Appendix D: Survey Methodology

Survey Purpose

As stated in the introduction section, the purpose of the North Central Texas Council of Governments (NCTCOG) Dallas Area Rapid Transit (DART) Red and Blue Line Corridors Survey was to get a general sense of travel behavior, demographics, and location choice preferences of those living, working, or owning/operating a business near DART Red Line and Blue Line rail stations. The study was planned in coordination with the cities of Dallas, Garland, Plano and Richardson as well as Dallas Area Rapid Transit and will help them, and the entire North Texas Region better address real-world needs and develop land-use and transportation policies. National Research Center, Inc. (NRC) was contracted by NCTCOG to conduct the study.

Study Area and Target Populations

The study area boundaries were defined as the one-mile radius around the 28 DART stations along the Red and Blue Line Corridors (see the map of these study stations on page 10). A one-mile boundary was used to assist in determining the relative effect of distance from the station beyond the traditional transit-oriented development (TOD) half-mile. Three target populations were surveyed for this study:

1) residents who lived within the study boundaries,
2) employers/businesses located within the study boundaries, and
3) employees who worked for employers located within the study boundaries.

Station Area Typology

Knowing that with 28 stations in the study area, it was unlikely that the survey resources would allow sufficient numbers of completed surveys to be able to provide much precision of estimates from the survey results for each station, staff from NCTCOG examined the characteristics of the stations to classify and group the stations into different groups based on similar characteristics. Figure 111 shows the various ways in which the stations could be classified, the purpose of looking at the stations through that lens, and the data source for the information used to make the classifications. Figure 112 starting on page 342 and continuing over the next two pages displays the classification assigned to each of the 28 stations for each of the10 types defined for this study. One of the types was a geographic type, based on the “corridor” in which the station could be found. The map in Figure 113 on page 345 shows which stations were included in each geographic corridor.

These typologies were used to help determine whether the sampling could be even across stations or would need to be differential to ensure sufficient completed surveys for each station type. This typology was also used for the analysis.

Figure 111: Data sources for station typology

Rank	Name	Intent	Data Source	Categories (number of stations in each)
1	Geography*	Logical groupings based on geographic distribution of stations along the corridors. Allows interpretation of various geographic factors.	NCTCOG observation	Plano / Richardson (6) North Dallas (6) Blue Line East (4) Central Dallas (3) Oak Cliff/ Lancaster Road (6) West Oak Cliff (3)
2	Density	Average of residential population and employment population density to use in comparing effect of density in responses	NCTCOG Parcel based estimates from the ½ station mile area	High Density (7) Mid-high Density (7) Moderate Density (4) Mid-low Density (7) Low Density (3)
3	Walkability	Evaluate responses against their estimated walkability, with assumption that highly walkable places will be distinct	Walkscore	Very Car-Dependent (3) Car- Dependent (7) Somewhat walkable (10) Very Walkable (7) Walker's paradise (1)
4	Presence of Park and Ride Lot	Determine response patterns for stations where park and ride lots are an option	DART data	Park and Ride (18) Without Park and Ride (10)
5	Development Age	Does the age of the neighborhood surrounding the station have influence on responses?	NCTCOG observation	Older (6) Older w/ redevelopment (5) 1950 – 1990 (7) 1950 - 1990 w/ redevelopment (7) Mostly new/ greenfield (3)
6	Ridership	Evaluate responses against associated ridership of nearest station	DART – FY 2017 Weekday Average Ridership Data	2,000 or more (5) 1,300 to 2,000 (4) 1,000 to 1,3000 (8) 600 to 1,000 (7) Less than 600 (4)
7	Residential Mix	Capture significant number of multi-family station areas vs. majority single family. Residents will likely be asked about type of housing	ACS Block Group 2016 5 year Estimates – Units in Structure	Multi-Family Majority (10) Mixed Housing (8) Single-Family Majority (10)
8	Transit Service/Rail Line	More rail lines serving a station corresponds with more frequent transit service at peak time. Most overlap with the Geography type	DART data	1 Line (11) 1 Line plus peak (5) 2 Lines (9) 3 Lines (3)
9	Land Use Focus	Capture the effect of employment oriented versus residential neighborhoods (presumed driver of ridership)	NCTCOG Observation	Residential (3) Mixed (9) Employment (16)
10	Income	Would evaluate effect of income on responses. Household income will also likely be a demographic question	ACS Block Group 2016 5 year Estimates – Median Household Income	High Income (3) High Middle Income (8) Low Middle Income (9) Low Income (8)

** See Figure 113 on page 345 for a map showing these geographic corridors*

Figure 112: Station typology

Station Name	City	Geographic Corridor*	Neighborhood Age Type	Park and Ride Type	Transit Service Type
8th & Corinth Station	Dallas	Oak Cliff/ Lancaster Road	Older	Park and Ride	2 lines
Arapaho Center Station	Richardson	Plano / Richardson	1950 - 1990	Park and Ride	2 lines
Cedars Station	Dallas	Central Dallas	Older w/ redevelopment	Without Park and Ride	2 lines
CityLine/Bush Station	Richardson	Plano / Richardson	Mostly new/ greenfield	Park and Ride	1 line plus peak
Cityplace Station	Dallas	Central Dallas	Mostly new/ greenfield	Without Park and Ride	3 lines
Convention Center Station	Dallas	Central Dallas	1950 - 1990 w/ redevelopment	Without Park and Ride	2 lines
Dallas Zoo Station	Dallas	Oak Cliff/ Lancaster Road	Older	Without Park and Ride	1 line
Downtown Garland Station	Garland	Blue Line East	Older w/ redevelopment	Park and Ride	1 line
Downtown Plano Station	Plano	Plano / Richardson	Older w/ redevelopment	Without Park and Ride	1 line plus peak
Forest Lane Station	Dallas	North Dallas	1950 - 1990	Park and Ride	2 lines
Forest/Jupiter Station	Garland	Blue Line East	1950 - 1990	Park and Ride	1 line
Galatyn Park Station	Richardson	Plano / Richardson	Mostly new/ greenfield	Without Park and Ride	1 line plus peak
Hampton Station	Dallas	West Oak Cliff	Older	Park and Ride	1 line
Illinois Station	Dallas	Oak Cliff/ Lancaster Road	Older	Park and Ride	1 line
Kiest Station	Dallas	Oak Cliff/ Lancaster Road	Older	Park and Ride	1 line
LBJ/Central Station	Dallas	North Dallas	1950 - 1990	Park and Ride	2 lines
LBJ/Skillman Station	Dallas	Blue Line East	1950 - 1990	Park and Ride	1 line
Lovers Lane Station	Dallas	North Dallas	1950 - 1990 w/ redevelopment	Without Park and Ride	2 lines
Mockingbird Station	Dallas	North Dallas	1950 - 1990 w/ redevelopment	Park and Ride	3 lines
Morrell Station	Dallas	Oak Cliff/ Lancaster Road	Older	Without Park and Ride	1 line
Park Lane Station	Dallas	North Dallas	1950 - 1990 w/ redevelopment	Park and Ride	2 lines
Parker Road Station	Plano	Plano / Richardson	1950 - 1990	Park and Ride	1 line plus peak
Spring Valley Station	Richardson	Plano / Richardson	1950 - 1990 w/ redevelopment	Park and Ride	1 line plus peak
Tyler/Vernon Station	Dallas	West Oak Cliff	Older w/ redevelopment	Without Park and Ride	1 line
VA Medical Center Station	Dallas	Oak Cliff/ Lancaster Road	Older w/ redevelopment	Without Park and Ride	1 line
Walnut Hill Station	Dallas	North Dallas	1950 - 1990 w/ redevelopment	Park and Ride	2 lines
Westmoreland Station	Dallas	West Oak Cliff	1950 - 1990	Park and Ride	1 line
White Rock Station	Dallas	Blue Line East	1950 - 1990 w/ redevelopment	Park and Ride	1 line

** See Figure 113 on page 345 for a map showing these geographic corridors*

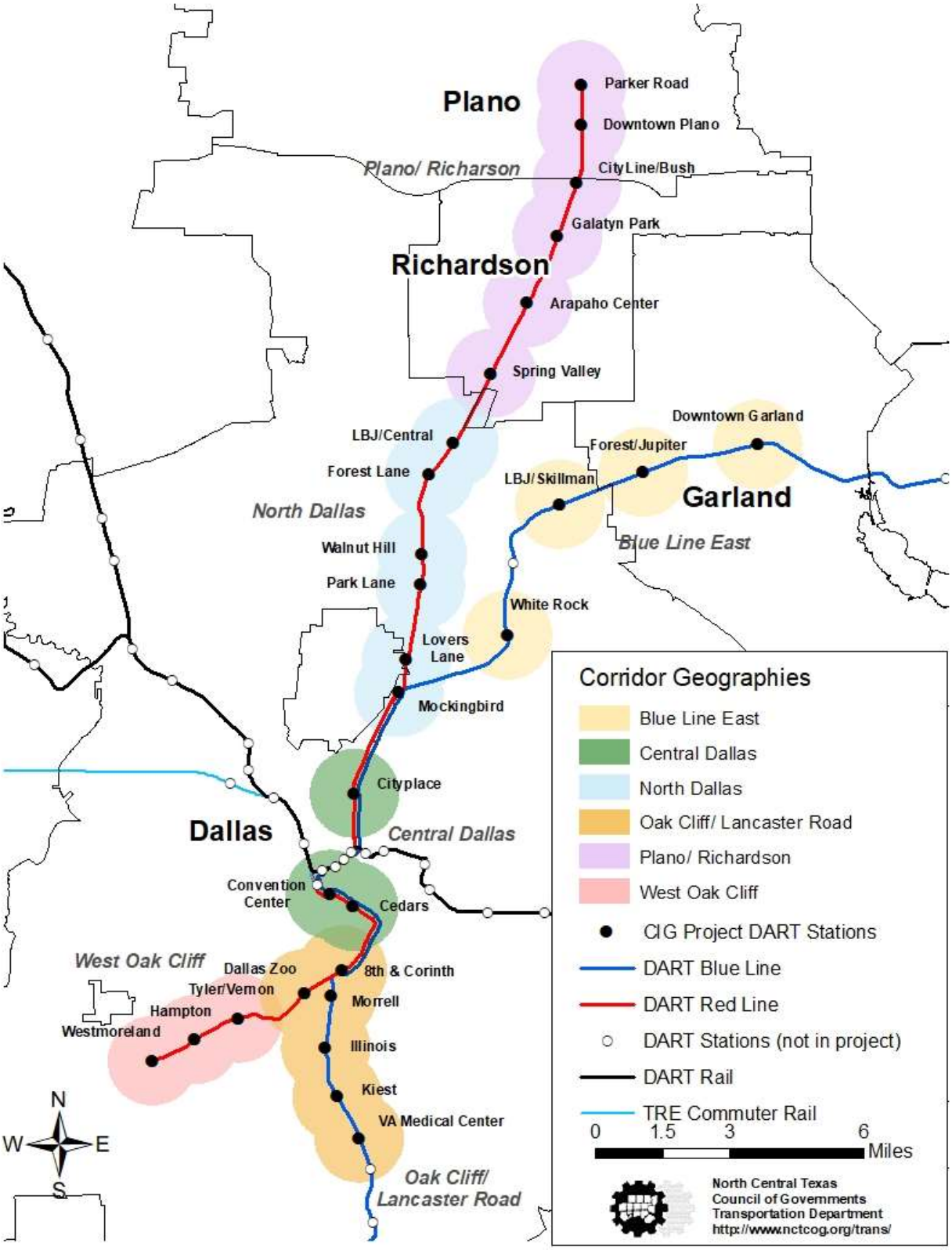
Figure 112: Station Typology (continued)

Station Name	Average Median Income	Income Type	Average Density Per Acre	Density Type
8th & Corinth Station	$26,942	Low Income	13	Low Density
Arapaho Center Station	$65,931	High Middle Income	25	Moderate Density
Cedars Station	$55,183	High Middle Income	92	High Density
CityLine/Bush Station	$72,226	High Middle Income	65	High Density
Cityplace Station	$76,106	High Middle Income	78	High Density
Convention Center Station	$61,598	High Middle Income	305	High Density
Dallas Zoo Station	$29,022	Low Income	22	Mid-low Density
Downtown Garland Station	$44,201	Low Middle Income	24	Mid-low Density
Downtown Plano Station	$43,962	Low Middle Income	31	Mid-high Density
Forest Lane Station	$49,937	Low Middle Income	24	Mid-low Density
Forest/Jupiter Station	$39,278	Low Income	23	Mid-low Density
Galatyn Park Station	$92,994	High Income	41	Mid-high Density
Hampton Station	$43,793	Low Middle Income	28	Moderate Density
Illinois Station	$25,985	Low Income	10	Low Density
Kiest Station	$25,226	Low Income	33	Mid-high Density
LBJ/Central Station	$47,138	Low Middle Income	44	Mid-high Density
LBJ/Skillman Station	$38,086	Low Income	34	Mid-high Density
Lovers Lane Station	$88,286	High Income	46	Mid-high Density
Mockingbird Station	$90,130	High Income	74	High Density
Morrell Station	$25,466	Low Income	23	Mid-low Density
Park Lane Station	$55,318	High Middle Income	70	High Density
Parker Road Station	$46,002	Low Middle Income	22	Mid-low Density
Spring Valley Station	$53,602	High Middle Income	28	Moderate Density
Tyler/Vernon Station	$42,847	Low Middle Income	39	Mid-high Density
VA Medical Center Station	$24,784	Low Income	29	Moderate Density
Walnut Hill Station	$48,216	Low Middle Income	57	High Density
Westmoreland Station	$43,191	Low Middle Income	20	Mid-low Density
White Rock Station	$70,323	High Middle Income	10	Low Density

Figure 112: Station Typology (continued)

Station Name	Walkscore	Walkability Type	% Single Family	% Multi-Family	Housing Type	DART FY 2017 Avg. Weekday Ridership	Ridership Type
8th & Corinth Station	29	Very Car-Dependent	61%	39%	Mixed Housing	1600	1,300 to 2,000
Arapaho Center Station	31	Car- Dependent	48%	52%	Mixed Housing	1133	1,000 to 1,3000
Cedars Station	78	Very walkable	5%	95%	Multi-Family Majority	789	600 to 1,000
CityLine/Bush Station	31	Car- Dependent	42%	58%	Mixed Housing	1427	1,300 to 2,000
Cityplace Station	93	Walker's paradise	8%	92%	Multi-Family Majority	2225	2,000 or more
Convention Center Station	66	Somewhat walkable	3%	97%	Multi-Family Majority	657	600 to 1,000
Dallas Zoo Station	42	Car- Dependent	71%	29%	Single-Family Majority	586	Less than 600
Downtown Garland Station	53	Somewhat walkable	82%	18%	Single-Family Majority	1505	1,300 to 2,000
Downtown Plano Station	82	Very walkable	27%	73%	Multi-Family Majority	616	600 to 1,000
Forest Lane Station	50	Somewhat walkable	33%	67%	Mixed Housing	1844	1,300 to 2,000
Forest/Jupiter Station	65	Somewhat walkable	22%	78%	Multi-Family Majority	801	600 to 1,000
Galatyn Park Station	36	Car- Dependent	82%	18%	Single-Family Majority	367	Less than 600
Hampton Station	48	Car- Dependent	84%	16%	Single-Family Majority	887	600 to 1,000
Illinois Station	53	Somewhat walkable	90%	10%	Single-Family Majority	1104	1,000 to 1,3000
Kiest Station	70	Very walkable	93%	7%	Single-Family Majority	1040	1,000 to 1,3000
LBJ/Central Station	19	Very Car-Dependent	20%	80%	Multi-Family Majority	1169	1,000 to 1,3000
LBJ/Skillman Station	64	Somewhat walkable	14%	86%	Multi-Family Majority	1173	1,000 to 1,3000
Lovers Lane Station	71	Very walkable	26%	74%	Multi-Family Majority	1259	1,000 to 1,3000
Mockingbird Station	86	Very walkable	31%	69%	Mixed Housing	3216	2,000 or more
Morrell Station	39	Car- Dependent	70%	30%	Single-Family Majority	500	Less than 600
Park Lane Station	83	Very walkable	9%	91%	Multi-Family Majority	2256	2,000 or more
Parker Road Station	69	Somewhat walkable	50%	50%	Mixed Housing	3348	2,000 or more
Spring Valley Station	63	Somewhat walkable	35%	65%	Mixed Housing	1284	1,000 to 1,3000
Tyler/Vernon Station	45	Car- Dependent	84%	16%	Single-Family Majority	282	Less than 600
VA Medical Center Station	64	Somewhat walkable	89%	11%	Single-Family Majority	789	600 to 1,000
Walnut Hill Station	70	Very walkable	12%	88%	Multi-Family Majority	1038	1,000 to 1,3000
Westmoreland Station	68	Somewhat walkable	63%	37%	Mixed Housing	2230	2,000 or more
White Rock Station	25	Very Car-Dependent	72%	28%	Single-Family Majority	630	600 to 1,000

Figure 113: Map of the corridor geographies



Developing the Survey Instruments

The survey instruments were drafted keeping in mind the key questions that were driving NCTCOG to conduct the study:

- How important is transit availability in influencing location choice decisions?
- Does transit availability change travel (including parking) behavior?
- Do walking supportive urban design factors play a large role in first/last mile travel with transit?
- What are the key barriers to transit use, including physical or perceptional for those not using transit?
- To what extent do businesses value transit and encourage employees to use it?

NCTCOG had also developed a set of topics and data points they wished to see addressed in the surveys. In addition, near the beginning of the project, an NRC staff member attended a meeting with representatives of NCTCOG and the partner agencies (DART, City of Dallas, City of Plano, City of Garland and City of Richardson) to provide an overview of the project and to learn what information might be useful to these organizations.

Using all these inputs, NRC drafted the first version of the surveys, and in an iterative process, continued to refine them with input from NCTCOG. The final version of the survey instruments can be found in *Appendix E: Survey Materials*.

Administering the Resident Survey

The original plan for the resident survey was to be primarily administered by mail, using an address-based sampling frame to select survey recipients. The sampling frame used was the United States Postal Service Delivery Sequence File. This is the most comprehensive list of household addresses, and is based on the lists that mail carriers use to deliver the mail.

All addresses within a one-mile radius (as the crow flies) of the 28 stations were purchased. A total of 146,196 residential addresses were found to be within that one-mile radius boundary. These were geocoded and each address was assigned a designation as being within a quarter-mile, half-mile or one-mile of one or more stations using the following criteria:

1) If the address was within a quarter-mile of a station, that station was its final designation.
2) If the address was within a half-mile or one or more stations (but not within a quarter-mile of any station), it was designated as belonging to the one or more stations of which it was within a half-mile.
3) If the address was within one-mile of one or more stations, but not within a half-mile or quarter-mile of any station, it was assigned as belonging to those one or more stations of which it was within one-mile.

NRC found that every station had over 600 addresses within the one-mile radius, but not all had residential addresses within the quarter-mile radius. A total of 13,088 were found to be within one-quarter-mile of a station; only three stations had no residential addresses within a quarter-mile, although three other stations had less than 200 addresses within a quarter-mile. A total of 33,649 addresses were within a half-mile of one or more stations (and were not within a quarter-mile of any station), while 99,539 addresses were within one-mile of one or more stations (and were not within a half-mile or quarter-mile of any stations).

A total of 16,800 households were selected such that 600 addresses were selected within a one-mile radius of each station. As possible, the 600 addresses for each station were stratified by distance from the station: 300 (50%) with a quarter-mile radius, 200 (33%) outside the quarter-mile radius but within the half-mile radius, and 100 (17%) outside the half-mile radius but within the one-mile radius. Stations had overlapping radii, and in these cases addresses were selected from the overlap in the proportions needed for each station. Not every station had 300 or 500 residential addresses within the quarter-mile or half-mile radius; in these cases, addresses were selected from the next radius so that a total of 600 households were chosen for each station.

Surveys were administered by mail with an option to complete the survey online; each household was contacted four times in August and September 2019. The survey was provided in English, but a paragraph was included on the cover letter in Spanish explaining that Spanish readers could go online to complete the survey in Spanish. The cover letter also gave English readers the option of completing the survey online. A copy of the mailed survey materials, including the questionnaire, can be found in *Appendix E: Survey Materials*.

By the end of October, nearly 700 completed surveys were obtained, for a 4% response rate. (This was lower than expected; an 8% to 15% response rate was anticipated. A similar study for the Denver Regional Council of Governments TOD study conducted in 2016 by NRC had an 11% response rate to the resident survey.)

An additional special survey effort was undertaken to include the perspective of Hispanic and Spanish-speaking residents in the study. Lists of phone numbers of likely Hispanic households in the study boundaries (the Census block groups) were purchased from a survey sampling research firm. These phone numbers were dialed in September and October 2019. However, at the end of October, when it was realized that the number of completed surveys for the regular resident survey was lower than expected, it was decided to broaden the scope of the telephone surveying to capture more residents, and to merge the Hispanic oversample into the resident sample. To help increase response rate, an incentive of entry into a drawing for one of 5 $100 gift cards was offered in the introduction to respondents. Contact information was gathered at the end of the interview. From those who provided contact information, five respondents were randomly selected to receive a $100 Visa gift card.

The initial focus was on those residents in areas with underrepresentation in the station typologies (e.g., lower median household income). All the addresses from the original purchase of 146,196 addresses, except those who had already responded to the survey, from the areas around these stations were sent to the sampling vendor for a phone match. About 60% of addresses could be matched to a phone number, and additional surveys were obtained. Then additional budget was added for additional calling, and the remaining addresses were sent for a phone match. Every phone list was de-duped against numbers that had already been sampled to ensure that no phone number was attempted after having been closed.

All the sample was called to exhaustion, meaning that each number was assigned a final disposition as either being a completed interview, a refusal, another disposition such as being a business phone number, or having been attempted multiple times with no response.

The response rates for the mail and phone survey were calculated using AAPOR's response rate #2[3] for mailed surveys of unnamed persons and phone surveys; the final response rate for the mailed survey with 693 completed surveys was 4.1% and for the phone survey was 2.4% with 847 completed interviews, for an overall response rate of 2.9% with a total of 1,540 responses.

Table 234: Resident survey response rate

Disposition	Mail Survey	Phone Survey	Total
Total sample used	15,198	51,877	68,677
I=Complete Interviews	693	847	1,540
P=Partial Interviews	0	0	0
R=Refusal and break off	15,198	37,11	18,909
NC=Non Contact	909	31,300	32,209
O=Other	0	123	123
UH=Unknown household	0	0	0
UO=Unknown other	0	0	0
Response rate: (I+P)/(I+P) + (R+NC+O) + (UH+UO)	4.1%	2.4%	2.9%

The 95% confidence interval (or "margin of error") quantifies the "sampling error" or precision of the estimates made from the survey results. A 95% confidence interval can be calculated for any sample size, and indicates that in 95 of 100 surveys conducted like this one, for a particular item, a result would be found that is within a certain number of percentage points of the result that would be found if everyone in the population of interest was surveyed. The practical difficulties of conducting any resident survey may introduce other sources of error in addition to sampling error. Despite the best efforts to boost participation and ensure potential inclusion of all households, some selected households will decline participation in the survey (referred to as non-response error) and some eligible households may be unintentionally excluded from the listed sources for the sample (referred to as coverage error). The margin of error for this survey, with 1,540 respondents, is plus or minus 2.5 percentage points.

It should be noted that a shortened version of the survey was used for the telephone survey respondents. Questions that were excluded from the telephone survey administration are shown in red in *Appendix E: Survey Materials*. Even with the exclusion of a set of the questions, the average interview length was about 26 minutes.

Administering the Employer/Business Survey

For the employer survey, a database of all employers in the census block groups identified by NCTCOG for the study area was purchased from InfoUSA. As with the residential addresses, the addresses of these businesses were geocoded to determine which station they were nearest and at what distance. A total of 12,853 employers were chosen as survey recipients; all 6,085 employers within the quarter-mile and half-mile radii, identified as having 3 or more employees; all 5,246 employers identified as having 5 or more employees or having an unknown number of employees outside the half-mile radius but within the one-mile radius, plus a random sample of 1,449

[3] See AAPOR's Standard Definitions here: http://www.aapor.org/Standards-Ethics/Standard-Definitions-(1).aspx for more information

employers with 3 to 4 employees; and an additional 100 employers from the ePass list that were geocoded as being within the study boundaries but could not be matched to the InfoUSA list.

These employers were first contacted by mail, with a hard copy survey that could be returned in a postage-paid envelope and the option to complete the survey online. About a week or so after the surveys were mailed, employers that had a telephone number (10,231, about 80% of the total sampled) were called to invite them to the survey. If interviewers were not able to talk to a staff member who could complete the survey, they left a voice mail with the URL where employers could go to complete the survey online. They also left a phone number that the employer could call back to do the survey by phone, if desired. If the employer representative was reached but did not have time to do the survey when reached, they were also provided with the URL or a phone number to call back. Completed surveys or interviewers were obtained from a total of 1,039 employers. Nearly 2,000 of the survey packets sent were returned as undeliverable by the post office (likely the company had moved or gone out of business), so the adjusted final response rate was 9.9%, or 8.2% of the total original list. The anticipated response rate for this survey was between 8% and 13%. The DRCOG 2016 TOD study had obtained a 7% response rate to the employer survey. The margin of error for the employer survey results with 1,039 completed responses is plus or minus 3.0 percentage points.

Administering the Employee Survey

All 1,039 employers that participated in the business survey were asked if they would allow their employees to participate in the employee survey, 389 (40%) agreed to allow their employees to participate. These company representatives were given two options for implementing the survey, they could share an email invitation to complete the survey online and/or request paper surveys, which were mailed to the representative along with postage-paid return envelopes for the employees to return completed surveys directly to NRC. A total of 353 employee completed surveys were received from 63 private employers, 183 from 5 locations/divisions from the City of Richardson and another 14 from employees who did not specify whom their employer was. These 64 specified employers represented 6% of those who agreed to let their employees be surveyed. According to their employer survey results and the InfoUSA database (for the City of Richardson), those 64 employers employed about 4,310 employees, for an approximate response rate of 12%. No margin of error was calculated, as the sampling was not a strict random probability (clustered within employers), with an unquantifiable amount of self-selection.

Analyzing the Results

Entering the Data into an Electronic Dataset

For hard copy returned surveys from the resident, employer and employee data collection efforts, responses were entered into an electronic dataset using a “key and verify” protocol, in which survey data were entered twice into an electronic dataset and then compared. Discrepancies were evaluated against the original survey form and corrected. Range checks as well as other forms of quality control were also performed.

Respondents who completed any of the three surveys online were essentially creating the electronic dataset as they entered their responses into the online survey application. This dataset was then downloaded for analysis.

For the resident and employer surveys that were completed by phone, use of a CATI (Computer-Aided Telephone Interviewing) system meant that all collected data were entered into the dataset at the time of the interview. Skip patterns were programmed into CATI so interviewers were automatically "skipped" to the appropriate question based on the individual responses being given. Before the data were analyzed, an in-depth cleaning of the data was conducted as part of the standard quality control procedures.

Weighting the Data

While every effort is made to get as many responses from a group as representative as possible of the target population, some individuals or entities are more or less likely to respond to a survey. For the resident and employer surveys, data from the Census or the InfoUSA database could be examined to see if there were certain subgroups that were more or less likely to respond than others. There was no source of data for a demographic profile of employees.

For the resident survey, the demographic profile from the Census for the block groups determined to comprise the study area was compared to the demographic profile of survey respondents, as shown in Table 235. (The first column shows the demographic profile from the Census, while the second column shows the profile of survey respondents.) In order to make the results more representative of the population in the study area, the survey data were weighted (statistically adjusted), which resulted in the demographic profile seen in the third column.

Weights were calculated using an Iterative Proportional Fitting model via a Python raking algorithm plug-in to SPSS. The control variables used were those shown in the table. The figure below shows a histogram of the resulting weights, which ranged from 0.05 to 7.50.

Figure 114: Histogram of resident survey weights

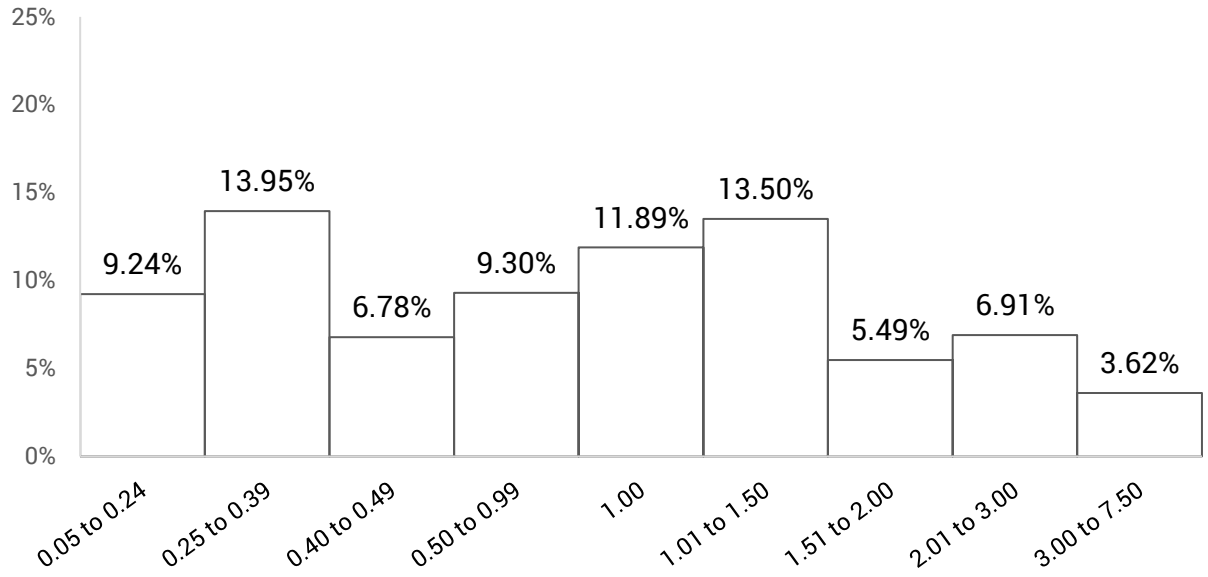


Table 235: Resident survey weighting table

Characteristic	Population Norm*	Unweighted Data	Weighted Data
Housing Tenure			
Own home	37%	59%	39%
Rent home	63%	41%	61%
Type of Housing Unit			
Single-Family Detached	34%	56%	37%
Multi-Family/Other	66%	44%	63%
Race and Ethnicity			
Non-Hispanic White	34%	48%	34%
Non-Hispanic Black	21%	18%	21%
Non-Hispanic Other	8%	7%	8%
Hispanic	37%	27%	36%
Sex			
Male	50%	45%	49%
Female	50%	55%	51%
Age			
18-34 years of age	43%	20%	40%
35-54 years of age	32%	30%	31%
55+ years of age	25%	51%	28%
Annual Household Income			
Less than $15,000	13%	9%	12%
$15,000 to $19,999	5%	5%	6%
$20,000 to $29,999	12%	10%	12%
$30,000 to $39,999	11%	8%	10%
$40,000 to $49,999	9%	8%	10%
$50,000 to $74,999	18%	16%	17%
$75,000 to $99,999	10%	14%	13%
$100,000 to $149,999	12%	15%	12%
$150,000 or more	11%	14%	8%

** Source: U.S. Census*

For the employer survey, a comparison could be made of the characteristics of businesses in the entire InfoUSA database to those employers who completed the survey. The data in the table below come from the business database – not the self-reported information, which may have varied from what InfoUSA reported; to see whether the respondents differed from the entire database, the variables needed to be comparable.

The table below looks at the number of employees and the radius distance from the nearest DART station. The respondent data had fewer responses from those that had been labeled as having an unknown number of employees. It seems likely that those for whom InfoUSA was unable to gather data would be more likely to be out of business, and therefore would not have been able to respond to the survey. When the unknown category was removed, the proportions of employers in each size category were roughly similar between the InfoUSA database and the respondents, with perhaps a somewhat greater proportion of larger employers among the survey respondents. This was likely due to the fact more effort was made to contact larger employers. The largest difference was about 5%, in the remaining categories the differences were smaller.

The radius distance to the nearest DART station of surveyed employers was similar to that found in the database as a whole. Not shown are comparisons by nearest DART station and two-digit SIC code; most of these differences were also not large. Thus, it was determined that the employer survey data would not be weighted.

Characteristic	Population Norm (InfoUSA)	Employer Survey Respondents
Size (Number of Employees), including unknown		
Epass (could be any size)	0.9%	0.2%
Unknown	16.4%	4.1%
3-4	26.5%	25.1%
5-9	30.1%	33.3%
10-19	13.1%	17.7%
20-49	8.1%	12.6%
50-99	2.9%	4.9%
100-249	1.4%	1.5%
250-499	0.3%	0.5%
500+	0.2%	0.1%
Size (Number of Employees), excluding unknown		
epass	1.1%	0.2%
3-4	31.7%	26.2%
5-9	36.0%	34.7%
10-19	15.6%	18.5%
20-49	9.7%	13.1%
50-99	3.5%	5.1%
100-249	1.7%	1.6%
250-499	0.4%	0.5%
500+	0.3%	0.1%
Radius		
quarter-mile	17.1%	16.4%
half-mile	30.3%	32.4%
one-mile	52.6%	51.2%

For the employee survey, it was also decided to not weight the survey results. For this component of the project, many of the surveys came from two employers (Region 10 Education Service Center and City of Richardson), and there was not a good source for a weighting standard; it was decided to leave the survey results unweighted. It should be noted that the employee survey results may not be generalizable to all employees in the DART Red and Blue Line corridors study area, but they do provide insight into the opinions and behaviors of the subset of employees surveyed.

Analyzing the Data

The electronic dataset was analyzed using the Statistical Package for the Social Sciences (SPSS). For the most part, frequency distributions and average (mean) ratings are presented in the body of the report. A complete set of frequencies for each survey question for each of the surveys are presented in the appendices. In addition, some tables in the body of the report are results by selected respondent or station area characteristics. Chi-square or ANOVA tests of significance were applied to these breakdowns of selected survey questions. A "p-value" of 0.05 or less indicates that there is less than a 5% probability that differences observed between groups are due to chance; or in other words, a greater than 95% probability that the differences observed in the selected categories of the sample represent "real" differences among those populations. Where differences between subgroups are statistically significant, they have been marked with grey shading in these figures.

Supplemental technical appendices are supplied (in Excel format) with additional breakdowns of survey results by respondent and station area characteristics, with multiple comparisons tests of significance, which further show which subgroups are statistically significantly different than others.

Study Challenges and Learnings for the Future

As with any study of this nature, there were a number of challenges encountered. One of the challenges was attempting to hear from a random sample of residents, employers and employees within a very specific and targeted geography --- the one-mile radius of the stations. Using address-based sampling helped with geolocating the correct sampling units, but with the lower than expected response rates (see the next paragraph), having to move to listed telephone sample increased data collection costs somewhat.

The bigger challenge was the lower than expected response rate to the surveys. For the resident and employer surveys, these were somewhat offset with additional telephone interviewing, but increasing response rates could help to lower the cost of a future study.

One idea to help increase response rates might be to have a different branding for the materials. The survey envelopes included the logo for NCTCOG, which may not have much immediacy for recipients, who may not be familiar with it. Perhaps using branding from the local government in which the recipient is located would help with an open rate. (It should be noted that the survey cover letters did include the logos of the four municipalities that were covered in the study geography, as well as the DART logo.)

The survey included many questions about the characteristics of the home or business of the respondent. While this was very helpful information in describing the state of TOD in the study area, respondents may not have found answering these types of questions very interesting or

compelling. Perhaps questions related to evaluations of quality of neighborhood, performance measurement of local government or DART services, or opinions about various policy options might help to increase interest in the surveys.

Finally, the survey instruments were rather lengthy and dense. While there was a desire to collect a lot of information for this baseline look at TOD, perhaps future surveys could be shortened.

To increase response to the employee survey, other methods for recruitment might be considered, although some might be more resource-intensive. Perhaps interns or hired field staff could be used to intercept employees at some of the larger office/industrial buildings or parks. Perhaps permission could be gained to post a poster or flyer in lobbies or entry doors with a QR code and/or URL code in where employees could go to complete the survey.