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Memorandum

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From: Stella Nepal, Texas A&M Transportation Institute

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Texas A&M Transportation Institute

Subject: 2017/2018 San Antonio Workplace Tech Memo to Modelers

The purpose of this memo is to transmit the following information:

1. Estimates of internal attractions and rates;
2. Estimates of internal non-resident travel;
3. Estimates of internal commercial vehicle travel; and
4. Estimates of attraction rates from the special generator travel surveys.

2017/2018 San Antonio Workplace Surveys

The San Antonio workplace surveys were conducted during the period of August 2017 through February 2018. The study area is located in south central Texas, which covers five counties — Bexar, Comal, Guadalupe, Kendall, and Wilson. The Texas Department of Transportation (TxDOT) contracted with Gram Traffic Consulting Inc. (GRAM) to conduct the surveys. These surveys collected data on the travel characteristics of employees and non-employees at randomly selected basic, retail, service, and education establishments. These data will enable TxDOT, in cooperation with the Alamo Area Metropolitan Planning Organization (AAMPO), to develop and/or update trip attraction models to forecast travel demand within the San Antonio study area.

The San Antonio workplace survey consisted of the following data collection efforts.

1. Establishment Survey. This survey determined whether the workplace was free standing (i.e., vehicle access points and parking serve that workplace only) or non-free standing (i.e., vehicle access points and parking serve more than one establishment). Data on total employment, number of employees at work, and other general information were collected in this survey.
2. Intercept Interview Survey. This survey involved an intercept interview of persons as they entered or exited the establishment. All survey participants were randomly selected and included both employees and non-employees.
3. Person or Vehicle Count. This task involved counting all vehicles that entered or exited the establishment using Accumulative Count Recorders (ACRs), in addition to video cameras. For those sites not suitable for vehicle counts, manual counts of persons and/or vehicles were conducted.
4. School Count. This task included the option to use an alternative person-count methodology to help address the potential difficulty of accurately counting individual students as they leave the premises in groups, to alleviate the concerns of school officials regarding unknown adults stationed in areas frequented by students, and to avoid vehicle counts that may be inaccurate due to the prevalence of walk and bike trips to/from some schools. Person counts at elementary schools, middle schools, and high schools may be obtained from the principal's office or other school administrator if the total number of individuals (employees plus students plus any other visitors) is recorded by the school on the survey day. This person count total should be multiplied by two to reflect the "in" and "out" counts that would normally be conducted at the school. This count methodology, however, was not employed in the San Antonio workplace survey. School bus and commercial vehicles counts were manually conducted to ensure being captured at schools.
5. Commercial Vehicle (CV) Count. This task involved counting the number of CVs accessing the establishment (i.e., making deliveries or pick-ups or other purposes) using ACRs, video cameras, or manual counts.

The survey sample was drawn from the InfoGroup database containing business listings for the six-county study area and the businesses were randomized in the order that they appeared on the list for recruitment.

The sampling plan sought to obtain 200 full surveys and 200 partial surveys. Full survey sites included all the previously mentioned data collection activities, while partial survey sites only collected general information (i.e., establishment survey) and did not include intercept interview surveys. Counts were conducted at all surveyed sites.

The actual survey sample consisted of 192 full surveys and 196 partial surveys. There were 17 establishments that were surveyed in two counties – Medina and Atascosa. These sites were excluded from the analysis as these were located outside the AAMPO TAZ boundary, and important information on employment, area types, and zones for these establishments were not readily available.

A total of 1,993 employee surveys and 3,900 visitor surveys were analyzed. The surveyed employees represented approximately 88 percent of the total 3,439 employees reported to be at work during the travel survey day.

Table 1 shows the number of full and partial surveys by employment category and establishment type. Table 2 provides the workplace survey key data summary by employment category.

Table 1. Full and Partial Surveys by Employment Category and Establishment Type.

| Employment Category | Full Survey | | | Partial Survey | | | All Surveys | | |
|---------------------|-----------------|------------------|------------|-----------------|------------------|------------|-----------------|------------------|------------|
| | FS ¹ | NFS ¹ | Total | FS ¹ | NFS ¹ | Total | FS ¹ | NFS ¹ | Total |
| Basic | 18 | 21 | 39 | 25 | 14 | 39 | 43 | 35 | 78 |
| Retail | 20 | 47 | 67 | 28 | 40 | 68 | 48 | 87 | 135 |
| Service | 26 | 34 | 60 | 33 | 27 | 60 | 59 | 61 | 120 |
| Education | 21 | 5 | 26 | 28 | 1 | 29 | 49 | 6 | 55 |
| Total | 85 | 107 | 192 | 114 | 82 | 196 | 199 | 189 | 388 |

¹ FS - Free Standing, NFS – Non-Free Standing.

Table 2. San Antonio Workplace Survey Key Data Summary.

| Data Elements | Basic | Retail | Service | Education | Total |
|------------------------|--------------|---------------|----------------|------------------|--------------|
| Number of sites | 78 | 135 | 120 | 55 | 388 |
| Total employment | 1,275 | 2,186 | 1,567 | 4,204 | 9,232 |
| Employees at work | 760 | 1,428 | 1,372 | 4,184 | 7,744 |
| Total person count | 3,022 | 51,908 | 10,271 | 5,600 | 70,801 |
| Total vehicle count | 3,654 | 26,712 | 7,701 | 46,032 | 84,099 |
| Total CV count | 289 | 482 | 284 | 314 | 1,369 |
| Total school bus count | - | - | 4 | 2,164 | 2,168 |
| Employee surveys | 184 | 424 | 362 | 1,023 | 1,993 |
| Visitor surveys | 427 | 2,784 | 417 | 272 | 3,900 |
| CV surveys | 28 | 98 | 34 | 17 | 177 |

Note: Count data represent actual number counted at the establishments.

Estimates of Internal Trip Attractions

The employee and visitor trip data from the workplace survey were aggregated for each site and then linked with the employment and count data from the establishment survey. The total trips were analyzed separately for employees and visitors, and residents and non-residents of the San Antonio study area were identified. The total trips for each site were classified by purpose, both from the origin to the workplace and from the workplace to the next destination, and by person and auto-driver modes of travel. Auto-driver trips included all trips by drivers of automobiles and commercial cargo and service vehicles. Person trips included all modes, including walking and bicycle trips.

The trip purposes of interest to travel demand models are Home Based Work – HBW; Home Based Non-Work – HBNW Retail; HBNW Education (K-12); HBNW Other (Basic and Service); Non-Home Based – NHB; External (EXT); and Non-Resident (NON-RES) trips. Please refer to the 2017/2018 San Antonio Workplace and Special Generator Travel Survey Technical Summary report for the definitions and details.

Table 3 and Table 4 present the person and auto-driver attraction rates by employment category and trip purpose, as calculated from the survey trip data. Table 5 and Table 6 provide the attraction rates by trip purpose, area type and employment category. The attraction rates were developed by dividing the total person and auto-driver trips by the total employment for all surveyed sites for each trip purpose. The NHB trip attractions represented the average of NHB trips at the origins and destinations. The NON-RES trips were divided by two to develop a rate for non-resident trip attractions. The external trips were removed from the analysis because these trips were estimated using the external survey and input to the travel demand model directly.

Table 3. San Antonio Workplace Survey Person Trip Attraction Rates by Employment Category and Trip Purpose.

| Employment Category | HBW | HBNW | NHB | NON-RES |
|---------------------|-------|--------|-------|---------|
| Basic | 1.064 | 3.140 | 0.768 | 0.160 |
| Retail | 1.173 | 25.017 | 5.933 | 0.695 |
| Service | 1.545 | 7.691 | 1.627 | 0.221 |
| Education | 1.769 | 10.987 | 1.571 | 0.006 |

Table 4. San Antonio Workplace Survey Auto-Driver Trip Attraction Rates by Employment Category and Trip Purpose.

| Employment Category | HBW | HBNW | NHB | NON-RES |
|---------------------|-------|--------|-------|---------|
| Basic | 0.987 | 2.377 | 0.605 | 0.100 |
| Retail | 1.047 | 18.039 | 4.315 | 0.430 |
| Service | 1.403 | 5.835 | 1.267 | 0.135 |
| Education | 1.616 | 8.046 | 1.175 | 0.006 |

Table 5. San Antonio Workplace Survey Observed, Unbalanced Person Trip Attraction Rates by Trip Purpose, Area Type and Employment Category.

| Trip Purpose | Area Type | Trips Per Employee | | | |
|--------------|------------|--------------------|---------|---------|-----------|
| | | Basic | Retail | Service | Education |
| HBW | CBD | 0.000* | 1.000 | 1.653 | 0.000* |
| | CBD Fringe | 0.653 | 1.086 | 1.560 | 1.937 |
| | Urban | 1.637 | 1.343 | 1.519 | 1.778 |
| | Suburban | 1.337 | 1.021 | 1.567 | 1.655 |
| | Rural | 1.467 | 1.190 | 1.319 | 1.638 |
| HBNW | CBD | 0.000* | 1.250* | 7.996 | 0.000* |
| | CBD Fringe | 2.215 | 23.568 | 9.878 | 9.293 |
| | Urban | 2.905 | 25.313 | 8.480 | 11.647 |
| | Suburban | 5.145* | 25.621 | 3.587* | 11.651 |
| | Rural | 5.685* | 40.778* | 6.959 | 5.560* |
| NHB | CBD | 0.000* | 1.563* | 1.701 | 0.000* |
| | CBD Fringe | 0.469 | 5.429 | 1.962 | 1.771 |
| | Urban | 0.684 | 5.890 | 1.581 | 1.832 |
| | Suburban | 1.526* | 6.437 | 1.140 | 1.143 |
| | Rural | 1.165* | 10.846* | 3.666* | 0.918* |
| NON-RES | CBD | 0.000* | 0.000* | 0.256 | 0.000* |
| | CBD Fringe | 0.039 | 0.624 | 0.204 | 0.000* |
| | Urban | 0.000* | 0.376 | 0.263 | 0.002 |
| | Suburban | 0.436 | 0.783 | 0.179 | 0.015 |
| | Rural | 1.025* | 7.082* | 0.005* | 0.010 |

Note: Attraction rates represent observed rates. *The low/high rates in the CBD and Rural area types for Basic and Retail trips were the result of a small sample, or were the case of a low/high number of observations relative to the total employment for Basic and Service trips in the Suburban area type. The null trip rates at CBD Basic and Education were due to surveys not being conducted at these locations, or there were no observations for the particular trip purpose (i.e., NON-RES at Basic Urban and Education CBD Fringe).

Table 6. San Antonio Workplace Survey Observed, Unbalanced Auto-Driver Trip Attraction Rates by Trip Purpose, Area Type and Employment Category.

| Trip Purpose | Area Type | Trips Per Employee | | | |
|--------------|------------|--------------------|---------|---------|-----------|
| | | Basic | Retail | Service | Education |
| HBW | CBD | 0.000* | 1.000 | 1.620 | 0.000* |
| | CBD Fringe | 0.596 | 0.982 | 1.433 | 1.581 |
| | Urban | 1.576 | 1.179 | 1.308 | 1.694 |
| | Suburban | 1.210 | 0.918 | 1.504 | 1.546 |
| | Rural | 1.322 | 1.141 | 1.227 | 1.511 |
| HBNW | CBD | 0.000* | 0.714* | 5.993 | 0.000* |
| | CBD Fringe | 1.649 | 16.885 | 7.434 | 6.755 |
| | Urban | 2.219 | 18.153 | 6.480 | 8.433 |
| | Suburban | 3.993* | 18.854 | 2.721* | 8.685 |
| | Rural | 4.100* | 29.248* | 5.323 | 4.171* |
| NHB | CBD | 0.000* | 0.893* | 1.310 | 0.000* |
| | CBD Fringe | 0.363 | 3.961 | 1.523 | 1.313 |
| | Urban | 0.568 | 4.221 | 1.245 | 1.332 |
| | Suburban | 1.191 | 4.787 | 0.871 | 0.907 |
| | Rural | 0.889 | 7.753* | 2.844* | 0.722 |
| NON-RES | CBD | 0.000* | 0.000* | 0.144 | 0.000* |
| | CBD Fringe | 0.039 | 0.362 | 0.129 | 0.000* |
| | Urban | 0.000* | 0.235 | 0.152 | 0.002 |
| | Suburban | 0.266 | 0.489 | 0.119 | 0.015 |
| | Rural | 0.539 | 4.709* | 0.005* | 0.006 |

Note: Attraction rates represent observed rates. *The low/high rates in the CBD and Rural area types for Basic and Retail trips were the result of a small sample, or were the case of a low/high number of observations relative to the total employment for Basic and Service trips in the Suburban area type. The null trip rates at CBD Basic and Education were due to surveys not being conducted at these locations, or there were no observations for the particular trip purpose (i.e., NON-RES at Basic Urban and Education CBD Fringe).

Table 7 provides the employment estimates for San Antonio that served as the basis to estimate the total trip attractions and to develop the attraction rates by employment type and area type. These estimates were obtained from the AAMPO 2017 zonal demographic data.

Table 7. Total Employment in the San Antonio Study Area by Area Type and Employment Category.

| Area Type | Total Employment | | | | Total |
|--------------|------------------|----------------|----------------|------------------|------------------|
| | Basic | Retail | Service | Education (K-12) | |
| CBD | 3,966 | 12,603 | 30,718 | 315 | 47,602 |
| CBD Fringe | 166,027 | 96,930 | 195,272 | 12,943 | 471,172 |
| Urban | 60,726 | 81,471 | 103,883 | 18,470 | 264,550 |
| Suburban | 72,443 | 47,088 | 66,728 | 17,488 | 203,747 |
| Rural | 19,557 | 11,140 | 13,546 | 4,460 | 48,703 |
| Total | 322,719 | 249,232 | 410,147 | 53,676 | 1,035,774 |

Source: AAMPO, 2017 TAZ employment estimates.

The attraction rates by employment category and trip purpose from the workplace surveys, shown in Table 3 and Table 4, were then multiplied by the employment estimates from Table 7 to calculate the total person attractions and total auto-driver attractions for the study area. It is important to note that the person trip attractions generated at the Education establishments appeared low and under-estimated. The counts conducted at the schools were either of persons or vehicles, and school buses. Only 7 out of the total 55 schools that were surveyed conducted person counts and 48 schools had vehicles counted. It was apparent that the student bus riders were not being captured from the vehicle counts, since person trips were estimated based on the average vehicle occupancy. With 2,164 school buses reported to have entered and exited the schools during the travel survey day, and assuming an average occupancy of 35 persons per school bus, a substantial amount of 75,740 school person trips were generated from this mode. To ensure that students were not counted twice, only those school buses in schools where vehicle counts were conducted, totaling 1,180 school buses, should be included in the conversion. The resulting estimate was 65,800 person trips, which when converted to attractions yield a total of 32,900 HBNW school person trips. This estimate was added to the HBNW person trip originally estimated from the survey, and the average HBNW Education person attraction rate increased from 10.987 to 18.813 school person trips per employee.

Table 8 and Table 9 provide the estimated total person and auto-driver attractions by trip purpose for each category of employment, respectively.

Table 8. San Antonio Study Area Total Person Trip Attractions by Employment Category and Trip Purpose.

| Employment Category | HBW | HBNW | NHB | NON-RES | Total |
|---------------------|------------------|-------------------|------------------|----------------|-------------------|
| Basic | 343,373 | 1,013,338 | 247,848 | 51,635 | 1,656,194 |
| Retail | 292,349 | 6,235,037 | 1,478,693 | 173,092 | 8,179,171 |
| Service | 633,677 | 3,154,441 | 667,309 | 90,437 | 4,545,864 |
| Education (K to12) | 94,953 | 1,009,807* | 84,325 | 322 | 1,189,406 |
| Total | 1,364,352 | 11,412,622 | 2,478,176 | 315,486 | 15,570,636 |

*School bus person trips were added to the HBNW Education attractions to account for the students that were transported by school buses and were not captured from the vehicle counts.

Table 9. San Antonio Study Area Total Auto-Driver Trip Attractions by Employment Category and Trip Purpose.

| Employment Category | HBW | HBNW | NHB | NON-RES | Total |
|---------------------|------------------|------------------|------------------|----------------|-------------------|
| Basic | 318,524 | 767,103 | 195,245 | 32,111 | 1,312,982 |
| Retail | 260,946 | 4,495,896 | 1,075,436 | 107,045 | 5,939,323 |
| Service | 575,436 | 2,393,208 | 519,656 | 55,165 | 3,543,465 |
| Education (K to12) | 86,740 | 431,877 | 63,069 | 322 | 582,009 |
| Total | 1,241,646 | 8,088,084 | 1,853,407 | 194,643 | 11,377,779 |

Table 10 and Table 11 provide the person and auto-driver attraction rates by trip purpose, area type, and employment category, respectively. The sample at the CBD and Rural area types were significantly less compared to the other area types. In particular, there was only one sample at the Retail CBD category that generated a low trip rate given its minimum employment and negligible count at the site. There were no observations at Basic CBD and Education CBD categories, which resulted in null trip rates. To address the variability in the rates across area types, the low and null trip rates were set to equal the overall average attraction rate within the same employment category. The trip rates were then adjusted to balance with the aggregate attraction estimates for each category.

Table 10. San Antonio Workplace Survey Adjusted, Unbalanced Person Trip Attraction Rates by Purpose, Area Type, and Employment Category.

| Trip Purpose | Area Type | Trips Per Employee | | | |
|------------------|------------|--------------------|---------|---------|-----------|
| | | Basic | Retail | Service | Education |
| HBW | CBD | 1.064* | 1.000 | 1.653 | 1.769* |
| | CBD Fringe | 0.653 | 1.086 | 1.560 | 1.937 |
| | Urban | 1.637 | 1.343 | 1.519 | 1.778 |
| | Suburban | 1.337 | 1.021 | 1.567 | 1.655 |
| | Rural | 1.467 | 1.190 | 1.319 | 1.638 |
| HBNW Retail | CBD | | 25.017* | | |
| | CBD Fringe | | 23.568 | | |
| | Urban | | 25.313 | | |
| | Suburban | | 25.621 | | |
| | Rural | | 25.017* | | |
| HBNW Other | CBD | 3.140* | | 7.996 | |
| | CBD Fringe | 2.215 | | 9.878 | |
| | Urban | 2.905 | | 8.480 | |
| | Suburban | 5.145 | | 7.691* | |
| | Rural | 5.685 | | 6.959 | |
| HBNW School** | CBD | | | | 18.813* |
| | CBD Fringe | | | | 13.924** |
| | Urban | | | | 20.038** |
| | Suburban | | | | 20.655** |
| | Rural | | | | 16.410** |
| NHB | CBD | 0.768* | 5.933* | 1.701 | 1.571* |
| | CBD Fringe | 0.469 | 5.429 | 1.962 | 1.771 |
| | Urban | 0.684 | 5.890 | 1.581 | 1.832 |
| | Suburban | 0.768* | 6.437 | 1.140 | 1.143 |
| | Rural | 0.768* | 5.933* | 1.627* | 0.918 |
| NON-RES | CBD | 0.160* | 0.700* | 0.256 | 0.006* |
| | CBD Fringe | 0.039 | 0.624 | 0.204 | 0.006* |
| | Urban | 0.160* | 0.376 | 0.263 | 0.002 |
| | Suburban | 0.436 | 0.783 | 0.179 | 0.015 |
| | Rural | 1.025 | 0.700* | 0.230* | 0.010 |

Note: Attraction rates represent adjusted and unbalanced rates. *Rates indicate null or limited observations and were replaced with the overall average rate within the same employment category to address the variability of rates across area types. **The HBNW School rates include school bus person attractions to account for the students transported by school buses that were not captured from the vehicle counts.

Table 11. San Antonio Workplace Survey Adjusted, Unbalanced Auto-Driver Trip Attraction Rates by Purpose, Area Type, and Employment Category.

| Trip Purpose | Area Type | Trips Per Employee | | | |
|----------------|------------|--------------------|---------|---------|-----------|
| | | Basic | Retail | Service | Education |
| HBW | CBD | 0.987* | 1.000 | 1.620 | 1.616* |
| | CBD Fringe | 0.596 | 0.982 | 1.433 | 1.581 |
| | Urban | 1.576 | 1.179 | 1.308 | 1.694 |
| | Suburban | 1.210 | 0.918 | 1.504 | 1.546 |
| | Rural | 1.322 | 1.141 | 1.227 | 1.511 |
| HBNW Retail | CBD | | 18.039* | | |
| | CBD Fringe | | 16.885 | | |
| | Urban | | 18.153 | | |
| | Suburban | | 18.854 | | |
| | Rural | | 18.039* | | |
| HBNW Other | CBD | 2.377 | | 5.993 | |
| | CBD Fringe | 1.649 | | 7.434 | |
| | Urban | 2.219 | | 6.480 | |
| | Suburban | 3.993 | | 5.835* | |
| | Rural | 4.100 | | 5.323 | |
| HBNW School | CBD | | | | 8.046* |
| | CBD Fringe | | | | 6.755 |
| | Urban | | | | 8.433 |
| | Suburban | | | | 8.685 |
| | Rural | | | | 4.171 |
| NHB | CBD | 0.605* | 4.315* | 1.310 | 1.175* |
| | CBD Fringe | 0.363 | 3.961 | 1.523 | 1.313 |
| | Urban | 0.568 | 4.221 | 1.245 | 1.332 |
| | Suburban | 0.605* | 4.787 | 0.871 | 0.907 |
| | Rural | 0.605* | 4.315* | 1.267* | 0.722 |
| NON-RES | CBD | 0.100* | 0.430* | 0.144 | 0.006* |
| | CBD Fringe | 0.039 | 0.362 | 0.129 | 0.006* |
| | Urban | 0.100* | 0.235 | 0.152 | 0.002 |
| | Suburban | 0.266 | 0.489 | 0.119 | 0.015 |
| | Rural | 0.539 | 0.430* | 0.135* | 0.006 |

Note: Attraction rates represent adjusted and unbalanced rates. *Rates indicate null or limited observations and were replaced with the overall average rate within the same employment category to address the variability of rates across area types.

Table 12 provides a summary of the travel estimates from the San Antonio workplace and commercial vehicle travel surveys. The San Antonio Household Travel Survey is currently underway. . The final recommended attraction rates will be developed in coordination with travel demand model development. This coordination will include finalization of employment variables and household trip making variables (productions) necessary for developing balanced attraction rates which reflect internal trip productions.

The HBNW school person trip attractions included school bus person trips to account for the students that were transported by school buses and not captured by the vehicle counts. The workplace CV attractions, with school buses and CVs combined, represented approximately 25 percent of the total 468,341 CV internal trips estimated from the San Antonio CV Survey.

Table 12. Travel Estimates from the 2017/2018 San Antonio Travel Surveys.

| Trip Purpose | Workplace Survey (2017/2018) | | Household Survey (2018) | | Commercial Vehicle Survey (2018/2019) |
|--------------------------|---------------------------------|--------------------------|----------------------------|--------------------------|---|
| | Person Trips | Auto- Driver Trips | Person Trips | Auto- Driver Trips | CV Trips |
| HBW | 1,364,352 | 1,241,646 | NA | NA | - |
| HBNW Retail | 6,235,037 | 4,495,896 | NA | NA | - |
| HBNW Other | 4,167,778 | 3,160,311 | NA | NA | - |
| HBNW Education (K to 12) | 1,009,807* | 431,877 | NA | NA | - |
| NHB | 2,478,176 | 1,853,407 | NA | NA | - |
| NON-RES | 315,486 | 194,643 | - | - | - |
| All Purposes | 15,570,636 | 11,377,780 | NA | NA | - |
| School Bus Trips | | 14,338 | | | |
| Commercial Vehicle Trips | | 103,224 | - | - | 468,341 |

*The HBNW Education person trip attractions include school bus person trips to account for the students that were transported by school buses and were not captured from the vehicle counts. NA – Not available.

Estimates of Internal Non-Resident Travel

In the same manner as trip attractions, the number of non-resident trips estimated for the surveyed sites were calculated, summed, and divided by the total employment. The resulting rates were applied to the study area’s total employment data to develop an estimate of the total number of internal trips made by persons that did not live in the San Antonio study area. The total non-resident trips from the San Antonio workplace survey when converted to trip productions and trip attractions yield an estimate of 315,486 person trips and 194,643 auto-driver trips.

Estimates of Internal Commercial Vehicle Travel

The CV and school bus counts from the workplace survey were aggregated by area type and employment and then divided by the total employment for all surveyed sites to develop the CV rates by area type and employment category. The average attraction rates were applied to the total employment estimates for the San Antonio study area to establish the total CV attractions by employment category. Table 13 provides the observed CV and school bus attraction rates by area type and total attractions for each category of employment.

Table 13. San Antonio Workplace Survey CV and School Bus Trip Estimates.

| Area Type | Commercial Vehicle Trips Per Employee | | | | School Bus Trips Per Employee | | | |
|--------------------------------|--|---------------|---------------|--------------|----------------------------------|--------------|--------------|---------------|
| | Basic | Retail | Service | Education | Basic | Retail | Service | Education |
| CBD | 0.000 | 0.000 | 0.067 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 |
| CBD Fringe | 0.039 | 0.056 | 0.112 | 0.042 | 0.000 | 0.000 | 0.000 | 0.167 |
| Urban | 0.166 | 0.118 | 0.097 | 0.038 | 0.000 | 0.000 | 0.003 | 0.262 |
| Suburban | 0.239 | 0.182 | 0.045 | 0.033 | 0.000 | 0.000 | 0.000 | 0.307 |
| Rural | 0.115 | 0.222 | 0.250 | 0.030 | 0.000 | 0.000 | 0.000 | 0.310 |
| Average Attraction Rate | 0.113 | 0.110 | 0.091 | 0.037 | 0.000 | 0.000 | 0.001 | 0.257 |
| Total Attractions | 36,629 | 27,416 | 37,118 | 2,013 | 0 | 0 | 615 | 13,875 |

Note: Attraction rates represent observed and unbalanced rates. The null trip rates indicate that no CVs or school buses were reported to have entered/exited the sites during the travel survey day. The school bus attractions are presented to account for the trips generated by this mode in the study area.

Table provides the adjusted and unbalanced CV attraction estimates, as developed from the San Antonio Workplace Survey, with CV and school buses combined. Table 1 provides the recommended CV attraction estimates, as developed from balancing the workplace CV rates with the total CV internal trip estimates from the 2018/2019 San Antonio Commercial Vehicle Survey. The CV rates at CBD Basic, Retail, and Education employment indicate that no CVs were counted at these locations. Rates must be developed for these cells and were set to equal the overall CV attraction rate for the same employment category. The CV rates were balanced and applied to the total employment estimates for the San Antonio study area to establish the total CV attractions by area type and employment category. The aggregate CV attractions for each employment category, when summed, match with the CV control total estimate of 468,341 internal trips. The CV rate of 0.090 per household was held constant across area types.

Table 14. San Antonio Workplace Survey Adjusted, Unbalanced CV Attraction Estimates by Area Type and Employment Category.

| Area Type | CV Trips Per Employee | | | |
|--------------------------------|-----------------------|---------------|---------------|---------------|
| | Basic | Retail | Service | Education |
| CBD | 0.113* | 0.110* | 0.067 | 0.295* |
| CBD Fringe | 0.039 | 0.056 | 0.112 | 0.209 |
| Urban | 0.166 | 0.118 | 0.101 | 0.301 |
| Suburban | 0.239 | 0.182 | 0.045 | 0.341 |
| Rural | 0.115 | 0.222 | 0.250 | 0.340 |
| Average Attraction Rate | 0.113 | 0.110 | 0.092 | 0.295 |
| Total Attractions | 36,575 | 27,477 | 37,691 | 15,819 |

Note: CV rates represent adjusted and unbalanced rates as developed from the San Antonio Workplace Survey, with CVs and school buses combined. *The CBD rates at basic, retail, and education employment were replaced with the average CV rates for the same employment category to address the issue of null trip rates due to zero observations.

Table 1. Balanced Commercial Vehicle Trip Attraction Rates and Total CV Attractions.

| Area Type | CV Trips Per Employee | | | | Trips Per Household |
|--------------------------|-----------------------|----------------|----------------|---------------|---------------------|
| | Basic | Retail | Service | Education | |
| CBD | 0.451 | 0.439 | 0.266 | 0.000 | 0.090 |
| CBD Fringe | 0.156 | 0.222 | 0.446 | 0.834 | 0.090 |
| Urban | 0.660 | 0.469 | 0.401 | 1.198 | 0.090 |
| Sub-Urban | 0.954 | 0.724 | 0.181 | 1.358 | 0.090 |
| Rural | 0.457 | 0.885 | 0.996 | 1.354 | 0.090 |
| All Area Types | 0.451 | 0.439 | 0.366 | 1.174 | 0.090 |
| Total Attractions | 145,706 | 109,463 | 150,151 | 63,021 | 468,341 |

Note: Attraction rates represent balanced and adjusted rates to match the CV Control Total estimates from the 2018/2019 San Antonio Commercial Vehicle Survey.

2017/2018 San Antonio Special Generator Travel Surveys

Special generators are those establishments that are considered unique trip attractors and therefore require modeling outside the typical travel demand modeling framework. Five special generators were surveyed in the San Antonio study area — the San Antonio International Airport (SAT), the University of Texas at San Antonio, Palo Alto College, the South Park Mall, and the Forum Mall. The survey methodology that was used was the same as the full workplace surveys. It included a general survey, an intercept survey, non-CV counts and/or person counts, and CV counts.

Table 16 provides a summary of the general data collected from the special generator surveys.

Table 16. San Antonio Special Generators Survey Key Data Summary.

| Data Elements | SAT | UT San Antonio | Palo Alto College | South Park Mall | Forum Mall |
|----------------------|------------|---------------------------|------------------------------|----------------------------|-----------------------|
| Total Employment | 5,000 | 6,000 | 250 | 1,175 | 425 |
| Employees at Work | 3,750 | 5,000 | 225 | 1,120 | 350 |
| CV Counts | 2,446 | 228 | 49 | 257 | 142 |
| School Bus Counts | 1,038 | 1,532 | 293 | 12 | 14 |
| Bicycle Counts | 56 | 268 | 11 | 24 | 32 |
| Non-CV Counts | 66,171 | 46,714 | 9,633 | 20,436 | 39,276 |
| Person Counts | 49 | 2,553 | 17 | 138 | 25 |
| Employee Surveys | 328 | 235 | 137 | 125 | 141 |
| Visitor Surveys | 278 | 31 | 57 | 619 | 624 |
| Student Surveys | 0 | 852 | 522 | 0 | 0 |
| CV Surveys | 34 | 18 | 8 | 22 | 14 |

Note: SAT employment estimates were based on another source given the low estimate from the establishment survey. Count data represent actual number counted at the sites.

Table 17 through Table 20 provide the special generator survey person and auto-driver trip attraction rates by purpose and category. The data expansion procedures used were similar to the full workplace survey sites. The attraction rates were developed by dividing the expanded trips by purpose by the reported total employment at the special generator. The NHB trips represented the average of the NHB origin and destination trips to develop a rate for NHB attractions. The NON-RES trips were divided by two to develop a rate for non-resident trip attractions. The CV counts were divided by two to develop a rate for CV trip attractions. The school bus counts were

divided by two to develop a rate for school bus attractions. The external (EXT) trips are shown for informational purposes only.

**Table 16. San Antonio Special Generator Survey Person Trip Attractions and Rates
— University and College.**

| Trip Purpose | UT San Antonio (Employment=6,000) | | Palo Alto College (Employment=250) | |
|--------------|--------------------------------------|--------------------|---------------------------------------|--------------------|
| | Total Attractions | Trips per Employee | Total Attractions | Trips per Employee |
| HBW | 9,456 | 1.576 | 655 | 2.618 |
| HBNW Retail | 0 | 0.000 | 0 | 0.000 |
| HBNW Other | 37,101 | 6.184 | 8,190 | 32.760 |
| NHB | 2,275 | 0.379 | 725 | 2.900 |
| EXT | 0 | 0.000 | 14 | 0.057 |
| NON-RES | 485 | 0.081 | 554 | 2.216 |

**Table 17. San Antonio Special Generator Survey Auto-Driver Trip Attractions and Rates
— University and College.**

| Trip Purpose | UT San Antonio (Employment=6,000) | | Palo Alto College (Employment=250) | |
|--------------|--------------------------------------|--------------------|---------------------------------------|--------------------|
| | Total Attractions | Trips per Employee | Total Attractions | Trips per Employee |
| HBW | 8,826 | 1.471 | 578 | 2.313 |
| HBNW Retail | 0 | 0.000 | 0 | 0.000 |
| HBNW Other | 32,925 | 5.487 | 6,869 | 27.477 |
| NHB | 2,036 | 0.339 | 613 | 2.450 |
| EXT | 0 | 0.000 | 12 | 0.048 |
| NON-RES | 445 | 0.074 | 468 | 1.872 |
| CV | 114 | 0.019 | 25 | 0.100 |
| School Bus | 766 | 0.128 | 147 | 0.586 |

**Table 18. San Antonio Special Generator Survey Person Trip Attractions and Rates
— Airport and Retail.**

| Trip Purpose | SAT (Employment=5,000) | | Forum Mall (Employment=425) | | South Park Mall (Employment=1,175) | |
|--------------|---------------------------|--------------------|--------------------------------|--------------------|---------------------------------------|--------------------|
| | Total Attractions | Trips per Employee | Total Attractions | Trips per Employee | Total Attractions | Trips per Employee |
| HBW | 11,178 | 2.236 | 1,006 | 2.367 | 1,904 | 1.620 |
| HBNW Retail | 0 | 0.000 | 38,929 | 91.597 | 23,883 | 20.326 |
| HBNW Other | 47,194 | 9.439 | 0 | 0.000 | 0 | 0.000 |
| NHB | 5,191 | 1.038 | 6,491 | 15.273 | 3,841 | 3.269 |
| EXT | 301 | 0.060 | 87 | 0.206 | 14 | 0.012 |
| NON-RES | 6,911 | 1.382 | 1,096 | 2.579 | 1,451 | 1.235 |

**Table 19. San Antonio Special Generator Survey Auto-Driver Trip Attractions and Rates
— Airport and Retail.**

| Trip Purpose | SAT (Employment=5,000) | | Forum Mall (Employment=425) | | South Park Mall (Employment=1,175) | |
|--------------|---------------------------|--------------------|--------------------------------|--------------------|---------------------------------------|--------------------|
| | Total Attractions | Trips per Employee | Total Attractions | Trips per Employee | Total Attractions | Trips per Employee |
| HBW | 10,197 | 2.039 | 812 | 1.911 | 1,588 | 1.352 |
| HBNW Retail | 0 | 0.000 | 27,830 | 65.484 | 12,956 | 11.026 |
| HBNW Other | 37,246 | 7.449 | 0 | 0.000 | 0 | 0.000 |
| NHB | 4,367 | 0.873 | 4,492 | 10.568 | 2,111 | 1.797 |
| EXT | 256 | 0.051 | 69 | 0.161 | 8 | 0.007 |
| NON-RES | 4,741 | 0.948 | 756 | 1.779 | 827 | 0.704 |
| CV | 1,233 | 0.245 | 71 | 0.167 | 129 | 0.110 |
| School Bus | 519 | 0.104 | 7 | 0.016 | 6 | 0.005 |

Important Note

The aggregate estimates of trip attractions from the San Antonio Workplace Travel Survey will require balancing to match the aggregate estimates of trip productions from the San Antonio Household Travel Survey. The balanced attraction rates will then be recommended as inputs for the San Antonio travel demand model. Since the San Antonio Household Survey is still underway, trip balancing of household productions cannot be performed at this time. The final recommended attraction rates will be developed in coordination with travel demand model development. This coordination will include finalization of employment variables and household trip making variables (productions) necessary for developing balanced attraction rates, which reflect internal trip productions.

The CV trip attraction rates that were developed from the San Antonio workplace surveys were balanced and adjusted to match with the CV Control Total developed from the 2018/2019 San Antonio Commercial Vehicle Travel Survey. The balanced rates, including CV rates per household, are recommended to be used as inputs to the CV Model for the study area.

The HBNW School person trip attractions from the San Antonio Workplace Survey included school bus person trips in order to account for the students that were transported by school buses and not captured from the vehicle counts.

Adjustments made to the observed trip rates are highly sensitive to the amount of employment and distribution of employment. The area types and employment estimates used in the analysis to estimate the trip attractions and develop the trip attraction rates were based on the AAMPO 2017 Traffic Analysis Zone data. The 2017 employment data will need to be updated to the year the household survey based its production estimates, and apply them to the developed attraction rates to update the aggregate attraction estimates and ensure congruence during trip balancing with the household productions. It is also anticipated that the attraction rates presented in this report may require smoothing and further adjustments during the calibration phase of the travel demand model for the San Antonio study area.

Should you have any question, please let me know.