# *APPENDIX G: Capital Metro's Ridership Memorandums*

METRO

# MEMORANDUM

**To:** Eric Bollich – City of Austin

**CC:** Roberto Gonzalez – Planning; Todd Hemingson – Planning

**From:** Caitlin D'Alton – Planning

**Date:** April 20, 2016

**Subject:** Overview of Bus Volumes & Passenger Loads on Guadalupe between Martin Luther King, Jr Blvd and 29th St (the Drag)

Approximately 1,400 Capital Metro vehicles operate on the Drag each weekday, carrying over 14,000 passengers (7,250 heading southbound and 6,950 heading northbound) on those trips. As plans to expand Capital Metro service are realized in the future, those numbers are expected to rise.

The attached graphic illustrates current and future bus volumes and current average passenger loads by segment of the corridor and time of day. Bus volumes and passenger loads are broken out by segment due to the reality of bus operations on the corridor; while many routes operate along the full length of the corridor, some routes enter and exit at different points along the way.

As the data illustrates, substantial bus volumes and passenger loads are present throughout the corridor in each direction. Heading northbound, current bus volumes and passenger loads increase throughout the day, with both figures peaking during the evening rush (4-7PM). In the future, northbound bus volumes are expected to increase overall, with the largest increase occurring during the morning rush (7-10AM). Some of this increase will result from rerouting and expanding service on our northwest Express routes to fully utilize the MoPac Express lanes; this is expected to occur in January 2017. As additional bus trips are added to the corridor, it is reasonable to assume that average passenger loads will also increase.

Heading southbound, current bus volumes and passenger loads peak during the morning rush (7-10AM) and taper off throughout the day. In the future, southbound bus volumes are expected to increase overall, with the largest increase occurring during the evening rush (4-7PM). This is the converse of the northbound experience; as our Express route service is expanded and rerouted to utilize the MoPac Express lanes, additional trips will be added to the corridor, with the bulk of southbound trips occurring during the evening rush. Similar to the northbound experience, as additional bus trips are added to the corridor, it is reasonable to assume that average passenger loads will also increase.

METRO | MEMORANDUM

**To:** Eric Bollich – City of Austin

**CC:** Roberto Gonzalez – Planning; Todd Hemingson – Planning

**From:** Caitlin D'Alton – Planning

**Date:** April 20, 2016

**Subject:** Mobility Benefits Resulting from the Implementation of a Transit Priority Lane on Guadalupe between Martin Luther King, Jr Blvd and 29th St (the Drag)

## Introduction

Research shows that transit priority lanes can carry more passengers per lane than general traffic lanes, thereby improving the efficiency and equity of the overall transportation system, especially in congested corridors. Bus lanes also improve the operating efficiency of transit service, which directly benefits riders by improving travel times and allowing for the reinvestment of operations cost savings into transit service improvements. Ultimately, such improvements attract more riders to transit, further benefiting the overall transportation system.

## Corridor Ridership Overview

The majority of riders onboard transit vehicles operating in the Drag corridor are making trips that begin or end in that corridor. As Table 1 below illustrates, on an average weekday about 5,150 people board a bus on the Drag. Additionally, as a major north/south roadway, a significant number of riders onboard buses operating in the Drag are riding through the corridor, destined for another location. On an average weekday, transit carries up to 6,950 people travelling northbound and up to 7,250 people traveling southbound on the Drag.

Table 1

| | |
|---|---|
| Average Daily Ridership at Stops in Corridor | 5,150 |
| Average Daily Passengers Onboard Transit in Corridor - Northbound | 5,400-6,950 |
| Average Daily Passengers Onboard Transit in Corridor - Southbound | 5,550-7,250 |

Source: Capital Metro Automatic Passenger Count (APC) data, 2014-15

**Research on Elasticity of Demand**

Travel time savings directly benefit transit users in two ways: by reducing trip times for riders, and by producing operations cost savings that allow for investment in service improvements, such as frequency, at no additional cost. Research on the elasticity of transit use with respect to in-vehicle travel time shows that the elasticity is -0.4 to -.06. This means that a 10% reduction in travel time will typically result in a 4-6% increase in ridership. Additionally, research on the elasticity of transit use with respect to service frequency averages 0.5. This means that a 10% increase in frequency will typically result in a 5% increase in ridership.

**Application of Research to the Drag**

Transit priority lanes on the Drag would be approximately 1-mile in length. Industry research shows that (on average) travel time savings of 1-11 minutes per mile can be achieved from the implementation of a dedicated bus lane. In this case, we have assumed a conservative estimate of 1-3 minute per mile time savings, and have applied this assumption to estimate ridership as follows:

Estimating Ridership Based on Travel Time Savings

Using the elasticity of demand for transit use with respect to travel time, the travel time savings resulting from the implementation of a bus lane on the Drag would result in an additional 570-850 daily riders on routes serving the corridor, translating to an additional 145,100-217,700 annual riders on those routes (Table 2 & Appendix).

Table 2

| | |
|---|---|
| Travel Time Savings per Mile | 1-3 minutes |
| Elasticity of Demand: Travel Time Savings | -0.4 to -0.6 |
| Projected Daily Ridership Increase due to Travel Time Savings | 570 - 850 riders |
| Projected Annual Ridership Increase due to Travel Time Savings | 145,100 - 217,700 riders |

Estimating Ridership Based on Operations Cost Savings

That same 1-3 minute per mile in travel time savings would also result in significant operations cost savings. As Table 3 illustrates, Capital Metro's current operations cost per hour of transit service averages $76. With 1,400 transit trips operating in the corridor, a 1-3 minute savings would result in a daily operations cost savings of $1,770-$5,300, and an annual operations cost savings of $451K-$1.3 million. In other words, each minute of travel time savings yields a cost savings of approximately $451K/year. As mentioned above, these operations cost savings would be reinvested in service improvements, like frequency, that would also increase ridership.

Table 3

| | |
|---|---|
| Operations Cost per Hour | $76 |
| Total Daily Trips Operating in the Corridor (2015) | 1,400 |
| Travel Time Savings per Mile | 1-3 minutes |
| Daily Operational Cost Savings (1-3 min x 1 mi x $76) | $1,770 - $5,300 |
| Annual Operations Cost Savings (255 Weekdays) | $451,350 - $1,351,500 |

The twenty different bus routes that serve the Drag operate different distances and levels of service, and, as a result, an infusion of a given number of operating hours would have a different effect on the frequency of each route. This reality makes calculating ridership using the frequency elasticity unfeasible. However, knowing that the research shows that frequency improvements will increase ridership, and given Capital Metro's own recent experience demonstrating this relationship, we can propose a projected ridership gain from frequency improvements using the expected operations costs savings.

In June 2015, Capital Metro improved the frequency of five local routes. On average, for each hour of service invested in improving the frequency of those routes, ridership increased by 15 riders/hour. As was illustrated in Table 3, a 1-3 minute reduction in transit travel time through the Drag would save Capital Metro $451K-$1.3 million in annual operating costs. At a per-hour cost of $76, these savings would result in 5,930-17,780 annual hours of service saved (Table 4). Using the 15 riders/hour gain observed above, Capital Metro could expect an 88,950-266,700 annual increase in ridership by investing those hours back into the transit system.

Table 4

| | |
|---|---|
| Travel Time Savings per Mile | 1-3 minutes |
| Annual Hours of Service Saved (Annual Operations Cost ÷ Operations Cost per Hour) | 5,930 - 17,780 hours |
| Projected Annual Ridership Increase due to Frequency Improvements (Annual Hours of Service Saved x 15 riders/hr.) | 88,950 – 266,700 riders |

**Conclusions**

The implementation of a transit priority lane on the Drag would be a boon for the thousands of individuals that travel by bus along that corridor every day. Current transit users would experience a faster ride and better quality of service. What's more, an estimated 500K new riders annually could benefit from the bus lane, having been attracted to the service based on travel time savings and frequency improvements. Such a shift in ridership towards transit would also benefit the overall transportation system by carrying more passengers per lane through a congested corridor.

**Supporting Research**

http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_rpt_90v2.pdf
http://onlinepubs.trb.org/onlinepubs/tcrp/tcrp_syn_83.pdf
http://www.vtpi.org/blw.pdf
http://www.vtpi.org/tranelas.pdf
http://eprints.whiterose.ac.uk/2034/1/ITS23_The_demand_for_public_transport_UPLOADABLE.pdf

## Appendix

| Route | One-way Travel Time (Minutes)* | One-Way Travel Time Savings in Corridor (Minutes)** | % of One-Way Travel Time Saved | Elasticity of Demand for Travel Time Savings - Low | Elasticity of Demand for Travel Time Savings - High | Ridership Increase (%) - Low | Ridership Increase (%) - High | Average Daily Ridership (August 2015) | Projected Daily Ridership Increase - Low | Projected Daily Ridership Increase - High | Projected Annual Ridership Increase (255 Weekdays) - Low | Projected Annual Ridership Increase (255 Weekdays) - High |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 116 | 3 | 2.6% | 0.4 | 0.6 | 1.0% | 1.6% | 6,204 | 64 | 96 | 16,366 | 24,549 |
| 3 | 100 | 3 | 3.0% | 0.4 | 0.6 | 1.2% | 1.8% | 4,046 | 49 | 73 | 12,382 | 18,572 |
| 5 | 90 | 2 | 2.2% | 0.4 | 0.6 | 0.9% | 1.3% | 2,498 | 22 | 33 | 5,663 | 8,494 |
| 18 | 37 | 0.5 | 1.4% | 0.4 | 0.6 | 0.5% | 0.8% | 1,153 | 6 | 9 | 1,590 | 2,384 |
| 19 | 56 | 3 | 5.4% | 0.4 | 0.6 | 2.1% | 3.2% | 785 | 17 | 25 | 4,288 | 6,432 |
| 21/22 | 76 | 1 | 1.3% | 0.4 | 0.6 | 0.5% | 0.8% | 621 | 3 | 5 | 834 | 1,251 |
| 410 | 16 | 1 | 6.3% | 0.4 | 0.6 | 2.5% | 3.8% | 643 | 16 | 24 | 4,101 | 6,151 |
| 412 | 10 | 0.25 | 2.5% | 0.4 | 0.6 | 1.0% | 1.5% | 225 | 2 | 3 | 574 | 861 |
| 481 | 30 | 1.5 | 5.0% | 0.4 | 0.6 | 2.0% | 3.0% | 193 | 4 | 6 | 985 | 1,478 |
| 640 | 17 | 1.5 | 8.8% | 0.4 | 0.6 | 3.5% | 5.3% | 3,588 | 127 | 190 | 32,292 | 48,438 |
| 642-sb | 21 | 0.25 | 1.2% | 0.4 | 0.6 | 0.5% | 0.7% | 3,651 | 17 | 26 | 4,433 | 6,650 |
| 661 | 20 | 1 | 5.0% | 0.4 | 0.6 | 2.0% | 3.0% | 2,663 | 53 | 80 | 13,582 | 20,373 |
| 663-sb | 15 | 0.5 | 3.3% | 0.4 | 0.6 | 1.3% | 2.0% | 1,154 | 15 | 23 | 3,922 | 5,883 |
| 801 | 97 | 3 | 3.1% | 0.4 | 0.6 | 1.2% | 1.9% | 6,057 | 75 | 112 | 19,107 | 28,660 |
| 803 | 69 | 3 | 4.3% | 0.4 | 0.6 | 1.7% | 2.6% | 3,524 | 61 | 92 | 15,630 | 23,445 |
| 982 | 47 | 3 | 6.4% | 0.4 | 0.6 | 2.6% | 3.8% | 867 | 22 | 33 | 5,643 | 8,464 |
| 983 | 74 | 3 | 4.1% | 0.4 | 0.6 | 1.6% | 2.4% | 538 | 9 | 13 | 2,223 | 3,334 |
| 987 | 86 | 3 | 3.5% | 0.4 | 0.6 | 1.4% | 2.1% | 327 | 5 | 7 | 1,162 | 1,743 |
| 990 | 76 | 3 | 3.9% | 0.4 | 0.6 | 1.6% | 2.4% | 90 | 1 | 2 | 362 | 544 |
| | | | **Projected Total Ridership Increase due to Travel Time Savings:** | | | | | | **569** | **854** | **145,138** | **217,708** |

* Travel time for NB trip at noon used as standard, except for late-night routes (midnight used), Express routes 987 & 990 (first afternoon trip used), and routes that only run southbound in the corridor (SB noon trip used)

** Travel time savings for Late-Night services reduced by half due to lower traffic volumes during their operating hours

# DID YOU KNOW...

**20** METRO Routes operate in the drag corridor

- 2 MetroRapid
- 4 MetroExpress
- 4 UT Shuttle
- 10 MetroBus

AND

Each weekday almost **14,000 people** move through the corridor

carried on **1,400** buses

WELL

**That's a LOT of people in a relatively small amount of space!**

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## So why are  TRANSIT-PRIORITY LANES  so great?

**Because they keep transit out of congestion so it can move**

## FASTER

**It's a party on the bus!**

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## Faster Service = *More* Transit Riders

### *WHY IS THAT?*

**Transit-priority** lanes on the Drag will save CapMetro buses up to

**3 MINUTES**

in travel time through the corridor

**3 minutes** may not seem like much, but research shows that time savings **alone** will attract

**218,000**

new riders annually to the corridor!

### *WHAT ELSE?*

## Faster Service = *More $$$* to spend on service improvements :)

**3 minute** time savings from the transit priority lane will save up to **$1.2 million** per year!

**$1.2 million** reinvested in frequency improvements will attract up to

**260,000**

additional trips across the transit system!

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### *SO, TO RECAP...*

Transit-priority lanes on the Drag will result in **FASTER, BETTER** transit service that will add almost

**500,000**

total new rides on transit annually

That's more people out of cars and in buses alleviating congestion improving **mobility** options for all travelers

***Go Metro Go Metro Go! Go Metro Go Metro Go!***

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# Northbound Bus Volumes & Passenger Loads

## Guadalupe from MLK Jr Blvd to 29th St















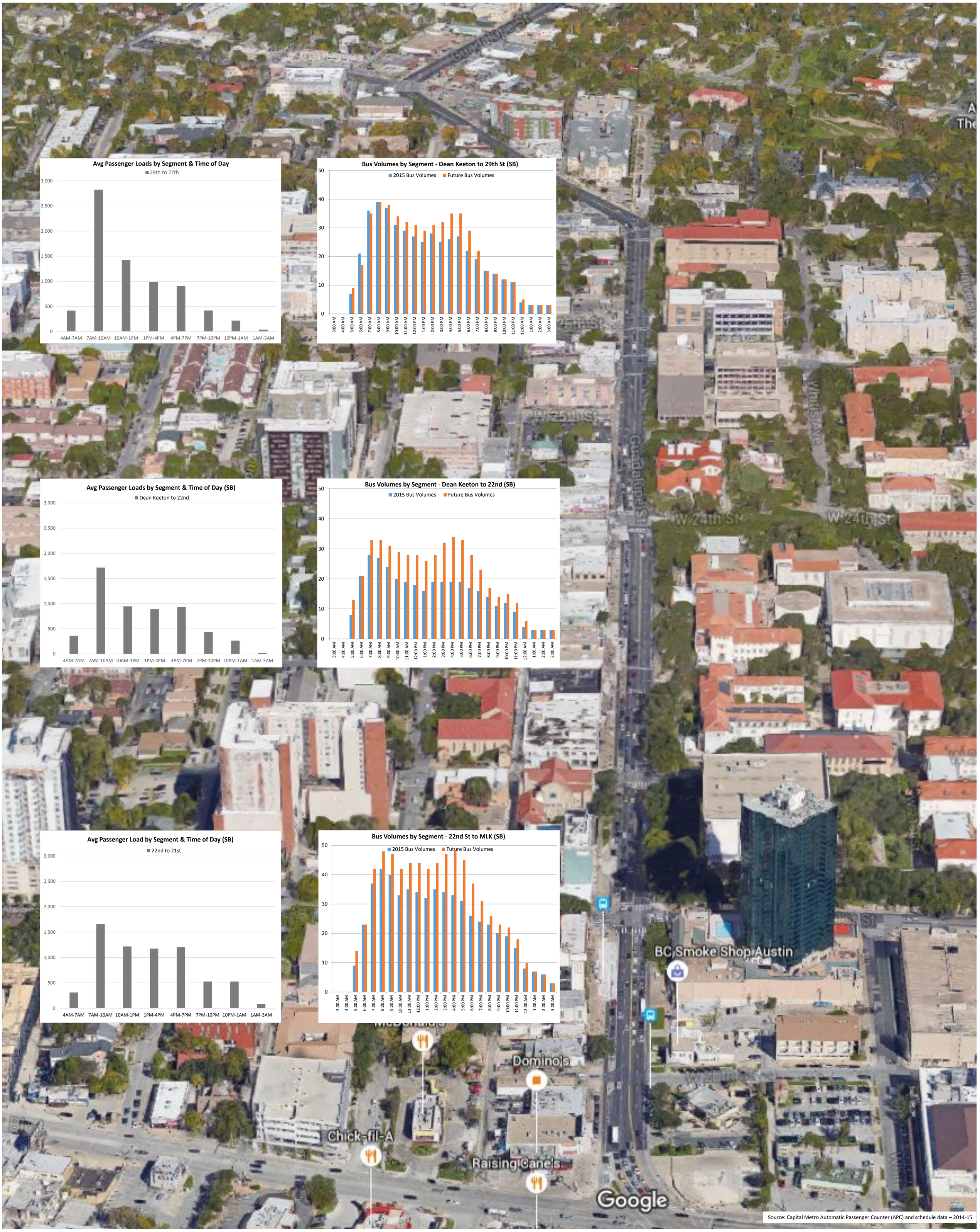





Source: Capital Metro Automatic Passenger Counter (APC) and schedule data – 2014-15

# Southbound Bus Volumes & Passenger Loads

## Guadalupe from MLK Jr Blvd to 29th St




Source: Capital Metro Automatic Passenger Counter (APC) and schedule data – 2014-15