	0.23	0.26	16.2	13.4	18.0	18.4	16.6	16.7	16.9	16.1	NP
Total			5.09	5.36	22.8	21.1	26.0	20.4	23.3	21.9	24.0	21.1	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 4d. Average Speed per Segment – Route 4 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
16th-Hackberry	4	3	0.72	0.73	21.8	20.5	23.4	19.5	16.0	15.9	20.4	18.6	30
Hackberry-10th	3	2	0.38	0.41	27.4	11.2	17.5	16.0	19.5	9.9	21.5	12.4	20*-30
Hackberry-Colonel Rowe	3	3	0.50	0.56	22.0	19.8	24.0	24.6	22.2	15.6	22.7	20.0	NP
Hackberry-McColl	2	3	0.49	0.53	35.3	26.9	36.8	28.9	28.9	26.5	33.6	27.4	20*-35
Hackberry-Polk-Jackson-Sugar-Warren	2	4	1.24	1.28	23.7	23.6	21.0	21.4	25.7	26.2	23.5	23.7	NP
Warren-Hibiscus-Ferguson	4	4	0.33	0.36	17.5	18.8	20.5	19.1	18.6	17.3	18.8	18.4	NP
Ferguson-Gumwood	2	4	1.20	1.23	34.3	34.3	26.0	26.0	22.7	22.7	27.7	27.7	25*-45
Gumwood-Bagwell-Alan-Juniper	4	4	0.23	0.26	16.2	16.4	16.2	16.7	17.6	18.0	16.7	17.0	NP
Total			5.09	5.36	25.0	21.9	22.9	21.8	21.6	19.0	23.1	20.8	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 5a. Average Speed per Segment – Route 5 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
US 83 Bus-Airport	2	4	0.92	0.98	36.8	36.8	32.8	28.2	30.4	20.3	33.3	28.4	45
US 83 Bus-Bridge	2	1	0.46	0.52	36.0	23.7	33.8	30.2	30.7	22.8	33.5	25.6	45
US 83 Bus-Texas	2	2	0.45	0.51	26.1	24.8	27.5	21.3	22.2	14.3	25.3	20.2	35
US 83 Bus-Border-Pike-Bridge	2	3	1.57	1.62	22.6	14.3	21.3	17.5	18.5	15.7	20.8	15.8	20*30
Pike-Airport-US 83	2	4	1.12	1.23	17.5	17.8	16.9	17.4	20.7	20.5	18.3	18.5	30
US 83-Bridge	1	4	0.38	0.39	50.7	52.0	54.7	52.0	57.0	56.2	54.1	53.4	55**
US 83-Border	1	3	0.49	0.50	63.0	62.1	63.0	64.3	63.0	64.3	63.0	63.5	NP
US 83-FM 1423	1	4	5.98	5.98	57.7	57.6	60.5	60.3	60.3	60.1	59.5	59.3	55**
US 83-Tower	1	5	1.49	1.54	49.2	42.6	53.6	32.8	55.9	43.0	52.9	39.5	55**
Tower-US 83 Business-7th	2	4	0.78	0.81	31.6	30.4	33.0	31.7	29.6	28.6	31.4	30.2	30
US 83 Business-7th Place	2	3	0.07	0.08	22.9	16.0	31.5	32.0	31.5	32.0	28.6	26.7	NP
7th Place-Bowie	4	4	0.17	0.17	17.0	16.1	19.7	18.5	19.1	18.0	18.6	17.6	NP
Total			13.88	14.33	37.0	31.9	37.1	32.7	36.3	31.1	36.8	31.9	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted										

Table 5b. Average Speed per Segment – Route 5 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
US 83 Bus-Airport	2	4	0.92	0.98	34.5	34.6	36.8	29.9	37.2	25.4	36.2	30.0	45
US 83 Bus-Bridge	2	1	0.46	0.52	36.8	35.3	31.8	27.5	32.5	20.8	33.7	27.9	45
US 83 Bus-Texas	2	2	0.45	0.51	23.8	18.5	24.2	21.3	21.3	13.7	23.1	17.9	35
US 83 Bus-Border-Pike-Bridge	2	3	1.57	1.62	22.4	22.5	19.3	15.4	14.4	11.7	18.7	16.5	20*30
Pike-Airport-US 83	2	4	1.12	1.23	24.3	24.3	16.2	16.2	16.0	16.3	18.8	18.9	30
US 83-Bridge	1	4	0.38	0.39	59.5	56.2	57.0	56.2	52.6	50.1	56.4	54.2	55**
US 83-Border	1	3	0.49	0.50	67.8	69.2	63.0	64.3	67.8	69.2	66.2	67.6	NP
US 83-FM 1423	1	4	5.98	5.98	58.3	58.2	53.4	53.2	60.0	59.6	57.2	57.0	55**
US 83-Tower	1	5	1.49	1.54	53.1	50.9	53.1	36.2	50.6	41.4	52.3	42.8	55**
Tower-US 83 Business-7th	2	4	0.78	0.81	30.2	29.5	32.3	31.4	31.2	29.8	31.2	30.2	30
US 83 Business-7th Place	2	3	0.07	0.08	28.0	26.2	31.5	28.8	28.0	26.2	29.2	27.1	NP
7th Place-Bowie	4	4	0.17	0.17	18.5	17.5	18.5	17.5	18.5	17.5	18.5	17.5	NP
Total			13.88	14.33	39.0	37.7	34.8	30.8	33.1	28.3	35.5	31.8	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted										

Table 5c. Average Speed per Segment – Route 5 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
7th Place-US 83 Business	4	4	0.15	0.16	17.4	14.4	17.4	16.5	17.4	12.5	17.4	14.5	NP
US 83 Business-7th	2	3	0.06	0.07	24.0	25.2	21.6	22.9	24.0	25.2	23.2	24.4	NP
US 83 Bus-Tower-US 83	2	4	0.72	0.77	26.4	22.4	22.7	20.5	28.2	23.5	25.8	22.1	30
US 83-FM 1423	1	5	1.52	1.53	49.7	49.2	52.1	51.5	54.2	53.0	52.0	51.2	55**
US 83-Border	1	4	5.99	6.00	55.7	55.5	56.9	56.7	56.5	56.4	56.4	56.2	55**
US 83-Bridge	1	3	0.49	0.50	46.4	46.2	42.0	42.9	44.1	43.9	44.2	44.3	NP
US 83-Airport	1	4	0.49	0.52	15.3	15.6	8.1	8.3	8.6	8.9	10.7	10.9	55**
Airport-Pike-Bridge	2	4	0.91	1.00	20.9	17.0	24.8	9.7	22.6	10.7	22.8	12.5	30
Pike-Border-US 83 Business-Texas	2	3	1.52	1.63	18.5	17.8	19.2	19.1	21.5	18.6	19.8	18.5	20*30
US 83 Business-Bridge	2	2	0.46	0.51	29.1	29.6	28.1	21.6	20.0	18.7	25.7	23.3	35
US 83 Business-Airport	2	1	0.46	0.52	35.2	17.3	29.6	27.9	31.8	22.3	32.2	22.5	45
US 83 Business-FM 1015	2	4	0.98	0.98	31.2	30.9	32.7	32.4	34.6	34.6	32.8	32.6	45
Total			13.75	14.19	34.0	30.8	32.1	27.2	33.1	27.6	33.0	28.5	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted										

Table 5d. Average Speed per Segment – Route 5 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
7th Place-US 83 Business	4	4	0.15	0.16	18.0	15.2	15.4	14.8	16.9	16.0	16.8	15.3	NP
US 83 Business-7th	2	3	0.06	0.07	27.0	25.2	21.6	22.9	21.6	22.9	23.4	23.7	NP
US 83 Business-Tower-US 83	2	4	0.72	0.77	32.8	28.9	26.4	25.9	18.4	16.6	25.9	23.8	30
US 83-FM 1423	1	5	1.52	1.53	53.1	52.5	52.1	50.1	52.6	51.5	52.6	51.3	55**
US 83-Border	1	4	5.99	6.00	58.9	58.9	58.1	58.1	56.3	56.4	57.8	57.8	55**
US 83-Bridge	1	3	0.49	0.50	46.4	46.2	50.4	48.6	45.2	43.9	47.4	46.2	NP
US 83-Airport	1	4	0.49	0.52	25.9	25.3	24.8	24.6	18.2	17.0	23.0	22.3	55**
Airport-Pike-Bridge	2	4	0.91	1.00	25.0	12.0	21.1	10.6	25.6	13.8	23.9	12.1	30
Pike-Border-US 83 Business-Texas	2	3	1.52	1.63	23.8	21.1	20.9	17.6	21.0	19.1	21.9	19.3	20*30
US 83 Business-Bridge	2	2	0.46	0.51	25.5	21.9	29.6	30.1	18.0	18.9	24.3	23.6	35
US 83 Business-Airport	2	1	0.46	0.52	36.0	14.4	35.2	19.3	39.4	16.0	36.9	16.6	45
US 83 Business-FM 1015	2	4	0.98	0.98	39.6	39.2	36.8	36.4	35.6	35.3	37.3	37.0	45
Total			13.75	14.19	39.5	31.7	36.9	30.4	34.7	29.4	36.9	30.5	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted										

Table 6a. Average Speed per Segment – Route 6 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
2nd-Washington	4	2	0.05	0.06	18.0	15.4	16.4	14.4	15.0	10.8	16.5	13.5	NP
Washington-Woodland-5th-Austin	3	2	0.42	0.44	22.6	21.4	23.6	19.8	21.9	20.6	22.7	20.6	20*-30
Austin-1st	3	3	0.25	0.27	24.3	19.4	25.7	24.3	25.7	23.1	25.3	22.3	30
1st-US 77 Business	2	3	0.39	0.42	22.6	18.2	21.9	15.1	19.8	19.4	21.5	17.6	30
1st-Matz-Breedlove	3	4	0.57	0.60	22.5	22.5	20.7	20.4	22.1	21.6	21.8	21.5	30
Breedlove-Ed Carey	4	4	0.56	0.58	24.3	23.7	22.4	22.0	23.2	22.9	23.3	22.9	20*-30
Ed Carey-13th	2	4	0.93	0.95	32.8	32.6	40.3	39.8	31.9	31.1	35.0	34.5	NP
13th-Vinson	3	4	0.24	0.26	27.0	26.0	27.0	25.3	27.0	25.3	27.0	25.5	30
Vinson-North 25th	4	4	0.74	0.77	22.8	20.7	21.7	21.5	22.0	21.3	22.1	21.2	30
North 25th-Oak	2	4	0.05	0.06	20.0	21.6	22.5	19.6	18.0	13.5	20.2	18.2	NP
Oak-Loop 499	4	4	0.07	0.10	15.8	12.4	15.8	8.6	16.8	11.6	16.1	10.9	NP
Loop 499-Airport	2	4	0.42	0.45	32.9	32.4	18.4	18.8	30.9	30.6	27.4	27.3	30-45
Airport-Raintree	4	4	0.43	0.44	30.4	29.9	14.1	14.1	30.4	29.9	24.9	24.6	35
Total			5.12	5.40	25.5	23.6	22.6	20.7	24.6	23.2	24.1	22.4	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 6b. Average Speed per Segment – Route 6 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
2nd-Washington	4	2	0.05	0.06	18.0	14.4	16.4	11.4	16.4	12.7	16.9	12.8	NP
Washington-Woodland-5th-Austin	3	2	0.42	0.44	21.3	19.3	18.0	17.0	22.6	21.4	20.6	19.3	20*-30
Austin-1st	3	3	0.25	0.27	27.3	22.6	23.1	21.1	23.7	19.4	24.7	21.1	30
1st-US 77 Business	2	3	0.39	0.42	23.4	18.7	21.6	19.9	21.3	18.7	22.1	19.1	30
1st-Matz-Breedlove	3	4	0.57	0.60	23.6	22.7	23.1	22.5	22.8	22.7	23.1	22.7	30
Breedlove-Ed Carey	4	4	0.56	0.58	22.4	20.9	19.6	19.0	24.3	23.2	22.1	21.0	20*-30
Ed Carey-13th	2	4	0.93	0.95	37.2	32.6	36.8	35.6	42.4	41.2	38.8	36.5	NP
13th-Vinson	3	4	0.24	0.26	28.8	26.7	24.7	22.3	26.2	25.3	26.6	24.8	30
Vinson-North 25th	4	4	0.74	0.77	21.7	20.2	19.6	19.3	21.3	20.8	20.9	20.1	30
North 25th-Oak	2	4	0.05	0.06	22.5	21.6	20.0	18.0	22.5	21.6	21.7	20.4	NP
Oak-Loop 499	4	4	0.07	0.10	16.8	15.0	13.3	12.4	15.8	12.4	15.3	13.3	NP
Loop 499-Airport	2	4	0.42	0.45	33.6	32.4	31.5	30.6	27.0	26.6	30.7	29.8	30-45
Airport-Raintree	4	4	0.43	0.44	31.0	30.5	31.0	29.9	31.6	30.5	31.2	30.3	35
Total			5.12	5.40	25.9	23.4	23.7	22.4	25.6	23.9	25.0	23.2	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 6c. Average Speed per Segment – Route 6 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Airport-Loop 499	4	4	0.42	0.43	30.2	28.7	31.5	26.2	32.2	29.8	31.3	28.2	35
Loop 499-Oak	2	4	0.42	0.45	24.0	21.3	30.9	27.5	33.6	30.0	29.5	26.3	30-45
Oak-North 25th	4	4	0.07	0.10	18.0	12.4	10.5	9.2	16.8	15.0	15.1	12.2	NP
North 25th-Vinson	2	4	0.05	0.06	22.5	19.6	20.0	18.0	18.0	14.4	20.2	17.3	NP
Vinson-13th	4	4	0.74	0.77	23.8	18.1	21.7	19.3	22.2	21.3	22.5	19.6	30
13th-Ed Carey	3	4	0.24	0.26	27.9	17.0	28.8	22.8	29.8	26.0	28.8	21.9	30
Ed Carey-Breedlove	2	4	0.93	0.95	39.4	33.5	35.6	25.3	24.8	24.1	33.3	27.6	NP
Breedlove-Matz	4	4	0.56	0.58	23.7	22.2	24.0	22.0	24.6	21.5	24.1	21.9	20*-30
Matz-1st-US 77 Business	3	4	0.57	0.60	23.9	23.5	23.6	22.7	23.9	18.5	23.8	21.6	30
1st-Austin	2	3	0.39	0.42	22.3	20.4	19.8	19.9	17.6	17.6	19.9	19.3	30
Austin-5th	3	3	0.25	0.27	23.1	16.5	24.3	23.1	23.7	22.6	23.7	20.7	30
5th-Woodland-Washington-2nd	3	2	0.42	0.44	20.4	19.8	21.9	21.4	21.3	20.6	21.2	20.6	20*-30
2nd-Lee	4	2	0.05	0.06	20.0	16.6	16.4	15.4	18.0	16.6	18.1	16.2	NP
Total			5.11	5.39	25.6	21.8	25.0	21.9	24.0	21.9	24.8	21.9	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 6d. Average Speed per Segment – Route 6 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Airport-Loop 499	4	4	0.42	0.43	32.9	29.2	31.5	30.4	30.2	27.2	31.5	28.9	35
Loop 499-Oak	2	4	0.42	0.45	33.6	23.5	32.2	24.2	20.4	20.0	28.7	22.6	30-45
Oak-North 25th	4	4	0.07	0.10	16.8	15.0	19.4	15.7	16.8	10.6	17.7	13.7	NP
North 25th-Vinson	2	4	0.05	0.06	20.0	16.6	22.5	19.6	20.0	18.0	20.8	18.1	NP
Vinson-13th	4	4	0.74	0.77	20.7	20.2	22.2	21.8	20.0	19.8	21.0	20.6	30
13th-Ed Carey	3	4	0.24	0.26	29.8	22.3	28.8	24.6	24.7	21.8	27.8	22.9	30
Ed Carey-Breedlove	2	4	0.93	0.95	37.2	34.5	43.5	41.7	31.0	30.0	37.2	35.4	NP
Breedlove-Matz	4	4	0.56	0.58	24.6	23.2	23.7	22.2	22.2	20.7	23.5	22.0	20*-30
Matz-1st-US 77 Business	3	4	0.57	0.60	25.3	17.3	25.0	24.0	23.1	20.4	24.5	20.6	30
1st-Austin	2	3	0.39	0.42	21.6	20.2	19.8	19.6	23.0	22.2	21.5	20.7	30
Austin-5th	3	3	0.25	0.27	23.1	22.1	23.7	23.1	23.1	22.6	23.3	22.6	30
5th-Woodland-Washington-2nd	3	2	0.42	0.44	21.9	20.8	21.6	20.6	20.7	19.8	21.4	20.4	20*-30
2nd-Lee	4	2	0.05	0.06	16.4	15.4	16.4	15.4	15.0	14.4	15.9	15.1	NP
Total			5.11	5.39	25.9	22.5	26.3	24.5	23.3	21.7	25.1	22.8	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 7a. Average Speed per Segment – Route 7 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Briar-25th	4	5	0.04	0.05	14.4	13.8	18.0	16.4	16.0	9.5	16.1	13.2	15*
25th-Ed Carey	3	4	0.35	0.39	32.3	31.2	30.7	31.2	30.0	29.3	31.0	30.6	45
25th-Rio Hondo	2	4	0.59	0.63	36.6	34.9	29.5	29.8	36.6	36.0	34.2	33.6	45
25th-Grimes	3	4	0.42	0.46	26.5	24.4	26.1	19.0	24.4	22.1	25.7	21.8	20*
25th-Washington-US 77 Business	3	3	1.03	1.15	26.5	18.7	26.1	20.2	23.9	14.2	25.5	17.7	20*-30
US 77 Business-Harrison	2	3	0.47	0.50	29.2	20.0	30.2	18.4	26.4	16.5	28.6	18.3	30
US 77 Business-Little Creek	2	2	0.29	0.39	23.2	29.3	22.2	28.1	22.7	28.7	22.7	28.7	30
US 77 Business-Ed Carey	2	3	0.96	0.99	25.0	25.1	25.2	25.6	21.5	21.5	23.9	24.1	30-35
Ed Carey-Hale	2	4	0.47	0.52	35.3	23.7	32.5	22.8	36.0	34.7	34.6	27.1	35-45
Ed Carey-US 77	2	3	0.40	0.49	32.0	24.5	36.0	20.0	34.3	13.8	34.1	19.4	45
Ed Carey-Morris	2	4	0.98	1.04	37.1	36.7	51.1	48.6	45.8	44.0	44.7	43.1	45-55
Total			6.00	6.61	29.5	25.2	29.9	24.8	28.3	21.9	29.2	23.9	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 7b. Average Speed per Segment – Route 7 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Briar-25th	4	5	0.04	0.05	16.0	15.0	16.0	15.0	16.0	15.0	16.0	15.0	15*
25th-Ed Carey	3	4	0.35	0.39	34.1	17.3	29.3	13.9	30.0	26.5	31.1	19.2	45
25th-Rio Hondo	2	4	0.59	0.63	25.9	26.1	34.8	34.4	34.3	32.4	31.7	30.9	45
25th-Grimes	3	4	0.42	0.46	25.6	23.7	23.3	20.2	24.8	14.9	24.6	19.6	20*
25th-Washington-US 77 Business	3	3	1.03	1.15	27.3	19.3	24.1	18.5	24.6	18.8	25.3	18.9	20*-30
US 77 Business-Harrison	2	3	0.47	0.50	33.2	19.6	31.3	18.9	30.8	30.0	31.8	22.8	30
US 77 Business-Little Creek	2	2	0.29	0.39	21.3	27.5	21.3	26.5	25.5	32.7	22.7	28.9	30
US 77 Business-Ed Carey	2	3	0.96	0.99	22.9	17.7	23.5	22.7	21.2	18.5	22.5	19.6	30-35
Ed Carey-Hale	2	4	0.47	0.52	34.5	32.3	33.8	31.7	33.8	32.3	34.1	32.1	35-45
Ed Carey-US 77	2	3	0.40	0.49	33.5	20.0	31.3	31.5	27.7	21.5	30.8	24.4	45
Ed Carey-Morris	2	4	0.98	1.04	51.9	49.9	47.7	46.2	47.7	45.7	49.1	47.3	45-55
Total			6.00	6.61	29.4	23.1	28.7	24.1	28.4	24.2	28.9	23.8	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 7c. Average Speed per Segment – Route 7 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed	
Ed Carey-US 77	2	4	0.98	1.04	45.2	33.1	46.4	44.6	45.2	22.8	45.6	33.5	45-55	
Ed Carey-Hale	2	3	0.40	0.49	30.6	30.9	36.0	23.5	37.9	36.8	34.8	30.4	45	
Ed Carey-US 77 Business	2	4	0.47	0.52	32.5	31.7	36.0	17.2	34.5	15.3	34.4	21.4	35-45	
US 77 Business-Little Creek	2	3	0.93	0.96	24.4	24.3	27.0	26.4	26.8	26.4	26.1	25.7	30-35	
US 77 Business-Harrison	2	2	0.28	0.38	11.6	15.4	11.7	15.4	20.2	25.8	14.5	18.9	30	
US 77 Business-Washington	2	3	1.03	1.14	26.5	26.8	22.2	21.9	27.9	28.5	25.5	25.8	30	
Washington-25th-Grimes	3	3	0.46	0.50	26.7	23.7	28.1	23.7	25.9	16.4	26.9	21.2	20*-30	
25th-Rio Hondo	3	4	0.43	0.47	27.6	26.4	27.2	25.3	25.8	25.3	26.9	25.6	20*	
25th-Ed Carey	2	4	0.59	0.63	36.6	24.1	32.2	28.7	33.2	29.8	34.0	27.6	45	
25th-Briar	3	4	0.36	0.38	37.0	34.2	33.2	30.4	20.9	20.1	30.4	28.2	45	
Briar-24th	4	5	0.04	0.05	18.0	18.0	16.0	16.4	16.0	15.0	16.7	16.5	15*	
Total			5.97	6.56	28.3	26.3	27.9	24.8	29.4	23.7	28.5	24.9		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 7d. Average Speed per Segment – Route 7 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed	
Ed Carey-US 77	2	4	0.98	1.04	46.4	27.9	47.7	30.0	43.6	26.0	45.9	28.0	45-55	
Ed Carey-Hale	2	3	0.40	0.49	33.5	25.9	36.0	36.0	37.9	36.8	35.8	32.9	45	
Ed Carey-US 77 Business	2	4	0.47	0.52	31.9	27.5	34.5	13.7	35.3	18.7	33.9	20.0	35-45	
US 77 Business-Little Creek	2	3	0.93	0.96	34.2	33.2	36.0	34.6	24.1	23.7	31.4	30.5	30-35	
US 77 Business-Harrison	2	2	0.28	0.38	21.0	27.4	15.8	21.0	24.0	31.1	20.3	26.5	30	
US 77 Business-Washington	2	3	1.03	1.14	27.9	27.9	28.5	28.7	24.1	23.1	26.8	26.6	30	
Washington-25th-Grimes	3	3	0.46	0.50	27.6	25.7	28.1	21.7	27.1	24.0	27.6	23.8	20*-30	
25th-Rio Hondo	3	4	0.43	0.47	26.7	25.6	27.6	24.5	26.2	24.9	26.9	25.0	20*	
25th-Ed Carey	2	4	0.59	0.63	33.7	24.4	36.0	36.0	33.7	28.7	34.5	29.7	45	
25th-Briar	3	4	0.36	0.38	36.0	32.6	37.0	35.1	32.4	29.7	35.1	32.5	45	
Briar-24th	4	5	0.04	0.05	16.0	18.0	16.0	16.4	14.4	15.0	15.5	16.5	15*	
Total			5.97	6.56	31.7	27.7	32.2	26.7	29.2	25.1	31.0	26.5		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 8a. Average Speed per Segment – Route 8 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Orange-Altas Palmas	4	5	0.11	0.12	15.8	12.7	19.8	17.3	18.0	16.6	17.9	15.5	20*
Altas Palmas-US 83	3	5	0.15	0.16	16.9	15.2	15.4	13.7	14.2	12.8	15.5	13.9	45
US 83-Stuart Place	1	5	0.89	0.89	45.8	45.1	46.4	45.8	37.3	36.4	43.2	42.4	55**
US 83-US 77	1	4	2.47	2.47	54.9	54.6	61.3	60.9	62.2	61.8	59.5	59.1	45-55**
US 77-Ed Carey	1	3	3.03	3.03	232.1	62.3	63.8	63.8	64.9	64.5	120.3	63.6	60
US 77-Williams	1	4	2.15	2.16	67.3	67.0	66.2	65.3	60.0	59.8	64.5	64.1	60
US 77-Sam Houston	1	3	1.47	1.50	56.3	39.4	30.1	19.5	46.8	31.4	44.4	30.1	50**
Sam Houston-Swanson	2	3	0.11	0.11	20.8	19.8	19.8	18.9	20.8	22.0	20.5	20.2	30
Swanson-Reagan-Robertson	4	3	0.31	0.33	14.9	12.5	14.7	12.1	15.1	14.0	14.9	12.9	30
Reagan-Rowson	4	1	0.06	0.07	15.4	15.8	16.6	16.8	16.6	16.8	16.2	16.5	NP
Total			10.75	10.84	59.3	45.1	46.0	39.7	48.1	43.7	50.5	42.7	
Unimpeded Method	Delay Method												

* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted

Table 8b. Average Speed per Segment – Route 8 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Orange-Altas Palmas	4	5	0.11	0.12	20.8	18.8	18.9	16.0	13.7	12.3	17.8	15.7	20*
Altas Palmas-US 83	3	5	0.15	0.16	17.4	16.0	16.4	15.2	15.9	14.4	16.6	15.2	45
US 83-Stuart Place	1	5	0.89	0.89	47.8	46.4	46.4	45.1	44.5	43.9	46.3	45.2	55**
US 83-US 77	1	4	2.47	2.47	66.9	66.9	62.6	62.6	65.9	65.9	65.1	65.1	45-55**
US 77-Ed Carey	1	3	3.03	3.03	65.3	64.5	63.8	63.1	66.9	66.1	65.3	64.6	60
US 77-Williams	1	4	2.15	2.16	66.2	66.5	64.5	64.3	68.5	68.2	66.4	66.3	60
US 77-Sam Houston	1	3	1.47	1.50	51.9	32.3	56.9	36.0	37.5	36.5	48.8	34.9	50**
Sam Houston-Swanson	2	3	0.11	0.11	23.3	22.0	22.0	22.0	22.0	20.8	22.4	21.6	30
Swanson-Reagan-Robertson	4	3	0.31	0.33	15.9	14.0	15.7	14.1	14.9	13.8	15.5	14.0	30
Reagan-Rowson	4	1	0.06	0.07	16.6	16.8	18.0	16.8	18.0	16.8	17.5	16.8	NP
Total			10.75	10.84	52.6	46.9	51.6	46.5	48.9	47.0	51.0	46.8	
Unimpeded Method	Delay Method												

* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted

Table 8c. Average Speed per Segment – Route 8 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Reagan-Robertson	4	1	0.06	0.07	16.6	12.6	14.4	11.5	15.4	11.5	15.5	11.8	NP
Reagan-Swanson-Sam Houston	4	3	0.31	0.34	15.7	14.1	16.2	14.2	12.8	12.8	14.9	13.7	30
Sam Houston-US 77	2	3	0.04	0.07	18.0	18.0	9.6	4.9	18.0	6.1	15.2	9.7	30
US 77-Williams	1	3	1.49	1.49	40.3	39.7	39.7	39.7	34.6	33.9	38.2	37.8	50**
US 77-Ed Carey	1	4	2.15	2.16	65.0	64.8	65.0	64.3	64.0	64.3	64.7	64.4	60
US 77-US 83	1	3	3.06	3.07	63.3	63.2	62.2	62.4	58.0	57.9	61.2	61.2	60
US 83-Stuart Place	1	4	2.49	2.50	63.6	63.4	62.7	62.1	56.4	55.9	60.9	60.4	45-55**
US 83-Altas Palmas	1	5	0.88	0.89	45.9	43.3	41.1	38.6	44.0	42.2	43.7	41.4	55**
Altas Palmas-Orange	3	5	0.11	0.12	18.0	18.0	19.8	19.6	19.8	20.6	19.2	19.4	45
Orange-Tangelo	4	5	0.11	0.12	14.7	13.9	17.2	16.6	16.5	14.9	16.1	15.1	20*
Total			10.70	10.83	49.6	47.4	48.6	44.9	45.3	42.6	47.8	44.9	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted										

Table 8d. Average Speed per Segment – Route 8 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Reagan-Robertson	4	1	0.06	0.07	15.4	12.6	18.0	14.0	16.6	12.6	16.7	13.1	NP
Reagan-Swanson-Sam Houston	4	3	0.31	0.34	15.5	15.1	15.5	13.8	14.9	14.2	15.3	14.4	30
Sam Houston-US 77	2	3	0.04	0.07	3.3	4.9	18.0	5.0	18.0	7.2	13.1	5.7	30
US 77-Williams	1	3	1.49	1.49	43.6	43.3	35.1	34.8	39.4	39.4	39.4	39.2	50**
US 77-Ed Carey	1	4	2.15	2.16	66.7	66.5	65.6	64.8	67.9	67.0	66.7	66.1	60
US 77-US 83	1	3	3.06	3.07	61.9	62.1	62.9	62.8	66.0	65.8	63.6	63.6	60
US 83-Stuart Place	1	4	2.49	2.50	62.7	62.1	60.2	60.0	61.8	61.6	61.6	61.2	45-55**
US 83-Altas Palmas	1	5	0.88	0.89	42.8	39.6	44.6	39.1	44.6	42.2	44.0	40.3	55**
Altas Palmas-Orange	3	5	0.11	0.12	18.9	19.6	18.9	18.8	18.9	18.8	18.9	19.1	45
Orange-Tangelo	4	5	0.11	0.12	17.2	16.0	18.9	18.0	18.0	16.6	18.0	16.9	20*
Total			10.70	10.83	47.7	46.1	48.2	44.0	49.9	46.9	48.6	45.6	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps ** Construction on adjacent lane(s) NP - Not Posted										

Table 9a. Average Speed per Segment – Route 9 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Bowie-Adele	3	1	0.05	0.06	16.4	15.4	18.0	18.0	18.0	16.6	17.5	16.7	NP
Adele-Sam Houston	4	1	0.05	0.07	15.0	12.6	12.0	11.5	13.8	12.0	13.6	12.0	NP
Adele-Crockett	4	3	0.05	0.07	18.0	10.5	16.4	9.3	18.0	4.8	17.5	8.2	NP
Crockett-US 77 Business	3	3	0.26	0.28	25.3	12.6	28.4	21.4	30.2	26.5	28.0	20.2	30
US 77 Business-Stookey	2	3	0.99	1.01	42.9	41.8	40.5	39.1	43.5	40.4	42.3	40.4	35-45
US 77 Business-Line M	2	4	0.51	0.52	47.1	43.5	44.8	41.6	44.8	39.0	45.5	41.4	50
Line M-San Jose Ranch-Norma Linda	3	5	2.18	2.20	41.7	41.0	37.7	37.0	43.6	42.8	41.0	40.3	55
Norma Linda-Line 17	4	5	0.92	0.98	33.5	30.9	33.8	30.4	34.1	31.5	33.8	31.0	30
Line 17-McCullough	3	5	0.47	0.48	25.3	24.7	23.8	23.4	30.2	29.3	26.4	25.8	NP
Line 17-Bonham	3	4	0.13	0.14	20.3	20.2	24.6	26.5	22.3	22.9	22.4	23.2	30
Line 17-Sam Houston	3	3	0.41	0.42	22.4	21.9	20.8	20.2	22.0	21.9	21.7	21.3	NP
Sam Houston-Resaca Shores	2	5	0.13	0.14	23.4	15.3	24.6	22.9	22.3	14.0	23.4	17.4	30
Resaca Shores-Meadowbrook	4	5	0.33	0.34	22.8	22.7	12.6	13.0	23.3	23.1	19.6	19.6	NP
Total			6.48	6.71	33.0	29.2	30.0	28.1	34.3	30.2	32.3	29.2	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 9b. Average Speed per Segment – Route 9 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Bowie-Adele	3	1	0.05	0.06	18.0	16.6	16.4	15.4	18.0	15.4	17.5	15.8	NP
Adele-Sam Houston	4	1	0.05	0.07	12.9	12.0	12.0	10.5	13.8	8.7	12.9	10.4	NP
Adele-Crockett	4	3	0.05	0.07	15.0	11.5	15.0	6.3	16.4	5.9	15.5	7.9	NP
Crockett-US 77 Business	3	3	0.26	0.28	31.2	26.5	27.5	13.6	28.4	16.5	29.0	18.9	30
US 77 Business-Stookey	2	3	0.99	1.01	42.9	40.9	40.5	38.7	40.5	39.5	41.3	39.7	35-45
US 77 Business-Line M	2	4	0.51	0.52	47.1	43.5	43.7	40.7	43.7	40.7	44.8	41.6	50
Line M-San Jose Ranch-Norma Linda	3	5	2.18	2.20	43.6	42.6	38.9	37.4	43.4	42.6	41.9	40.8	55
Norma Linda-Line 17	4	5	0.92	0.98	35.6	33.3	37.2	33.3	34.5	31.2	35.8	32.6	30
Line 17-McCullough	3	5	0.47	0.48	28.7	27.9	29.7	28.8	28.7	27.9	29.0	28.2	NP
Line 17-Bonham	3	4	0.13	0.14	20.3	20.2	20.3	20.2	22.3	21.9	21.0	20.7	30
Line 17-Sam Houston	3	3	0.41	0.42	18.2	17.6	24.6	24.0	21.4	18.7	21.4	20.1	NP
Sam Houston-Resaca Shores	2	5	0.13	0.14	22.3	19.4	27.5	25.2	24.6	21.0	24.8	21.9	30
Resaca Shores-Meadowbrook	4	5	0.33	0.34	22.8	23.1	25.3	25.0	24.2	24.5	24.1	24.2	NP
Total			6.48	6.71	33.5	31.4	33.5	29.2	33.8	29.3	33.6	29.9	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 9c. Average Speed per Segment – Route 9 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Resaca Shores-Sam Houston	4	5	0.33	0.34	23.3	19.7	22.0	22.3	23.8	23.5	23.0	21.8	NP
Sam Houston-Line 17	2	5	0.14	0.15	25.2	23.5	28.0	24.5	26.5	25.7	26.6	24.6	30
Line 17-Bonham	3	3	0.41	0.42	19.7	19.6	21.1	21.0	21.4	21.0	20.7	20.5	NP
Line 17-McCullough	3	4	0.13	0.14	22.3	21.9	27.5	28.0	23.4	25.2	24.4	25.0	30
Line 17-Norma Linda	3	5	0.47	0.48	23.8	23.4	28.7	27.9	27.7	27.0	26.7	26.1	NP
Norma Linda-San Jose Ranch	4	5	0.92	0.98	29.8	28.0	32.5	29.4	32.8	29.2	31.7	28.9	30
San Jose Ranch-Line M-US 77 Business	3	5	2.17	2.19	44.6	42.8	45.4	44.3	45.7	43.8	45.2	43.6	55
US 77 Business-Stookey	2	4	0.50	0.51	43.9	41.7	42.9	39.9	42.9	39.9	43.2	40.5	50
US 77 Business-Crockett	2	3	0.99	1.01	36.7	31.9	41.0	20.3	40.0	22.4	39.3	24.9	35-45
Crockett-Adele	3	3	0.25	0.27	24.3	21.6	32.1	29.5	27.3	24.3	27.9	25.1	30
Adele-Sam Houston	4	3	0.05	0.07	16.4	14.0	15.0	10.5	15.0	11.5	15.5	12.0	NP
Sam Houston-Bowie	4	1	0.05	0.07	13.8	12.6	18.0	15.8	15.0	11.0	15.6	13.1	NP
Bowie-Hicks	3	1	0.05	0.06	18.0	16.6	22.5	21.6	18.0	18.0	19.5	18.7	NP
Total			6.46	6.69	31.7	29.3	34.3	28.8	33.8	28.8	33.2	29.0	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 9d. Average Speed per Segment – Route 9 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Resaca Shores-Sam Houston	4	5	0.33	0.34	23.8	23.1	24.2	24.0	22.4	22.7	23.5	23.3	NP
Sam Houston-Line 17	2	5	0.14	0.15	26.5	24.5	28.0	27.0	26.5	24.5	27.0	25.4	30
Line 17-Bonham	3	3	0.41	0.42	21.7	21.0	24.6	24.0	23.4	22.9	23.2	22.6	NP
Line 17-McCullough	3	4	0.13	0.14	23.4	24.0	31.2	33.6	24.6	25.2	26.4	27.6	30
Line 17-Norma Linda	3	5	0.47	0.48	25.3	24.7	28.7	28.3	28.7	27.9	27.5	27.0	NP
Norma Linda-San Jose Ranch	4	5	0.92	0.98	32.2	29.4	34.9	31.8	32.5	29.4	33.2	30.2	30
San Jose Ranch-Line M-US 77 Business	3	5	2.17	2.19	44.4	43.1	43.9	42.2	42.2	38.5	43.5	41.2	55
US 77 Business-Stookey	2	4	0.50	0.51	43.9	40.8	43.9	40.8	42.9	41.7	43.6	41.1	50
US 77 Business-Crockett	2	3	0.99	1.01	40.0	28.0	38.7	28.4	38.3	37.1	39.0	31.2	35-45
Crockett-Adele	3	3	0.25	0.27	29.0	26.3	27.3	24.3	27.3	24.9	27.9	25.2	30
Adele-Sam Houston	4	3	0.05	0.07	16.4	12.0	18.0	12.6	16.4	12.0	16.9	12.2	NP
Sam Houston-Bowie	4	1	0.05	0.07	15.0	11.5	15.0	14.0	15.0	12.6	15.0	12.7	NP
Bowie-Hicks	3	1	0.05	0.06	20.0	16.6	20.0	18.0	18.0	18.0	19.3	17.5	NP
Total			6.46	6.69	33.4	29.8	34.7	31.2	33.2	30.8	33.7	30.6	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 10a. Average Speed per Segment – Route 10 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed	
Tyler-C Street	2	3	1.43	1.44	28.0	27.9	26.7	26.6	30.5	30.3	28.4	28.3	35-40	
Tyler-Commerce	2	2	0.15	0.21	22.5	24.4	27.0	29.1	25.7	12.4	25.1	22.0	NP	
Tyler-6th	2	1	0.31	0.33	25.4	25.8	31.0	29.7	24.3	24.2	26.9	26.6	35	
Tyler-US 77 Business	2	2	0.59	0.63	18.3	18.9	30.3	31.1	29.5	28.7	26.1	26.2	20*-35	
Tyler-27th-Harrison-Ed Carey	2	3	0.98	1.05	34.3	26.8	35.6	36.0	34.6	32.9	34.8	31.9	35-45	
Harrison-FM 509	2	4	1.83	1.88	47.4	46.7	50.3	50.1	48.1	47.7	48.6	48.2	55	
Total			5.29	5.54	31.2	29.8	34.7	34.7	34.8	32.3	33.5	32.2		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 10b. Average Speed per Segment – Route 10 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed	
Tyler-C Street	2	3	1.43	1.44	27.1	27.0	27.1	27.0	28.0	27.9	27.4	27.3	35-40	
Tyler-Commerce	2	2	0.15	0.21	27.0	28.0	28.4	29.1	24.5	12.6	26.7	23.2	NP	
Tyler-6th	2	1	0.31	0.33	31.0	32.1	32.8	33.0	23.7	23.8	29.2	29.6	35	
Tyler-US 77 Business	2	2	0.59	0.63	32.2	32.9	25.9	17.9	28.3	18.6	28.8	23.1	20*-35	
Tyler-27th-Harrison-Ed Carey	2	3	0.98	1.05	36.8	37.1	37.1	36.7	36.8	25.4	36.9	33.0	35-45	
Harrison-FM 509	2	4	1.83	1.88	47.7	47.7	53.6	53.3	51.9	50.9	51.1	50.6	55	
Total			5.29	5.54	34.9	35.1	35.1	32.6	34.6	28.5	34.8	31.8		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 10c. Average Speed per Segment – Route 10 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Harrison-Ed Carey	2	4	1.83	1.88	45.8	42.0	47.7	37.4	46.7	38.2	46.7	39.2	55
Harrison-US 77 Business	2	3	0.97	1.04	38.0	32.6	40.1	32.8	36.4	24.8	38.2	30.1	35-45
Harrison-6th	2	2	0.57	0.63	33.1	32.4	34.8	33.4	30.2	25.8	32.7	30.5	35
Harrison-Commerce	2	1	0.33	0.38	29.7	17.3	15.8	16.7	23.8	19.5	23.1	17.8	35
Harrison-C Street	2	2	0.13	0.16	22.3	22.2	2.4	2.9	26.0	25.0	16.9	16.7	NP
Harrison-US 77	2	3	1.15	1.20	31.1	30.4	33.9	29.8	31.6	31.1	32.2	30.4	35-40
Harrison-Dixieland	2	4	0.25	0.26	30.0	30.2	30.0	30.2	30.0	31.2	30.0	30.5	NP
Total			5.23	5.55	36.1	32.0	26.7	24.4	35.3	29.5	32.1	28.3	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 10d. Average Speed per Segment – Route 10 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Harrison-Ed Carey	2	4	1.83	1.88	47.4	42.8	46.1	45.4	48.1	48.0	47.2	45.4	55
Harrison-US 77 Business	2	3	0.97	1.04	38.0	27.7	38.8	34.0	36.4	36.0	37.7	32.6	35-45
Harrison-6th	2	2	0.57	0.63	33.6	32.4	35.4	34.4	20.1	21.0	29.7	29.3	35
Harrison-Commerce	2	1	0.33	0.38	32.1	33.4	33.0	34.2	29.0	28.5	31.4	32.0	35
Harrison-C Street	2	2	0.13	0.16	29.3	32.0	24.6	25.0	23.4	24.0	25.8	27.0	NP
Harrison-US 77	2	3	1.15	1.20	30.4	30.4	30.4	30.4	29.2	29.0	30.0	29.9	35-40
Harrison-Dixieland	2	4	0.25	0.26	30.0	30.2	31.0	31.2	15.3	15.3	25.4	25.6	NP
Total			5.23	5.55	36.8	33.6	36.8	35.7	31.5	31.5	34.9	33.5	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 11a. Average Speed per Segment – Route 11 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed	
Kingsway-Old Port Isabel	4	5	0.06	0.07	18.0	15.8	24.0	18.0	24.0	19.4	22.0	17.7	20*	
Old Port Isabel-Ruben Torres	2	5	0.35	0.36	17.5	17.3	19.7	19.1	26.8	25.9	21.3	20.8	35	
Old Port Isabel-Coffeepport	2	4	0.48	0.52	13.4	13.8	7.6	7.8	28.3	14.3	16.4	12.0	35	
Coffeepport-Old Alice	3	4	2.05	2.14	25.3	24.2	21.0	19.6	23.8	23.4	23.3	22.4	30-35	
Coffeepport-US 77	2	3	0.17	0.30	14.6	18.9	15.3	19.6	24.5	26.3	18.1	21.6	30	
Coffeepport-Central-Stoval	2	4	1.44	1.54	33.2	26.5	33.2	26.5	22.7	19.7	29.7	24.2	40-45	
Stoval-Russell-Del Mar	4	4	0.31	0.32	18.0	17.2	20.3	19.5	22.3	21.3	20.2	19.4	20*	
Total			4.86	5.25	22.9	21.5	19.4	18.2	24.0	21.0	21.9	20.1		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 11b. Average Speed per Segment – Route 11 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed	
Kingsway-Old Port Isabel	4	5	0.06	0.07	21.6	16.8	21.6	15.8	19.6	14.8	20.9	15.8	20*	
Old Port Isabel-Ruben Torres	2	5	0.35	0.36	23.8	23.1	17.5	17.5	25.7	24.9	22.3	21.9	35	
Old Port Isabel-Coffeepport	2	4	0.48	0.52	28.8	15.2	22.2	21.5	28.8	16.3	26.6	17.7	35	
Coffeepport-Old Alice	3	4	2.05	2.14	24.1	22.3	23.7	22.3	25.6	24.0	24.5	22.9	30-35	
Coffeepport-US 77	2	3	0.17	0.30	14.2	18.3	27.8	16.9	19.1	22.5	20.4	19.2	30	
Coffeepport-Central-Stoval	2	4	1.44	1.54	35.5	19.5	18.3	17.8	33.7	27.7	29.2	21.7	40-45	
Stoval-Russell-Del Mar	4	4	0.31	0.32	21.1	20.2	20.3	19.5	20.3	19.5	20.5	19.8	20*	
Total			4.86	5.25	26.1	20.1	21.1	19.8	27.0	23.3	24.4	20.9		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 11c. Average Speed per Segment – Route 11 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Russell-Stoval-Central	4	4	0.30	0.32	18.0	12.5	19.6	18.9	20.4	17.2	19.3	16.2	20*
Central-Coffeepport-US 77	2	4	1.44	1.53	21.8	21.9	8.9	8.8	11.8	11.9	14.1	14.2	40-45
Coffeepport-Old Alice	2	3	0.17	0.30	34.0	34.8	24.5	8.8	15.3	8.3	24.6	17.3	30
Coffeepport-Old Port Isabel	3	4	2.04	2.13	29.7	29.8	19.2	19.1	17.8	15.1	22.2	21.4	30-35
Old Port Isabel-Ruben Torres	2	4	0.48	0.52	28.3	27.9	33.2	31.7	21.6	21.5	27.7	27.1	35
Old Port Isabel-Kingsway	2	5	0.34	0.36	18.0	18.3	11.2	11.7	15.1	15.2	14.8	15.1	35
Kingsway-Banburg	4	5	0.06	0.07	19.6	16.8	24.0	19.4	24.0	21.0	22.5	19.1	20*
Total			4.83	5.23	24.7	24.0	14.3	13.5	15.6	14.0	17.2	16.0	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 11d. Average Speed per Segment – Route 11 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Russell-Stoval-Central	4	4	0.30	0.32	20.8	18.3	22.0	15.6	20.8	13.4	21.2	15.7	20*
Central-Coffeepport-US 77	2	4	1.44	1.53	24.8	24.8	19.1	19.3	22.6	22.7	22.2	22.2	40-45
Coffeepport-Old Alice	2	3	0.17	0.30	27.8	9.6	27.8	9.2	25.5	9.2	27.0	9.3	30
Coffeepport-Old Port Isabel	3	4	2.04	2.13	23.6	20.7	30.7	24.9	30.6	27.6	28.3	24.4	30-35
Old Port Isabel-Ruben Torres	2	4	0.48	0.52	33.2	32.3	33.9	32.8	33.9	33.4	33.7	32.8	35
Old Port Isabel-Kingsway	2	5	0.34	0.36	28.5	28.2	16.1	16.4	14.4	14.7	19.7	19.8	35
Kingsway-Banburg	4	5	0.06	0.07	21.6	19.4	24.0	21.0	19.6	16.8	21.7	19.1	20*
Total			4.83	5.23	24.9	21.3	24.2	20.2	25.1	21.3	24.7	20.9	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 12a. Average Speed per Segment – Route 12 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed	
Camino del Rey-Military Highway	4	3	0.03	0.05	15.4	9.0	15.4	15.0	12.0	12.9	14.3	12.3	NP	
Military Highway-Old Military Road	2	3	0.34	0.35	28.5	25.7	34.0	32.3	32.2	30.7	31.6	29.6	30	
Old Military Road-Elizabeth-Central	3	3	0.96	1.00	27.6	23.4	27.9	27.9	24.5	18.4	26.7	23.2	30	
Elizabeth-Palm	2	3	0.47	0.51	30.2	28.2	28.2	28.2	28.2	26.6	28.9	27.7	30	
Elizabeth-East 7th	2	2	0.44	0.48	17.8	17.5	18.4	18.4	22.3	15.3	19.5	17.0	20*	
Elizabeth-East 13th-Tyler	2	1	0.91	0.94	17.6	17.8	14.5	14.6	8.4	8.6	13.5	13.7	30	
Tyler-International	4	1	0.29	0.32	17.1	14.2	15.1	8.1	14.3	10.0	15.5	10.8	20*	
Tyler-East-Taylor	3	3	0.57	0.58	15.0	15.0	20.9	20.7	19.7	19.5	18.5	18.4	30-40	
East-Elena	3	4	1.04	1.05	32.3	32.3	21.8	21.8	17.8	17.6	24.0	23.9	30	
East-Margarita	3	2	0.04	0.06	20.6	12.0	20.6	27.0	18.0	19.6	19.7	19.5	NP	
Margarita-Jessica	4	2	0.06	0.07	19.6	19.4	18.0	18.0	19.6	21.0	19.1	19.5	NP	
Total			5.15	5.41	22.1	20.6	20.7	19.3	16.7	15.1	19.5	18.0		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 12b. Average Speed per Segment – Route 12 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed	
Camino del Rey-Military Highway	4	3	0.03	0.05	15.4	10.0	13.5	15.0	15.4	12.9	14.8	12.6	NP	
Military Highway-Old Military Road	2	3	0.34	0.35	25.5	22.9	32.2	29.3	29.1	26.8	29.0	26.3	30	
Old Military Road-Elizabeth-Central	3	3	0.96	1.00	27.6	19.8	18.7	18.7	22.9	19.7	23.1	19.4	30	
Elizabeth-Palm	2	3	0.47	0.51	29.2	19.5	27.7	28.2	26.9	26.6	27.9	24.8	30	
Elizabeth-East 7th	2	2	0.44	0.48	21.1	20.6	20.3	18.2	16.2	16.1	19.2	18.3	20*	
Elizabeth-East 13th-Tyler	2	1	0.91	0.94	10.1	10.3	9.8	10.0	10.1	10.2	10.0	10.2	30	
Tyler-International	4	1	0.29	0.32	15.8	7.8	18.3	17.7	18.0	8.2	17.4	11.3	20*	
Tyler-East-Taylor	3	3	0.57	0.58	21.6	21.3	21.2	20.9	20.5	20.3	21.1	20.8	NP	
East-Elena	3	4	1.04	1.05	17.7	16.7	21.5	21.6	29.7	29.8	23.0	22.7	30-40	
East-Margarita	3	2	0.04	0.06	16.0	16.6	18.0	21.6	18.0	21.6	17.3	19.9	NP	
Margarita-Jessica	4	2	0.06	0.07	21.6	21.0	19.6	19.4	21.6	21.0	20.9	20.5	NP	
Total			5.15	5.41	18.0	15.5	17.7	17.5	18.8	17.0	18.1	16.6		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 12c. Average Speed per Segment – Route 12 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Margarita-East	4	2	0.06	0.07	18.0	16.8	18.0	7.9	19.6	19.4	18.5	14.7	NP
East-Elena	3	2	0.04	0.05	8.0	9.0	12.0	12.9	18.0	16.4	12.7	12.7	NP
East-Taylor	3	4	0.69	0.75	28.6	21.4	28.2	27.0	31.8	26.5	29.5	25.0	30-40
East-Polk	3	3	0.30	0.30	19.3	19.3	24.5	24.5	24.0	24.0	22.6	22.6	NP
Polk-International	4	3	0.56	0.58	25.5	12.6	24.0	19.3	20.6	20.3	23.4	17.4	30
Polk-East 16th-Tyler-East 10th-Jackson	4	1	0.71	0.78	14.4	14.5	13.7	14.0	13.0	13.2	13.7	13.9	NP
East 10th-Washington	3	1	0.25	0.28	12.9	13.1	12.7	12.9	11.8	11.5	12.5	12.5	NP
Washington-East 7th	4	1	0.17	0.19	11.1	9.8	13.6	12.4	10.6	10.4	11.8	10.9	NP
Washington-Palm	4	2	0.42	0.46	24.4	21.8	24.4	19.3	22.6	14.2	23.8	18.4	30
Palm-Elizabeth	2	2	0.04	0.07	18.0	14.8	16.0	11.5	20.6	16.8	18.2	14.4	NP
Elizabeth-Central	2	3	0.47	0.51	27.7	20.2	26.0	16.8	26.0	25.2	26.6	20.7	30
Elizabeth-Old Military Road-Military Highway	3	3	0.96	1.00	25.6	19.8	27.2	19.7	21.1	20.9	24.6	20.1	20*-30
Military Highway-Camino del Rey	2	3	0.33	0.35	30.5	28.6	33.0	30.7	32.1	31.5	31.9	30.3	40
Camino del Rey-Avenida Imperial	4	3	0.03	0.04	15.4	14.4	15.4	14.4	13.5	13.1	14.8	14.0	20*
Total			5.03	5.43	20.9	17.1	21.4	18.0	19.7	18.3	20.6	17.8	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 12d. Average Speed per Segment – Route 12 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Margarita-East	4	2	0.06	0.07	19.6	11.0	19.6	14.8	18.0	10.1	19.1	12.0	NP
East-Elena	3	2	0.04	0.05	16.0	5.5	20.6	20.0	5.3	6.0	14.0	10.5	NP
East-Taylor	3	4	0.69	0.75	33.1	27.3	33.1	33.8	33.6	25.5	33.3	28.8	30-40
East-Polk	3	3	0.30	0.30	27.0	26.3	25.7	25.7	25.7	25.7	26.1	25.9	NP
Polk-International	4	3	0.56	0.58	22.2	22.7	22.9	16.8	23.7	23.7	22.9	21.1	30
Polk-East. 16th-Tyler-East. 10th-Jackson	4	1	0.71	0.78	13.0	12.9	15.6	15.5	14.8	14.5	14.4	14.3	NP
East 10th-Washington	3	1	0.25	0.28	10.3	11.6	10.7	10.3	7.4	7.7	9.5	9.9	NP
Washington-East. 7th	4	1	0.17	0.19	11.3	9.2	11.8	11.0	10.7	9.9	11.3	10.1	NP
Washington-Palm	4	2	0.42	0.46	24.0	19.7	22.6	21.2	24.8	16.7	23.8	19.2	30
Palm-Elizabeth	2	2	0.04	0.07	18.0	15.8	20.6	14.8	18.0	14.8	18.9	15.1	NP
Elizabeth-Central	2	3	0.47	0.51	29.7	17.2	28.7	28.7	24.9	18.0	27.7	21.3	30
Elizabeth-Old Military Road-Military Highway	3	3	0.96	1.00	25.2	17.1	27.2	18.2	28.1	26.9	26.8	20.7	20*-30
Military Highway-Camino del Rey	2	3	0.33	0.35	30.5	30.0	32.1	30.0	31.3	29.3	31.3	29.8	40
Camino del Rey-Avenida Imperial	4	3	0.03	0.04	15.4	14.4	13.5	14.4	13.5	13.1	14.1	14.0	20*
Total			5.03	5.43	20.7	17.2	21.9	19.1	20.2	17.9	20.9	18.0	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps				** Construction on adjacent lane(s)				NP - Not Posted		

Table 13a. Average Speed per Segment – Route 13 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Coolidge-International	4	3	0.41	0.42	17.6	17.2	17.2	16.6	16.8	15.4	17.2	16.4	20
International-14th	2	3	0.46	0.49	24.7	24.2	33.8	32.7	24.4	24.5	27.6	27.1	25*-35
International-South Padre Island-Central	2	4	1.76	1.78	31.4	27.9	23.0	21.5	18.6	18.6	24.3	22.7	35-55
Central-Coffeeport	3	5	0.43	0.48	26.2	20.8	18.2	14.3	30.4	24.3	24.9	19.8	30
Central-FM 802	3	4	0.45	0.50	31.2	29.0	31.2	29.0	34.5	31.6	32.3	29.9	NP
FM 802-Coffeeport	2	4	1.65	1.67	23.0	22.9	35.4	35.0	24.0	24.0	27.5	27.3	45
Las Palmas-Princess Palm-Royal Palm	4	4	0.10	0.11	14.4	14.1	13.8	13.7	15.0	14.7	14.4	14.2	25*
Total			5.26	5.45	25.3	23.8	25.6	23.7	21.9	21.3	24.1	22.9	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 13b. Average Speed per Segment – Route 13 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Coolidge-International	4	3	0.41	0.42	17.2	11.4	16.8	15.8	18.0	11.9	17.3	13.0	20
International-14th	2	3	0.46	0.49	31.8	30.9	35.2	33.3	37.6	36.8	34.9	33.7	25*-35
International-South Padre Island-Central	2	4	1.76	1.78	19.6	19.6	24.0	20.5	22.1	22.0	21.9	20.7	35-55
Central-Coffeeport	3	5	0.43	0.48	24.6	21.9	32.3	27.0	27.2	24.0	28.0	24.3	30
Central-FM 802	3	4	0.45	0.50	29.5	28.1	34.5	23.4	32.4	30.0	32.1	27.2	NP
FM 802-Coffeeport	2	4	1.65	1.67	39.9	39.3	27.6	27.1	22.4	22.3	30.0	29.6	45
Las Palmas-Princess Palm-Royal Palm	4	4	0.10	0.11	16.4	2.3	14.4	14.1	12.9	12.8	14.5	9.7	25*
Total			5.26	5.45	25.2	19.9	25.8	23.0	23.3	21.8	24.7	21.5	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 13c. Average Speed per Segment – Route 13 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed	
Princess Palm-Las Palmas-Coffeeport	4	4	0.11	0.13	11.3	8.2	11.6	10.4	14.1	5.3	12.4	8.0	25*	
FM 802-Central	2	4	1.66	1.69	32.8	31.5	27.8	27.5	24.4	21.2	28.3	26.8	45	
Central-Coffeeport	3	4	0.45	0.51	29.5	26.2	25.3	16.7	32.4	27.8	29.1	23.6	NP	
Central-South Padre Island	3	5	0.43	0.48	27.2	25.4	27.2	24.3	29.2	16.0	27.8	21.9	30	
South Padre Island-International-14th	2	4	1.76	1.79	29.5	29.3	12.3	12.4	18.5	18.7	20.1	20.1	35-55	
International-Coolidge	2	3	0.46	0.50	29.1	22.5	16.6	12.2	22.1	12.2	22.6	15.6	25*-35	
Coolidge-25th	4	3	0.41	0.42	14.6	14.5	16.4	16.3	16.4	15.9	15.8	15.6	20	
Total			5.28	5.52	27.1	25.1	17.7	16.5	21.5	17.5	21.4	19.0		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 13d. Average Speed per Segment – Route 13 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed	
Princess Palm-Las Palmas-Coffeeport	4	4	0.11	0.13	12.8	11.1	14.7	12.6	13.2	11.4	13.5	11.7	25*	
FM 802-Central	2	4	1.66	1.69	28.2	24.8	33.0	27.8	32.5	29.5	31.2	27.4	45	
Central-Coffeeport	3	4	0.45	0.51	32.4	29.1	33.1	29.6	30.6	27.4	32.0	28.7	NP	
Central-South Padre Island	3	5	0.43	0.48	30.4	27.0	31.0	26.6	28.7	27.4	30.0	27.0	30	
South Padre Island-International-14th	2	4	1.76	1.79	28.0	28.1	20.5	20.7	26.3	26.3	24.9	25.0	35-55	
International-Coolidge	2	3	0.46	0.50	32.5	28.6	31.8	21.2	32.5	32.1	32.3	27.3	25*-35	
Coolidge-25th	4	3	0.41	0.42	17.8	17.2	18.5	18.0	17.6	17.6	17.9	17.6	20	
Total			5.28	5.52	27.0	25.0	25.4	23.0	27.3	26.0	26.5	24.6		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 14a. Average Speed per Segment – Route 14 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Autumn Sage-Coffeeport	4	5	0.24	0.25	19.2	18.4	18.0	14.8	16.6	8.7	17.9	14.0	20*
Coffeeport-Vermillion	2	4	0.15	0.16	25.7	23.0	16.9	15.2	25.7	24.0	22.8	20.7	NP
Vermillion-Houston-N. Dakota	3	4	1.23	1.27	25.0	23.7	24.9	23.9	26.2	24.6	25.4	24.1	20*-30
N. Dakota-Boca Chica	4	4	0.48	0.49	20.8	19.8	24.0	21.0	22.7	21.5	22.5	20.8	NP
Boca Chica-Minnesota	2	4	0.51	0.56	33.4	23.2	36.7	19.8	36.0	20.8	35.4	21.2	NP
Boca Chica-Iowa	2	3	0.32	0.36	31.1	29.5	33.9	24.0	34.9	19.6	33.3	24.4	45
Iowa-Les Mauldin	3	4	0.40	0.45	28.2	23.5	29.4	24.5	28.2	22.8	28.6	23.6	30
Iowa-Morningside	3	5	0.39	0.42	19.2	17.2	21.0	19.6	19.5	18.0	19.9	18.3	NP
Morningside-Norton	4	4	0.28	0.30	25.2	24.0	25.8	24.5	24.0	22.5	25.0	23.7	30
Norton-Minnesota-Zafiro	4	5	0.36	0.36	19.6	18.8	20.3	19.6	16.6	16.0	18.8	18.1	30
Total			4.36	4.62	24.2	21.9	24.8	21.2	24.3	19.8	24.4	20.9	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 14b. Average Speed per Segment – Route 14 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Autumn Sage-Coffeeport	4	5	0.24	0.25	18.8	11.4	19.2	16.1	13.9	11.5	17.3	13.0	20*
Coffeeport-Vermillion	2	4	0.15	0.16	27.0	23.0	23.5	20.6	22.5	21.3	24.3	21.6	NP
Vermillion-Houston-N. Dakota	3	4	1.23	1.27	25.7	25.1	25.6	24.8	24.2	23.1	25.2	24.4	20*-30
N. Dakota-Boca Chica	4	4	0.48	0.49	22.2	21.0	20.8	20.0	18.8	17.5	20.6	19.5	NP
Boca Chica-Minnesota	2	4	0.51	0.56	36.0	33.0	31.7	25.8	38.3	18.3	35.3	25.7	NP
Boca Chica-Iowa	2	3	0.32	0.36	33.9	21.6	27.4	15.1	34.9	32.4	32.1	23.0	45
Iowa-Les Mauldin	3	4	0.40	0.45	31.3	27.0	27.2	23.1	28.8	23.1	29.1	24.4	30
Iowa-Morningside	3	5	0.39	0.42	21.0	19.9	14.3	13.9	15.6	15.0	17.0	16.2	NP
Morningside-Norton	4	4	0.28	0.30	25.2	22.0	25.2	24.0	25.8	24.5	25.4	23.5	30
Norton-Minnesota-Zafiro	4	5	0.36	0.36	20.9	19.9	22.0	20.9	21.6	20.6	21.5	20.5	30
Total			4.36	4.62	25.5	22.4	23.3	20.6	23.0	20.0	23.9	21.0	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 14c. Average Speed per Segment – Route 14 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed	
Minnesota-Norton-Morningside	4	5	0.37	0.38	24.2	23.6	21.8	21.0	22.6	21.7	22.9	22.1	30	
Morningside-Iowa	4	4	0.28	0.30	25.2	22.0	25.2	23.0	26.5	23.5	25.6	22.8	30	
Iowa-Les Mauldin	3	5	0.39	0.42	18.5	17.6	18.7	16.3	21.6	18.0	19.6	17.3	NP	
Iowa-Boca Chica	3	4	0.41	0.45	27.8	19.5	30.1	27.5	27.3	23.8	28.4	23.6	30	
Boca Chica-Minnesota	2	3	0.31	0.35	36.0	34.1	33.8	22.9	31.9	19.1	33.9	25.4	45	
Boca Chica-N. Dakota	2	4	0.51	0.57	37.5	34.8	36.7	35.4	40.8	38.0	38.3	36.1	NP	
N. Dakota-Houston	4	4	0.48	0.50	20.3	19.8	21.1	20.7	20.8	20.5	20.7	20.3	NP	
Houston-Vermillion-Coffeepport	3	4	1.24	1.27	19.2	18.7	24.0	23.3	26.0	14.8	23.0	19.0	20*-30	
Coffeepport-Autumn Sage	2	4	0.15	0.17	27.0	23.5	25.7	23.5	23.5	21.9	25.4	23.0	NP	
Autumn Sage-Woodstone	4	5	0.24	0.25	17.6	17.6	16.6	16.7	17.3	17.0	17.2	17.1	20*	
Total			4.38	4.66	22.8	21.4	24.3	22.7	25.3	19.5	24.1	21.1		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 14d. Average Speed per Segment – Route 14 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed	
Minnesota-Norton-Morningside	4	5	0.37	0.38	23.8	23.2	22.6	21.7	21.1	19.5	22.5	21.5	30	
Morningside-Iowa	4	4	0.28	0.30	25.2	22.5	25.8	23.0	22.9	21.6	24.7	22.4	30	
Iowa-Les Mauldin	3	5	0.39	0.42	22.6	20.2	22.3	20.7	12.0	10.4	19.0	17.1	NP	
Iowa-Boca Chica	3	4	0.41	0.45	27.3	19.8	23.4	21.9	29.5	22.2	26.8	21.3	30	
Boca Chica-Minnesota	2	3	0.31	0.35	31.9	16.4	33.8	17.0	36.0	36.0	33.9	23.1	45	
Boca Chica-N. Dakota	2	4	0.51	0.57	38.3	36.0	39.1	37.3	38.3	35.4	38.5	36.2	NP	
N. Dakota-Houston	4	4	0.48	0.50	20.6	19.8	21.6	21.2	20.8	20.2	21.0	20.4	NP	
Houston-Vermillion-Coffeepport	3	4	1.24	1.27	26.0	18.0	26.0	20.4	26.3	15.0	26.1	17.8	20*-30	
Coffeepport-Autumn Sage	2	4	0.15	0.17	27.0	23.5	30.0	27.8	20.8	19.7	25.9	23.7	NP	
Autumn Sage-Woodstone	4	5	0.24	0.25	17.3	17.3	18.4	18.4	16.9	16.4	17.5	17.3	20*	
Total			4.38	4.66	25.4	20.4	25.4	21.9	23.1	18.4	24.6	20.2		
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted			

Table 15a. Average Speed per Segment – Route 15 (Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 1 Avg. Speed		Run 3 Avg. Speed		Run 11 Avg. Speed		Segment Average		Posted Speed
Billy Mitchell-Les Mauldin	2	5	0.24	0.24	37.6	37.6	39.3	39.3	39.3	39.3	38.7	38.7	NP
Billy Mitchell-Central	2	4	0.38	0.42	40.2	36.0	42.8	18.4	37.0	19.4	40.0	24.6	45
Billy Mitchell-Boca Chica	2	3	0.69	0.77	40.7	38.0	38.2	29.5	36.0	21.0	38.3	29.5	45
Boca Chica-Old Port Isabel	2	4	1.57	1.64	29.1	29.2	24.7	22.5	19.3	19.5	24.4	23.7	40
Boca Chica-US 77	2	3	0.37	0.62	33.3	21.7	38.1	21.1	29.6	10.5	33.7	17.7	NP
US 77-Los Ebanos	1	3	0.56	0.56	42.9	41.1	48.0	46.9	41.1	40.3	44.0	42.8	NP
US 77-Price	1	4	0.46	0.46	55.2	51.8	61.3	57.1	48.7	46.0	55.1	51.6	50**
US 77-Coffeeport	1	3	1.08	1.08	67.0	67.0	61.7	60.8	51.8	51.8	60.2	59.9	50**
US 77-Alton Gloor	1	4	2.18	2.20	56.9	55.8	54.1	51.4	37.9	36.7	49.6	48.0	55-60
Alton Gloor-Windwood	2	4	0.14	0.15	33.6	31.8	31.5	28.4	28.0	8.9	31.0	23.0	45
Total			7.67	8.14	43.1	39.5	40.8	33.5	32.5	24.7	38.3	31.4	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps						** Construction on adjacent lane(s)		NP - Not Posted		

Table 15b. Average Speed per Segment – Route 15 (Off-Peak Period, A→B Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 5 Avg. Speed		Run 7 Avg. Speed		Run 9 Avg. Speed		Segment Average		Posted Speed
Billy Mitchell-Les Mauldin	2	5	0.24	0.24	41.1	41.1	37.6	36.0	41.1	39.3	40.0	38.8	NP
Billy Mitchell-Central	2	4	0.38	0.42	40.2	18.4	35.1	27.0	42.8	44.5	39.4	30.0	45
Billy Mitchell-Boca Chica	2	3	0.69	0.77	38.8	33.0	34.5	22.2	40.7	25.0	38.0	26.7	45
Boca Chica-Old Port Isabel	2	4	1.57	1.64	23.7	21.4	18.8	17.8	20.8	19.6	21.1	19.6	40
Boca Chica-US 77	2	3	0.37	0.62	38.1	19.4	32.5	20.1	33.3	19.1	34.6	19.5	NP
US 77-Los Ebanos	1	3	0.56	0.56	36.7	35.4	38.8	36.7	42.0	39.5	39.1	37.2	NP
US 77-Price	1	4	0.46	0.46	48.7	47.3	55.2	53.4	47.3	44.8	50.4	48.5	50**
US 77-Coffeeport	1	3	1.08	1.08	54.8	54.0	57.2	56.3	57.2	56.3	56.4	55.6	50**
US 77-Alton Gloor	1	4	2.18	2.20	50.6	50.4	52.7	52.5	48.1	47.7	50.5	50.2	55-60
Alton Gloor-Windwood	2	4	0.14	0.15	56.0	27.0	29.6	15.0	29.6	25.7	38.4	22.6	45
Total			7.67	8.14	38.6	31.9	34.9	29.6	36.5	31.5	36.6	31.0	
Unimpeded Method	Delay Method		* School Zone or Speed Bumps						** Construction on adjacent lane(s)		NP - Not Posted		

Table 15c. Average Speed per Segment – Route 15 (Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 2 Avg. Speed		Run 10 Avg. Speed		Run 12 Avg. Speed		Segment Average		Posted Speed
Alton Gloor-US 77	2	4	0.09	0.20	27.0	11.8	36.0	5.2	32.4	28.8	31.8	15.3	45
US 77-Coffeepoint	1	4	2.20	2.20	59.1	58.7	56.2	55.8	49.8	49.5	55.0	54.6	55-60
US 77-Price	1	3	1.08	1.09	65.9	65.4	56.3	55.3	43.7	43.1	55.3	54.6	50**
US 77-Los Ebanos	1	4	0.46	0.46	59.1	57.1	51.8	50.2	35.2	34.5	48.7	47.3	50**
US 77-Boca Chica	1	3	0.49	0.57	44.1	25.7	35.3	24.1	36.8	29.3	38.7	26.4	NP
Boca Chica-Old Port Isabel	2	3	0.37	0.65	38.1	23.2	33.3	18.3	34.2	10.0	35.2	17.1	NP
Boca Chica-Billy Mitchell	2	4	1.56	1.63	20.4	20.7	19.6	19.7	28.8	28.5	22.9	22.9	40
Billy Mitchell-Central	2	3	0.72	0.76	38.1	33.0	37.0	31.8	38.7	38.5	37.9	34.4	45
Billy Mitchell-Les Mauldin	2	4	0.38	0.42	42.8	40.9	41.5	24.0	44.1	44.5	42.8	36.4	45
Billy Mitchell-Iowa	2	5	0.24	0.24	43.2	43.2	45.5	43.2	39.3	39.3	42.6	41.9	NP
Total			7.59	8.22	38.9	33.2	36.4	27.8	38.6	30.8	38.0	30.4	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		

Table 15d. Average Speed per Segment – Route 15 (Off-Peak Period, B→A Direction).

Segment	FUNCL	ATYPE	Length (miles)		Run 4 Avg. Speed		Run 6 Avg. Speed		Run 8 Avg. Speed		Segment Average		Posted Speed
Alton Gloor-US 77	2	4	0.09	0.20	11.6	15.7	32.4	8.5	32.4	30.0	25.5	18.0	45
US 77-Coffeepoint	1	4	2.20	2.20	51.1	50.4	57.4	56.6	58.2	57.4	55.6	54.8	55-60
US 77-Price	1	3	1.08	1.09	54.0	53.8	58.9	58.6	57.2	56.9	56.7	56.4	50**
US 77-Los Ebanos	1	4	0.46	0.46	50.2	48.7	61.3	59.1	57.1	55.2	56.2	54.3	50**
US 77-Boca Chica	1	3	0.49	0.57	41.0	18.3	42.0	23.9	38.3	15.5	40.5	19.2	NP
Boca Chica-Old Port Isabel	2	3	0.37	0.65	33.3	22.7	26.1	21.7	35.1	20.5	31.5	21.6	NP
Boca Chica-Billy Mitchell	2	4	1.56	1.63	21.9	22.0	28.4	28.2	24.4	24.3	24.9	24.8	40
Billy Mitchell-Central	2	3	0.72	0.76	41.1	32.6	41.1	41.5	39.3	25.6	40.5	33.2	45
Billy Mitchell-Les Mauldin	2	4	0.38	0.42	40.2	37.8	47.2	47.3	42.8	39.8	43.4	41.6	45
Billy Mitchell-Iowa	2	5	0.24	0.24	43.2	43.2	13.5	13.5	43.2	43.2	33.3	33.3	NP
Total			7.59	8.22	36.7	31.6	39.7	33.5	40.5	32.4	38.9	32.5	
Unimpeded Method	Delay Method						* School Zone or Speed Bumps		** Construction on adjacent lane(s)		NP - Not Posted		