

DETERMINATION OF VEHICLE OCCUPANCY ON THE KATY AND NORTHWEST FREEWAY MAIN LANES AND FRONTAGE ROADS

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Houston Value Pricing Project, March 2004

INTRODUCTION

In the late 1990s, an innovative program called QuickRide was introduced on the HOV lanes of Houston's Katy and Northwest freeways. QuickRide was designed to increase utilization of these facilities by converting them to high-occupancy/toll (HOT) lanes and charging two-person vehicles for access during peak periods. The toll helps regulate the number of two-person vehicles choosing to use the HOT lanes during the busiest times of the day. An important consideration regarding the viability and prudence of potential changes to the QuickRide program is the volume of qualifying vehicles presently traveling on mixed-use lanes in these corridors. Due to Federal Transit Administration funding of the Katy and Northwest Freeway HOT lanes, traffic using these lanes must remain free flow. Therefore, a limited amount of room is available on these facilities.

PURPOSE

The purpose of determining the vehicle occupancy (number of occupants per vehicle) on the Katy and Northwest freeways was to assess the potential market for the QuickRide program if its schedule were expanded or eligibility and operational structure modified. The last vehicle occupancy studies on these corridors were undertaken in the early 1990s. They measured the number of passengers per vehicle for one mixed-use lane and extrapolated the results to adjacent lanes. Due to possible variation in vehicle occupancies among lanes and the need for current data, a new vehicle occupancy data collection effort was conducted.

DATA COLLECTION

Officials from the Texas Department of Transportation and local researchers involved in past vehicle occupancy studies were consulted to determine safe and convenient locations from which to monitor traffic on the Katy and Northwest corridors. Based on field observations and input from these sources, locations on the grass shoulders and medians of the Katy Freeway near Bunker Hill Road and the Northwest Freeway near Pinemont Drive were selected (see Figure 1). Vehicle occupancy data for the Katy Freeway main lanes and frontage roads were collected from 6:45 AM to 8:45 AM and 4:30 PM to 6:30 PM on Tuesday, April 29, 2003. The same information was collected on the Northwest Freeway from 6:45 AM to 8:45 AM on Wednesday, April 30, 2003 (there is no afternoon QuickRide in this corridor). Data collection was scheduled on Tuesday and Wednesday to avoid potential traffic-flow irregularities at the beginning or end of the work week.

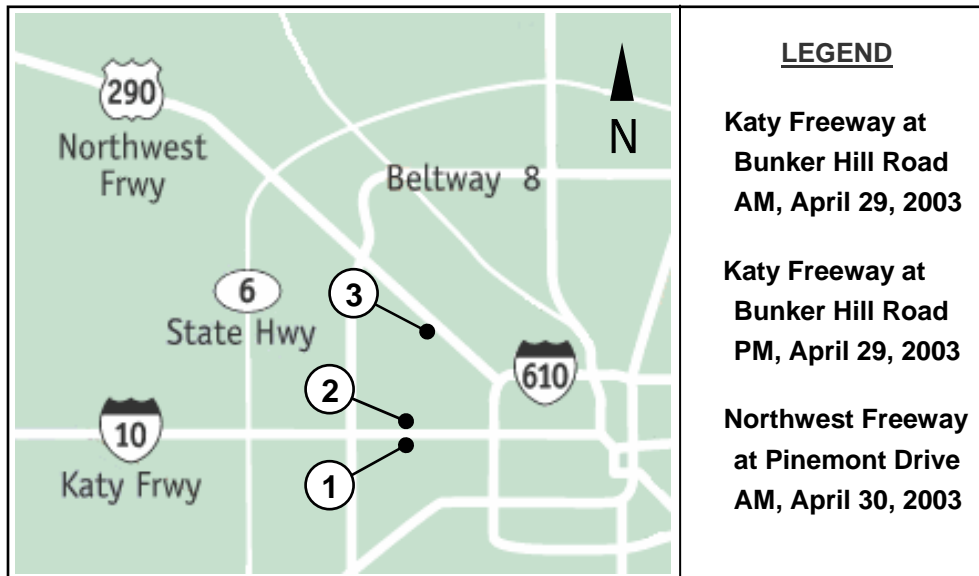


Figure 1: Vehicle Occupancy Data Collection Sites on the Katy and Northwest Freeways

An automated method of accurately counting the number of human beings in a moving vehicle has not yet been developed. Therefore, manual determination of vehicle occupancy was necessary. The selected sites provided key advantages in this respect. First, the grade of the traffic and the data collectors was the same, thus optimizing views of the interior of passing vehicles. Second, the lane configuration at all sites was three main lanes and three frontage roads separated by a median. This enabled the six data collectors (one for each lane) to split into two groups and monitor their respective lanes from the safety of data collection vans parked on the median or grass shoulder of the frontage lane. The vans were oriented slightly toward the oncoming vehicles to further improve the vantage point of the data collectors and minimize obstruction of the center and left lanes from traffic in intervening lanes. Viewing conditions during all three data collection sessions were good.

The primary focus of the data collection effort was to determine the peak-period occupancy of passenger vehicles (cars, pick-up trucks and vans). These vehicles were classified according to one of five occupancy categories: 1, 2, 3, 4, or 5+. If the data collector was uncertain about the number of occupants, the vehicle was tallied as “unsure”. “Unsure” counts comprised less than 3% of all passenger vehicles observed and were excluded from analysis. The number of people in other types of vehicles on Katy and Northwest freeways was also recorded. Vehicle classifications included busses (occupancy noted as empty, ¼ full, ½ full, ¾ full, full), commercial trucks, motorcycles and emergency vehicles. Data collectors used push-button counters and special data collection sheets to facilitate the collection and tabulation of vehicle occupancy information in 15-minute time segments.

RESULTS

The raw data collected by researchers at each of the three locations monitored is provided in Tables A, B and C in the Appendix to this report. The most relevant information has been

summarized in the tables below to facilitate data analysis and comparison. Table 1 shows the volume of peak-period passenger vehicles according to occupancy. The data indicate that the overwhelming majority of passenger vehicles on the mixed-use lanes have only one occupant. Of the 7,580 passenger vehicles recorded during the Katy Freeway AM data collection, 6,912 (91%) were single-occupant vehicles, 582 (8%) were two-person vehicles, and the remaining 86 (1%) were vehicles carrying three or more occupants. Of the 6,134 passenger vehicles counted during the Katy Freeway PM data collection session, 5,472 (89%) were single-occupant vehicles, 559 (9%) were two-person vehicles and 103 (2%) were vehicles with three or more individuals. The highest volume of passenger vehicles was recorded on the Northwest Freeway mixed-use lanes during the AM period. Of the 7,947 passenger vehicles observed at this location, 7,385 (93%) were single-occupant vehicles, 494 (6%) were vehicles with two occupants and 68 (1%) were vehicles with three or more occupants. The occupancy rate of 21,661 passenger vehicles was recorded during the three data collection sessions. Of these, 19,769 (91%) had one occupant, 1,635 (8%) had two occupants and 257 (1%) had three or more occupants. A total of 15,101 (70%) passenger vehicles were traveling on the main lanes and 6,560 (30%) were using the frontage roads. Passenger vehicles accounted for over 95% of all vehicles observed during the data collection effort.

Table 1. Volume of Katy and Northwest Freeway Passenger Vehicles by Occupancy

| Passenger Vehicles (Cars, Pick-Up Trucks, Vans) | | | | | | | |
|---|-------------------------|--------|-------|-----|----|----|----------------------------|
| Location | Occupancy: | 1 | 2 | 3 | 4 | 5+ | Total (All Occupancies) |
| Katy Freeway 6:45 AM - 8:45 AM | Main Lane Vehicles: | 4,656 | 297 | 8 | 5 | 17 | 4,983 |
| | Frontage Road Vehicles: | 2,256 | 285 | 38 | 14 | 4 | 2,597 |
| | Total: | 6,912 | 582 | 46 | 19 | 21 | 7,580 |
| Katy Freeway 4:30 PM - 6:30 PM | Main Lane Vehicles: | 3,922 | 307 | 52 | 7 | 6 | 4,294 |
| | Frontage Road Vehicles: | 1,550 | 252 | 22 | 15 | 1 | 1,840 |
| | Total: | 5,472 | 559 | 74 | 22 | 7 | 6,134 |
| Northwest Freeway 6:45 AM - 8:45 AM | Main Lane Vehicles: | 5,508 | 286 | 16 | 12 | 2 | 5,824 |
| | Frontage Road Vehicles: | 1,877 | 208 | 24 | 10 | 4 | 2,123 |
| | Total: | 7,385 | 494 | 40 | 22 | 6 | 7,947 |
| Total (All Sites) | Main Lane Vehicles: | 14,086 | 890 | 76 | 24 | 25 | 15,101 |
| | Frontage Road Vehicles: | 5,683 | 745 | 84 | 39 | 9 | 6,560 |
| | Total: | 19,769 | 1,635 | 160 | 63 | 34 | 21,661 |

Table 2 provides average vehicle occupancy information by lane and time segment for each data collection session. Overall average vehicle occupancy rates were relatively constant across time segments. The average number of persons per vehicle on the Katy Freeways during the morning period peaked at 1.16 during the 7:30 AM to 7:45 AM time segment. The average vehicle occupancy for the Northwest Freeway mixed-use lanes peaked at 1.12 during the same time segment. In the afternoon data collection session on the Katy Freeway, average vehicle occupancy for the main lanes and frontage roads peaked at 1.21 from 6:15 PM to 6:30 PM. Overall average vehicle occupancy rates by lane were more variable than by time segment. Rates ranged from an average of 1.04 occupants per vehicle on the left main lane at the Katy AM data

collection site, to 1.22 occupants per vehicle on the right frontage road at the Katy PM data collection location. A statistical analysis of the data found that occupancy rates differed significantly ($p = 0.05$) by lane. At all three locations, the average number of occupants per passenger vehicle was generally higher on the frontage roads than on the main lanes.

Table 2. Average Occupancy of Passenger Vehicles on the Katy and Northwest Freeways

| Passenger Vehicles (Cars, Pick-Up Trucks, Vans) | | | | | | | | | |
|---|----------------|----------------|----------------|----------------|----------------|----------------|----------------|----------------|-----------------|
| Katy Freeway AM | | | | | | | | | |
| Lane \ Time | 6:45 - 7:00 AM | 7:00 - 7:15 AM | 7:15 - 7:30 AM | 7:30 - 7:45 AM | 7:45 - 8:00 AM | 8:00 - 8:15 AM | 8:15 - 8:30 AM | 8:30 - 8:45 AM | Overall Average |
| Left Main | 1.04 | 1.05 | 1.06 | 1.04 | 1.04 | 1.04 | 1.04 | 1.03 | 1.04 |
| Center Main | 1.03 | 1.05 | 1.06 | 1.25 | 1.06 | 1.03 | 1.12 | 1.06 | 1.08 |
| Right Main | 1.09 | 1.09 | 1.15 | 1.12 | 1.23 | 1.11 | 1.19 | 1.19 | 1.15 |
| Left Frontage | 1.18 | 1.12 | 1.18 | 1.14 | 1.10 | 1.07 | 1.09 | 1.06 | 1.12 |
| Center Frontage | 1.20 | 1.14 | 1.19 | 1.16 | 1.15 | 1.21 | 1.10 | 1.15 | 1.16 |
| Right Frontage | 1.15 | 1.16 | 1.11 | 1.27 | 1.24 | 1.17 | 1.13 | 1.09 | 1.16 |
| Overall Average | 1.11 | 1.10 | 1.12 | 1.16 | 1.14 | 1.11 | 1.11 | 1.10 | 1.12 |
| Katy Freeway PM | | | | | | | | | |
| Lane \ Time | 4:30 - 4:45 PM | 4:45 - 5:00 PM | 5:00 - 5:15 PM | 5:15 - 5:30 PM | 5:30 - 5:45 PM | 5:45 - 6:00 PM | 6:00 - 6:15 PM | 6:15 - 6:30 PM | Overall Average |
| Left Main | 1.07 | 1.03 | 1.03 | 1.03 | 1.09 | 1.06 | 1.08 | 1.07 | 1.06 |
| Center Main | 1.10 | 1.10 | 1.08 | 1.11 | 1.11 | 1.11 | 1.11 | 1.11 | 1.10 |
| Right Main | 1.29 | 1.17 | 1.15 | 1.17 | 1.18 | 1.18 | 1.18 | 1.24 | 1.19 |
| Left Frontage | 1.12 | 1.10 | 1.22 | 1.15 | 1.17 | 1.20 | 1.17 | 1.27 | 1.17 |
| Center Frontage | 1.23 | 1.16 | 1.23 | 1.17 | 1.20 | 1.16 | 1.24 | 1.22 | 1.20 |
| Right Frontage | 1.18 | 1.18 | 1.11 | 1.12 | 1.19 | 1.37 | 1.31 | 1.34 | 1.22 |
| Overall Average | 1.16 | 1.12 | 1.14 | 1.12 | 1.16 | 1.18 | 1.18 | 1.21 | 1.16 |
| Northwest Freeway AM | | | | | | | | | |
| Lane \ Time | 6:45 - 7:00 AM | 7:00 - 7:15 AM | 7:15 - 7:30 AM | 7:30 - 7:45 AM | 7:45 - 8:00 AM | 8:00 - 8:15 AM | 8:15 - 8:30 AM | 8:30 - 8:45 AM | Overall Average |
| Left Main | 1.02 | 1.05 | 1.05 | 1.04 | 1.05 | 1.06 | 1.05 | 1.05 | 1.05 |
| Center Main | 1.04 | 1.07 | 1.08 | 1.08 | 1.03 | 1.04 | 1.08 | 1.08 | 1.06 |
| Right Main | 1.12 | 1.05 | 1.06 | 1.14 | 1.12 | 1.09 | 1.15 | 1.10 | 1.10 |
| Left Frontage | 1.07 | 1.05 | 1.10 | 1.07 | 1.13 | 1.08 | 1.11 | 1.01 | 1.08 |
| Center Frontage | 1.23 | 1.09 | 1.13 | 1.20 | 1.20 | 1.11 | 1.10 | 1.14 | 1.15 |
| Right Frontage | 1.13 | 1.11 | 1.18 | 1.21 | 1.12 | 1.14 | 1.23 | 1.08 | 1.15 |
| Overall Average | 1.10 | 1.07 | 1.10 | 1.12 | 1.11 | 1.09 | 1.12 | 1.08 | 1.10 |

CONCLUSIONS

Vehicle occupancy data collected on the Katy and Northwest freeways in April 2003 indicate that there are few carpools using the main lanes and frontage roads of these corridors during peak periods. Single-occupant vehicles accounted for over 90% of all passenger vehicles recorded on these lanes, with two-person vehicles comprising the vast majority of the remainder. The total volume of passenger vehicles using the main lanes is more than double that of the frontage roads,

but vehicles traveling on the latter tend to have slightly higher occupancy rates. At all data collection sites, the furthest lane away from data collectors (left main lane) had the lowest recorded number of occupants per vehicle. This may be partially attributed to the obstruction of data collector views from traffic in intervening lanes and the reduced visibility of infants and children in the back seats of vehicles. During the two morning data collection sessions, the highest average vehicle occupancy rates for the mixed-use lanes were recorded between 7:30 AM and 7:45 AM. In the afternoon data collection session on the Katy Freeway, average vehicle occupancies peaked from 6:15 PM to 6:30 PM. With respect to the QuickRide program, the data indicate that opportunities to recruit two-person vehicles from the main lanes and frontage roads are limited. However, the likelihood of attracting single-occupant vehicles to the HOT lanes under a modified eligibility and tolling scenario appears high given the volume of these vehicles on the congested mixed-use lanes.

APPENDIX: COLLECTED DATA

Table A. Vehicle Occupancy at Katy Freeway & Bunker Hill, 6:45-8:45 AM, April 29, 2003

| NUMBER OF OCCUPANTS PER VEHICLE ON FRONTAGE AND MAIN LANES | | | | | | | | | | | | | | | | | | | |
|--|-------------------|---|---|--------|--|----|---|---|----|--------|-------|-----|-----|-----|------|------------|-----------|----------------|--------|
| TIME SEGMENT, LANE | COMMERCIAL TRUCKS | | | | PASSENGER VEHICLES (CARS, PICKUPS, VANS) | | | | | | BUS | | | | | MOTORCYCLE | EMERGENCY | TOTAL VEHICLES | |
| | 1 | 2 | 3 | UNSURE | 1 | 2 | 3 | 4 | 5+ | UNSURE | EMPTY | 1/4 | 2/4 | 3/4 | FULL | | | | UNSURE |
| 6:45-7:00 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 5 | 0 | 0 | 0 | 472 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 498 |
| Center Main | 27 | 0 | 0 | 0 | 318 | 9 | 0 | 0 | 0 | 38 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 392 |
| Right Main | 16 | 0 | 0 | 0 | 244 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 285 |
| Left Frontage | 2 | 0 | 0 | 0 | 127 | 14 | 2 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 148 |
| Center Frontage | 0 | 0 | 0 | 0 | 107 | 20 | 3 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 131 |
| Right Frontage | 2 | 0 | 0 | 1 | 52 | 9 | 0 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 69 |
| 7:00-7:15 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 5 | 0 | 0 | 0 | 443 | 23 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 472 |
| Center Main | 20 | 1 | 0 | 0 | 332 | 17 | 0 | 0 | 0 | 34 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 405 |
| Right Main | 11 | 1 | 0 | 0 | 268 | 24 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 307 |
| Left Frontage | 1 | 0 | 0 | 0 | 168 | 17 | 3 | 0 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 |
| Center Frontage | 0 | 0 | 0 | 0 | 127 | 16 | 1 | 1 | 0 | 0 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 150 |
| Right Frontage | 1 | 0 | 0 | 0 | 66 | 8 | 2 | 0 | 0 | 4 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 84 |
| 7:15-7:30 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 9 | 1 | 0 | 0 | 337 | 18 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 367 |
| Center Main | 16 | 5 | 0 | 0 | 279 | 19 | 0 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 339 |
| Right Main | 5 | 0 | 0 | 0 | 232 | 31 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 272 |
| Left Frontage | 2 | 0 | 0 | 0 | 218 | 25 | 3 | 1 | 2 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 259 |
| Center Frontage | 0 | 0 | 0 | 0 | 174 | 24 | 8 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 207 |
| Right Frontage | 1 | 2 | 0 | 0 | 126 | 13 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 145 |
| 7:30-7:45 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 8 | 0 | 0 | 0 | 354 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 376 |
| Center Main | 15 | 3 | 1 | 0 | 330 | 13 | 0 | 0 | 15 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 377 |
| Right Main | 6 | 2 | 1 | 0 | 226 | 24 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 262 |
| Left Frontage | 2 | 0 | 0 | 0 | 218 | 21 | 2 | 3 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 252 |
| Center Frontage | 0 | 0 | 0 | 0 | 195 | 30 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 229 |
| Right Frontage | 1 | 0 | 0 | 0 | 116 | 35 | 2 | 1 | 0 | 2 | 0 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 159 |
| 7:45-8:00 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 8 | 0 | 0 | 0 | 374 | 12 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 395 |
| Center Main | 22 | 2 | 0 | 0 | 271 | 16 | 1 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 340 |
| Right Main | 8 | 2 | 0 | 0 | 176 | 32 | 1 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 223 |
| Left Frontage | 2 | 0 | 0 | 0 | 228 | 2 | 3 | 5 | 0 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 246 |
| Center Frontage | 1 | 0 | 0 | 0 | 222 | 23 | 3 | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 254 |
| Right Frontage | 0 | 0 | 0 | 0 | 112 | 28 | 2 | 1 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 145 |
| 8:00-8:15 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 5 | 0 | 0 | 0 | 321 | 13 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 340 |
| Center Main | 22 | 4 | 0 | 0 | 240 | 8 | 0 | 0 | 0 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 290 |
| Right Main | 4 | 0 | 0 | 0 | 199 | 19 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 224 |
| Left Frontage | 4 | 0 | 0 | 0 | 221 | 9 | 2 | 1 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 241 |
| Center Frontage | 0 | 0 | 0 | 0 | 147 | 29 | 2 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 180 |
| Right Frontage | 1 | 0 | 1 | 0 | 102 | 16 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 122 |
| 8:15-8:30 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 2 | 0 | 0 | 0 | 283 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 297 |
| Center Main | 31 | 5 | 0 | 1 | 181 | 12 | 0 | 2 | 1 | 10 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 244 |
| Right Main | 11 | 1 | 0 | 0 | 176 | 23 | 5 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 217 |
| Left Frontage | 1 | 1 | 0 | 0 | 210 | 13 | 1 | 0 | 1 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 231 |
| Center Frontage | 0 | 0 | 0 | 0 | 203 | 17 | 1 | 1 | 0 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 226 |
| Right Frontage | 1 | 0 | 0 | 0 | 105 | 13 | 1 | 0 | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 125 |
| 8:30-8:45 AM | | | | | | | | | | | | | | | | | | | |
| Left Main | 4 | 1 | 0 | 0 | 284 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 297 |
| Center Main | 20 | 0 | 1 | 0 | 231 | 12 | 0 | 1 | 0 | 17 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 283 |
| Right Main | 10 | 1 | 0 | 0 | 206 | 35 | 1 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 259 |
| Left Frontage | 1 | 0 | 0 | 0 | 202 | 10 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 215 |
| Center Frontage | 0 | 0 | 0 | 0 | 173 | 21 | 3 | 1 | 0 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 202 |
| Right Frontage | 1 | 0 | 0 | 0 | 114 | 7 | 2 | 0 | 0 | 8 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 134 |

Table B. Vehicle Occupancy at Katy Freeway & Bunker Hill, 4:30-6:30 PM, April 29, 2003

| NUMBER OF OCCUPANTS PER VEHICLE ON FRONTAGE AND MAIN LANES | | | | | | | | | | | | | | | | | | | | |
|--|-------------------|---|---|--------|--|----|----|---|----|--------|-------|-----|-----|-----|------|------------|-----------|----------------|--------|-----|
| TIME SEGMENT, LANE | COMMERCIAL TRUCKS | | | | PASSENGER VEHICLES (CARS, PICKUPS, VANS) | | | | | | BUS | | | | | MOTORCYCLE | EMERGENCY | TOTAL VEHICLES | | |
| | 1 | 2 | 3 | UNSURE | 1 | 2 | 3 | 4 | 5+ | UNSURE | EMPTY | 1/4 | 2/4 | 3/4 | FULL | | | | UNSURE | |
| 4:30-4:45 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 4 | 1 | 0 | 0 | 346 | 18 | 3 | 0 | 0 | 28 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 400 |
| Center Main | 28 | 4 | 0 | 0 | 284 | 25 | 2 | 1 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 347 |
| Right Main | 8 | 0 | 0 | 0 | 258 | 42 | 14 | 2 | 3 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 331 |
| Left Frontage | 1 | 0 | 0 | 0 | 57 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 66 |
| Center Frontage | 0 | 1 | 0 | 0 | 135 | 27 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 168 |
| Right Frontage | 0 | 0 | 0 | 0 | 136 | 23 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 160 |
| 4:45-5:00 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 3 | 2 | 0 | 0 | 370 | 12 | 0 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 407 |
| Center Main | 14 | 3 | 0 | 0 | 319 | 26 | 4 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 369 |
| Right Main | 6 | 3 | 0 | 0 | 299 | 45 | 5 | 2 | 0 | 0 | 3 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 365 |
| Left Frontage | 2 | 0 | 0 | 0 | 71 | 6 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 80 |
| Center Frontage | 3 | 0 | 0 | 0 | 156 | 30 | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 191 |
| Right Frontage | 0 | 0 | 0 | 0 | 127 | 18 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 148 |
| 5:00-5:15 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 8 | 1 | 0 | 0 | 359 | 8 | 1 | 0 | 0 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 397 |
| Center Main | 12 | 0 | 1 | 0 | 347 | 23 | 2 | 1 | 0 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 391 |
| Right Main | 4 | 0 | 0 | 0 | 326 | 34 | 6 | 0 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 373 |
| Left Frontage | 1 | 1 | 0 | 0 | 64 | 11 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 81 |
| Center Frontage | 1 | 0 | 0 | 0 | 179 | 32 | 2 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 219 |
| Right Frontage | 0 | 0 | 0 | 0 | 174 | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 |
| 5:15-5:30 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 2 | 1 | 1 | 0 | 370 | 13 | 0 | 0 | 0 | 21 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 408 |
| Center Main | 20 | 0 | 0 | 0 | 302 | 33 | 2 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 362 |
| Right Main | 2 | 0 | 1 | 0 | 328 | 36 | 8 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 377 |
| Left Frontage | 0 | 0 | 0 | 0 | 77 | 11 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 89 |
| Center Frontage | 0 | 0 | 0 | 0 | 197 | 34 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 233 |
| Right Frontage | 0 | 0 | 0 | 0 | 155 | 14 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 172 |
| 5:30-5:45 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 3 | 2 | 0 | 0 | 343 | 24 | 4 | 0 | 0 | 14 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 390 |
| Center Main | 17 | 0 | 0 | 0 | 335 | 36 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 393 |
| Right Main | 3 | 1 | 1 | 0 | 300 | 35 | 10 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 352 |
| Left Frontage | 1 | 0 | 0 | 0 | 87 | 15 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 104 |
| Center Frontage | 0 | 0 | 0 | 0 | 169 | 35 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 207 |
| Right Frontage | 0 | 0 | 0 | 0 | 104 | 24 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 |
| 5:45-6:00 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 5 | 1 | 0 | 0 | 337 | 2 | 8 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 356 |
| Center Main | 24 | 1 | 0 | 0 | 278 | 26 | 2 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 333 |
| Right Main | 6 | 4 | 0 | 0 | 297 | 37 | 7 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 354 |
| Left Frontage | 0 | 0 | 0 | 0 | 86 | 14 | 2 | 1 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 105 |
| Center Frontage | 2 | 0 | 0 | 0 | 155 | 19 | 2 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 180 |
| Right Frontage | 0 | 0 | 0 | 0 | 103 | 24 | 5 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 137 |
| 6:00-6:15 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 10 | 0 | 0 | 0 | 251 | 20 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 284 |
| Center Main | 25 | 3 | 0 | 0 | 233 | 24 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 288 |
| Right Main | 5 | 4 | 0 | 0 | 263 | 45 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 322 |
| Left Frontage | 0 | 1 | 0 | 0 | 165 | 25 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 194 |
| Center Frontage | 0 | 0 | 0 | 0 | 105 | 24 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 133 |
| Right Frontage | 0 | 0 | 0 | 0 | 85 | 22 | 5 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 113 |
| 6:15-6:30 PM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 3 | 0 | 0 | 0 | 205 | 13 | 1 | 0 | 0 | 6 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 228 |
| Center Main | 13 | 0 | 0 | 0 | 222 | 21 | 3 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 260 |
| Right Main | 7 | 0 | 1 | 0 | 201 | 32 | 8 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 253 |
| Left Frontage | 1 | 0 | 0 | 0 | 118 | 20 | 3 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 145 |
| Center Frontage | 1 | 0 | 0 | 0 | 151 | 32 | 0 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 187 |
| Right Frontage | 0 | 0 | 0 | 0 | 101 | 33 | 4 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 140 |

Table C. Vehicle Occupancy at Northwest Frwy. & Pinemont, 6:45-8:45 AM, April 30, 2003

| NUMBER OF OCCUPANTS PER VEHICLE ON FRONTAGE AND MAIN LANES | | | | | | | | | | | | | | | | | | | | |
|--|-------------------|---|---|--------|--|----|---|---|----|--------|-------|-----|-----|-----|------|------------|-----------|----------------|--------|-----|
| TIME SEGMENT, LANE | COMMERCIAL TRUCKS | | | | PASSENGER VEHICLES (CARS, PICKUPS, VANS) | | | | | | BUS | | | | | MOTORCYCLE | EMERGENCY | TOTAL VEHICLES | | |
| | 1 | 2 | 3 | UNSURE | 1 | 2 | 3 | 4 | 5+ | UNSURE | EMPTY | 1/4 | 2/4 | 3/4 | FULL | | | | UNSURE | |
| 6:45-7:00 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 5 | 0 | 0 | 0 | 508 | 13 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 527 |
| Center Main | 13 | 3 | 0 | 0 | 424 | 13 | 0 | 1 | 0 | 49 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 504 |
| Right Main | 19 | 6 | 7 | 0 | 361 | 30 | 3 | 4 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 432 |
| Left Frontage | 0 | 0 | 0 | 0 | 63 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 68 |
| Center Frontage | 1 | 0 | 0 | 0 | 131 | 18 | 2 | 1 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 156 |
| Right Frontage | 0 | 0 | 0 | 0 | 106 | 11 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 121 |
| 7:00-7:15 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 0 | 0 | 0 | 0 | 488 | 20 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 510 |
| Center Main | 13 | 0 | 0 | 0 | 391 | 22 | 2 | 1 | 0 | 45 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 474 |
| Right Main | 23 | 4 | 2 | 0 | 349 | 18 | 1 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 401 |
| Left Frontage | 3 | 0 | 0 | 0 | 86 | 5 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 94 |
| Center Frontage | 7 | 0 | 0 | 0 | 160 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 183 |
| Right Frontage | 0 | 1 | 0 | 0 | 127 | 13 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 144 |
| 7:15-7:30 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 2 | 0 | 0 | 0 | 429 | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 451 |
| Center Main | 13 | 5 | 0 | 0 | 343 | 19 | 2 | 0 | 1 | 32 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 415 |
| Right Main | 26 | 4 | 2 | 0 | 305 | 16 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 355 |
| Left Frontage | 2 | 0 | 0 | 0 | 92 | 7 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 102 |
| Center Frontage | 1 | 0 | 0 | 0 | 187 | 16 | 1 | 3 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 210 |
| Right Frontage | 1 | 2 | 0 | 0 | 116 | 23 | 1 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 145 |
| 7:30-7:45 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 1 | 0 | 0 | 0 | 450 | 20 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 472 |
| Center Main | 14 | 5 | 1 | 0 | 348 | 27 | 0 | 1 | 0 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 415 |
| Right Main | 21 | 3 | 0 | 0 | 221 | 24 | 2 | 1 | 1 | 11 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 284 |
| Left Frontage | 0 | 0 | 0 | 0 | 107 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 115 |
| Center Frontage | 0 | 0 | 0 | 0 | 183 | 23 | 7 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 215 |
| Right Frontage | 1 | 0 | 0 | 0 | 123 | 18 | 2 | 1 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 0 | 151 |
| 7:45-8:00 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 1 | 0 | 0 | 0 | 352 | 14 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 368 |
| Center Main | 15 | 3 | 1 | 0 | 303 | 10 | 0 | 0 | 0 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 342 |
| Right Main | 19 | 2 | 2 | 0 | 236 | 21 | 2 | 2 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 285 |
| Left Frontage | 4 | 0 | 0 | 0 | 116 | 8 | 1 | 2 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 133 |
| Center Frontage | 3 | 0 | 0 | 0 | 173 | 22 | 7 | 0 | 1 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 209 |
| Right Frontage | 2 | 2 | 1 | 0 | 107 | 15 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 128 |
| 8:00-8:15 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 1 | 0 | 0 | 0 | 302 | 19 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 322 |
| Center Main | 9 | 2 | 0 | 0 | 288 | 12 | 0 | 0 | 0 | 8 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 319 |
| Right Main | 28 | 4 | 1 | 0 | 201 | 13 | 3 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 252 |
| Left Frontage | 2 | 1 | 0 | 0 | 113 | 6 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 123 |
| Center Frontage | 8 | 1 | 0 | 0 | 159 | 2 | 4 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 177 |
| Right Frontage | 2 | 0 | 0 | 0 | 96 | 16 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 114 |
| 8:15-8:30 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 2 | 0 | 0 | 0 | 197 | 9 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 209 |
| Center Main | 18 | 2 | 1 | 0 | 223 | 14 | 3 | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 265 |
| Right Main | 29 | 6 | 0 | 0 | 164 | 21 | 2 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 224 |
| Left Frontage | 2 | 0 | 0 | 0 | 86 | 3 | 1 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 93 |
| Center Frontage | 4 | 2 | 0 | 0 | 150 | 11 | 3 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 171 |
| Right Frontage | 3 | 1 | 0 | 0 | 86 | 13 | 4 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 108 |
| 8:30-8:45 AM | | | | | | | | | | | | | | | | | | | | |
| Left Main | 3 | 0 | 0 | 0 | 172 | 9 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 184 |
| Center Main | 16 | 6 | 0 | 0 | 238 | 14 | 0 | 2 | 0 | 12 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 288 |
| Right Main | 37 | 5 | 0 | 0 | 184 | 19 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 246 |
| Left Frontage | 1 | 0 | 0 | 0 | 79 | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 82 |
| Center Frontage | 6 | 1 | 0 | 0 | 179 | 15 | 1 | 2 | 1 | 2 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 208 |
| Right Frontage | 7 | 1 | 0 | 0 | 121 | 10 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 140 |