

# Frisco Area Transit Opportunities Summary

## 1.0 INTRODUCTION

As part of the DART 2040 Transit System Plan, an assessment of regional opportunities was conducted for several communities outside of the DART Service Area. The effort included:

- Identification of current and future travel patterns
- Analysis of recommended regional rail corridors in the NCTCOG Mobility 2040 Plan to understand:
  - Ridership potential
  - Transfer activity
  - Passenger loads and potential impact on DART system
- Assessment of the competitiveness of transit to major markets/activity centers

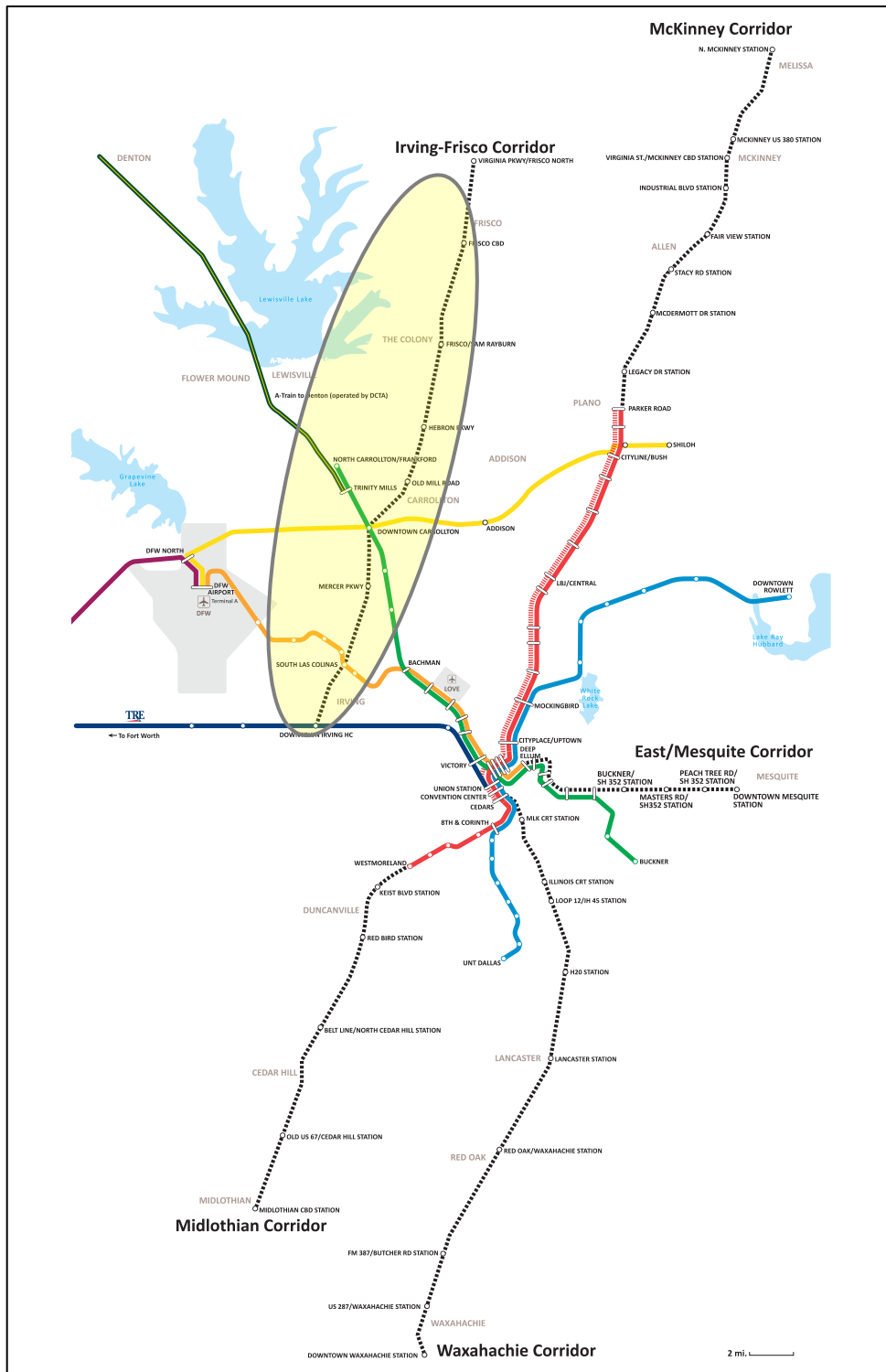
This document summarizes key findings for Frisco and surrounding communities and is intended to provide information to these cities about potential transit opportunities for the future. These opportunities can be jointly explored under DART Policy III.07 *DART Services Outside the DART Service Area Boundary*.

## 1.1 Corridor Overview

Figure 1 shows the location of the Irving-Frisco Corridor in relation to the existing and committed DART Rail System and other regional corridors contained in the NCTCOG Mobility 2040 Plan. The regional rail line connects Frisco, Carrollton and Irving along the existing BNSF railroad corridor, known as the Madill Subdivision. DART owns the portion of the corridor south of downtown Carrollton; BNSF owns the northern section. There is active freight service in the corridor. The Frisco section of the line is the only portion that is outside the current DART Service Area.

The Irving-Frisco Corridor provides opportunities for Frisco area residents to connect with various employment and activity centers within the DART Service Area via regional rail. The 29-mile corridor would operate within the existing railroad corridor, starting in North Frisco, with additional stations in Downtown Frisco and at Sam Rayburn Tollway (SRT)/SH121 near the growing Plano Legacy West Business Area. The rail line then continues to the existing Downtown Carrollton station, allowing for transfer opportunities to the future Cotton Belt Line and the Green Line. Service would continue south, providing connection opportunities with the Orange Line at a future South Las Colinas Station (deferred until this regional corridor is implemented), and with the Trinity Railway Express (TRE) in South Irving. Depending on the operating plan, service could continue east or west along the TRE corridor for additional regional connectivity, although this could result in a bypass of the South Irving/Heritage Crossing station.

**Figure 1: Irving – Frisco Regional Rail Corridor**



Source: DART based on NCTCOG *Mobility 2040: The Metropolitan Transportation Plan for North Central Texas*

## 2.0 CURRENT AND FUTURE TRAVEL PATTERNS

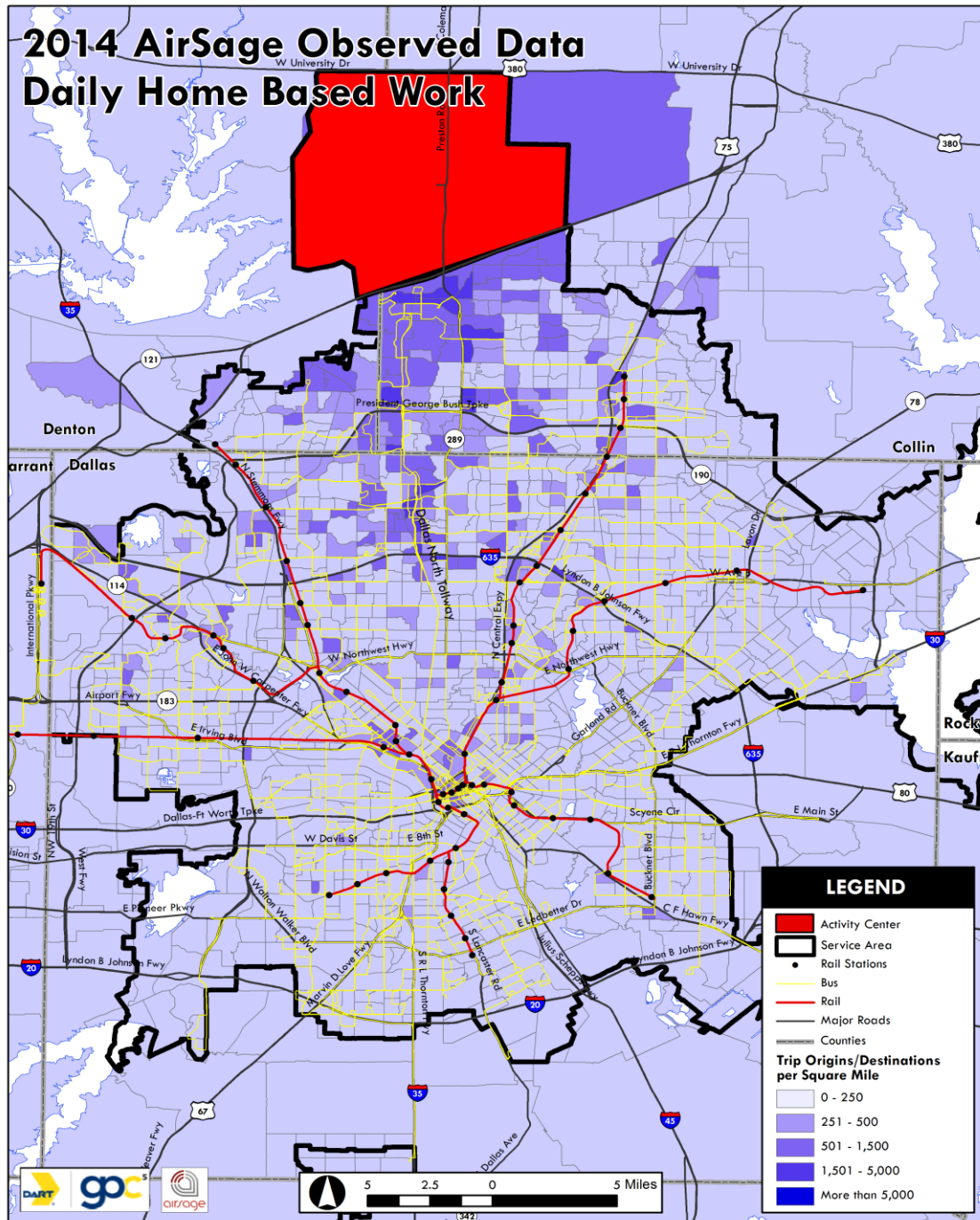
For purposes of looking at travel patterns, both current (2014) and future (2040) year data were analyzed. Data was mapped to show the work trip origins and destinations per square mile. For the 2014 data, DART used Airsage mobile device tracking data that was collected and used in the Comprehensive Operations Analysis (COA) recently completed for the bus system. This data provides an insight into the potential for work related transit travel based on a large sample of trips using actual data.

Figure 2 shows the 2014 daily home based work trips going to and from Frisco (red zone) and various other locations with the DART Service Area (purple shaded zones). These work trip patterns reflect person trip travel from Frisco and demonstrate the existing potential for transit travel between Frisco and the darker purple shaded areas.

Figure 3 shows similar data using the regional travel demand model to understand projected patterns in 2040 for home based work person trips. The comparison between the two figures paints a clear picture of growth and future transit potential. Key destinations are shown to be along the Sam Rayburn Tollway corridor and the Dallas North Tollway Corridor. The Irving-Frisco Rail to Cotton Belt Rail connection in downtown Carrollton would provide access to some of these work locations. Comparing the changes in work trip density between the two maps demonstrates the growth anticipated for this area in 2040. The area along the Dallas North Tollway and the Sam Rayburn Tollway shows increasing density up to the highest range (5,000 trips per square mile). Remembering that these are trips that start or end in Frisco (shown as the red zone) demonstrates the potential for service and the importance of the connections the Irving-Frisco Regional Rail would provide via transfers at the Downtown Carrollton station (to Cotton Belt and Green Line).

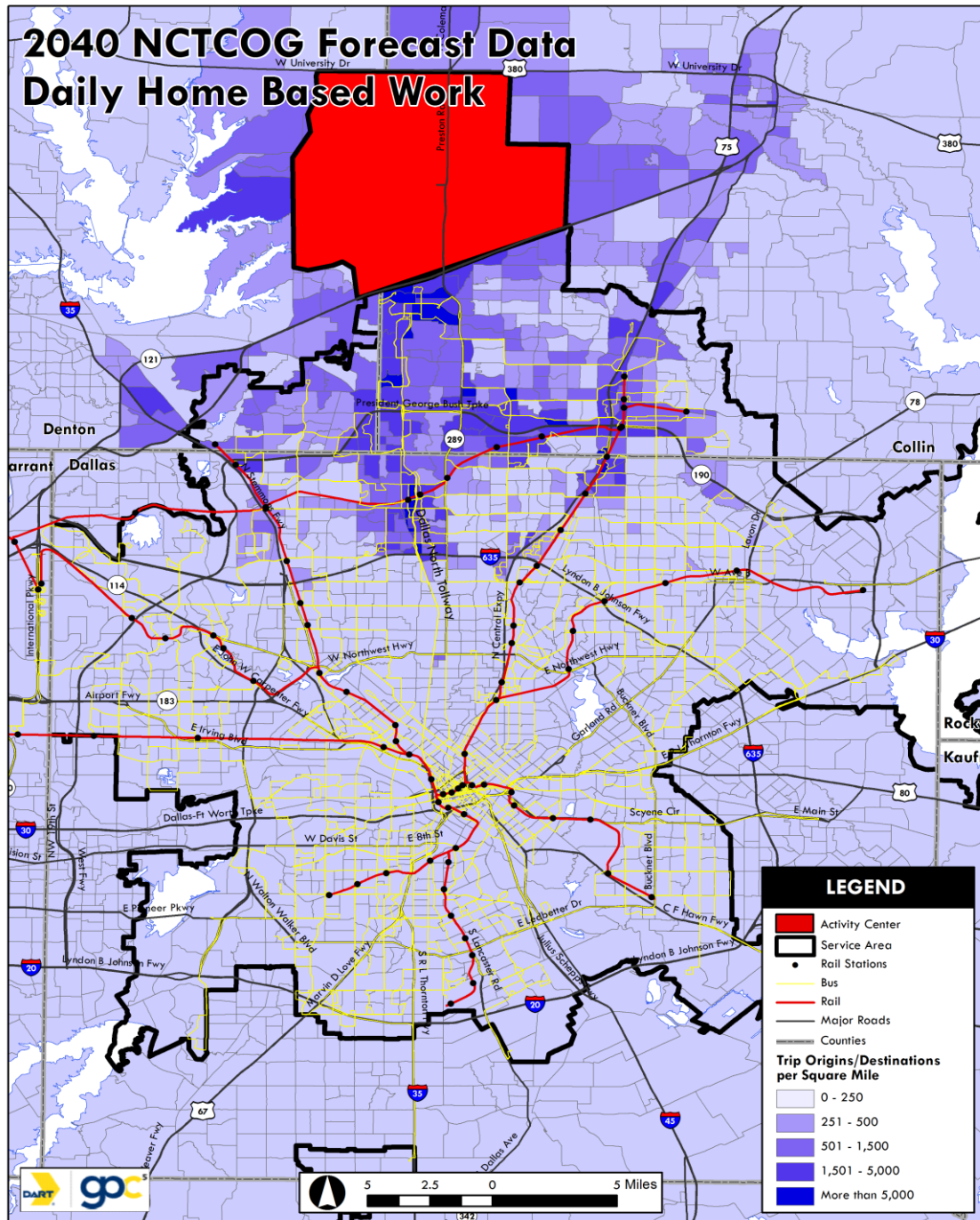
It is important to be mindful of the limitations of the Airsage mobile device tracking data when comparing the maps in Figure 2 and 3. The Airsage data does not represent all work trips on an average weekday in 2014. Since it is based on travelers using mobile devices connected to Sprint and Verizon cellular towers, it includes only 60% of the market share. Also, it does not include trip information for travelers without a mobile device. There is also the potential for trip end misallocation in the less urban areas as the cell phone locations are less accurate there. Even with these limitations though, it is still an excellent source of observed traveler information. Although the data in Figure 3 reflects projections to the year 2040, the trips represent a more complete picture of work travelers as opposed to only those using cellular devices as outlined above. For future planning purpose, both sets of data demonstrate trends and patterns that are important to be considered.

Figure 2: Frisco 2014 Observed Work Trip Origins and Destinations per Square Mile



Source: Connetics Transportation Group, Airsage 2014 Data

Figure 3: Frisco 2040 Forecast Work Trip Origins and Destinations per Square Mile



Source: Connetics Transportation Group, NCTCOG 2040 Mobility Plan Forecast Person Trips

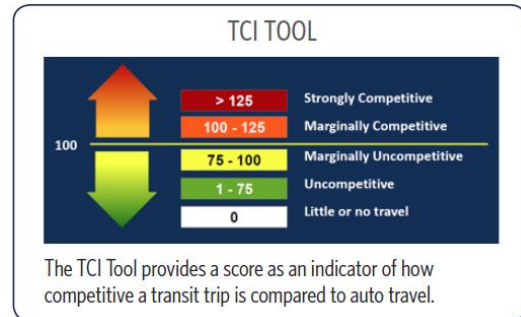


### 3.0 TRANSIT COMPETITIVENESS INDEX (TCI) AND MARKET POTENTIAL

The Transit Competitiveness Index (TCI) tool compares the relative desirability of a given transit trip versus the same trip made by auto. The TCI algorithm uses characteristics of the origin, trip, and destination to evaluate transit competitiveness, where:

- the origin characteristic is trip production density,
- the trip related characteristics are congestion and toll cost, and
- the destination related characteristics are trip attraction density, parking cost and parking availability.

The TCI is expressed as a single number incorporating many of the conditions that contribute to successful transit service. A high TCI score of more than 125 indicates that transit service between the two points has potential for generating significant ridership. Scores falling in the 75-125 range could be competitive if changes were made to some of the characteristics described above. Below 75 are generally not competitive markets for transit.



The TCI was calculated for a variety of key destinations with the Frisco area serving as the trip origin. In addition, segments were defined to further refine the TCI and provide a more detailed look at key travel patterns that could be served by the introduction of the Irving-Frisco Regional Rail Line, or other transit in the interim. This information is shown in Tables 1 and 2 below.

**Table 1: Transit Competitiveness Index (TCI) for Key Activity Centers from Frisco**

Destination	2040 Trips	TCI Value	TCI Policy Factors					
			Congestion	Parking Cost	Parking Time	Toll Cost	Production Density	Attraction Density
Legacy	9,666	184	35	-	2	10	18	101
Addison	14,512	151	96	-	3	39	10	85
Galleria/Tollway	3,519	141	39	-	6	34	8	112
Downtown Dallas	2,863	54	4	12	4	18	-	41

SOURCE: DART; Cambridge Systematics Regional TCI Analysis

The Legacy Business Area, which is in far North Plano, has a high TCI value primarily due to the high number of Frisco based person trips destined for that area in 2040 (9,666), and the corresponding Attraction Density value of 101. Other strong activity centers that are nearby, but not adjacent to the Irving-Frisco Regional Rail Line are Addison (with the highest number of trips at 14,512) and the Galleria/Dallas North Tollway area. These areas would be accessible via transfer to the Cotton Belt Line at the Downtown Carrollton Station. Finally, the TCI value for Downtown Dallas is shown to be very low as the number of daily trips from Frisco to the Dallas CBD in 2040 are predicted to be low (2,862). Figure

3 supports this shift in Frisco based trips to the Dallas CBD as it shows work trips being more concentrated north of LBJ Expressway and the George Bush Tollway. This is reflective of the growth forecast for 2040 employment in the north Dallas/south Collin County area. The shift in trip patterns is clear when comparing the observed Airside data in Figure 2 to the forecast 2040 data in Figure 3.

Table 2 shows the TCI score for origin-destination pairs from potential regional rail stations in and near Frisco. Given the high TCI shown for Galleria/Tollway, Legacy and Addison in Table 1, it is no surprise to see that confirmed again when looking at the rail stations connecting to those activity centers. The highest TCI is for the SRT/SH 121 area to Galleria/Tollway Activity Center (TCI=915.) Other strong candidates shown are to Addison and Legacy from the SRT/SH 121 area and from Downtown Frisco to the Legacy Activity Center. Again, connections to Downtown Dallas do not demonstrate high TCI for Frisco travelers, although SRT/SH 121 to Downtown Dallas is moderately competitive and could be met with the connection to the Green Line in downtown Carrollton.

**Table 2: TCI Results for Regional Rail Stations in/near Frisco**

Origin Station Area	Destination	2040 Trips	TCI Value	TCI Policy Factors					
				Congestion	Parking Cost	Parking Time	Toll Cost	Production Density	Attraction Density
SRT/SH 121	Galleria/Tollway Activity Center	4,955	915	581	-	47	232	373	559
SRT/SH 121	Addison Activity Center	4,649	506	271	-	18	114	252	261
SRT/SH 121	Legacy Activity Center	13,373	391	26	-	5	7	119	181
SRT/SH 121	Carpenter/Las Colinas Activity Center	1,031	247	164	-	16	80	169	133
Downtown Frisco	Legacy Activity Center	12,373	171	66	-	2	8	45	94
SRT/SH 121	Green Line North	3,143	164	81	-	2	36	112	42
SRT/SH 121	Orange Line West	1,697	145	95	-	9	48	99	56
Downtown Frisco	Addison Activity Center	3,982	121	52	-	2	28	9	83
North Frisco	Legacy Activity Center	3,802	117	51	-	2	19	4	64
SRT/SH 121	Downtown Dallas	521	96	8	26	7	30	24	75
Downtown Frisco	Downtown Dallas	807	64	6	16	5	21	1	47

SOURCE: DART; Cambridge Systematics Regional TCI Analysis

Similarly, a connection to the Orange Line in Las Colinas would serve the SRT/SH 121 to Orange Line West pattern, which has a competitive TCI score of 145. It should be noted that given that many of the competitive markets are south of Frisco along the Dallas North Tollway. As such, a more direct transit service using that facility could be a more attractive connection, although an exclusive transit right-of-way that avoids congested corridors may not be available or offer a competitive advantage over the Irving-Frisco regional rail corridor. These TCI values support the ridership results discussed in the following sections of this report. Based on this TCI analysis, the Frisco area shows to be a strong candidate for transit service in the future.

#### 4.0 REGIONAL RAIL CORRIDOR RIDERSHIP ANALYSIS

The Irving-Frisco Regional Rail line is projected to carry nearly 16,000 daily riders in 2040. This is the highest ridership of all regional rail lines evaluated for the DART 2040 Transit System Plan and comparable to the ridership anticipated for TRE and Cotton Belt in the future. The Frisco portion of the line has three of the potential nine stations on the line: Virginia Parkway (North Frisco), Downtown Frisco and Sam Rayburn Tollway/SH121 (South Frisco). These three stations make up 43 percent of the daily total riders for the entire route in 2040. The highest ridership of the three stations is the Frisco CBD Station with approximately 2,700 daily riders. Providing park and ride opportunity is key for all three stations as most riders access the regional rail line by car (park and ride or kiss and ride). A limited bus network was assumed for the ridership projections. The feeder bus potential is strong at the Frisco CBD station, but even stronger at the Sam Rayburn Tollway/SH121 station in South Frisco. The access and egress activity for the Frisco stations is shown in Table 3.

**Table 3: Frisco Regional Rail 2040 Daily Riders and Station Access/Egress**

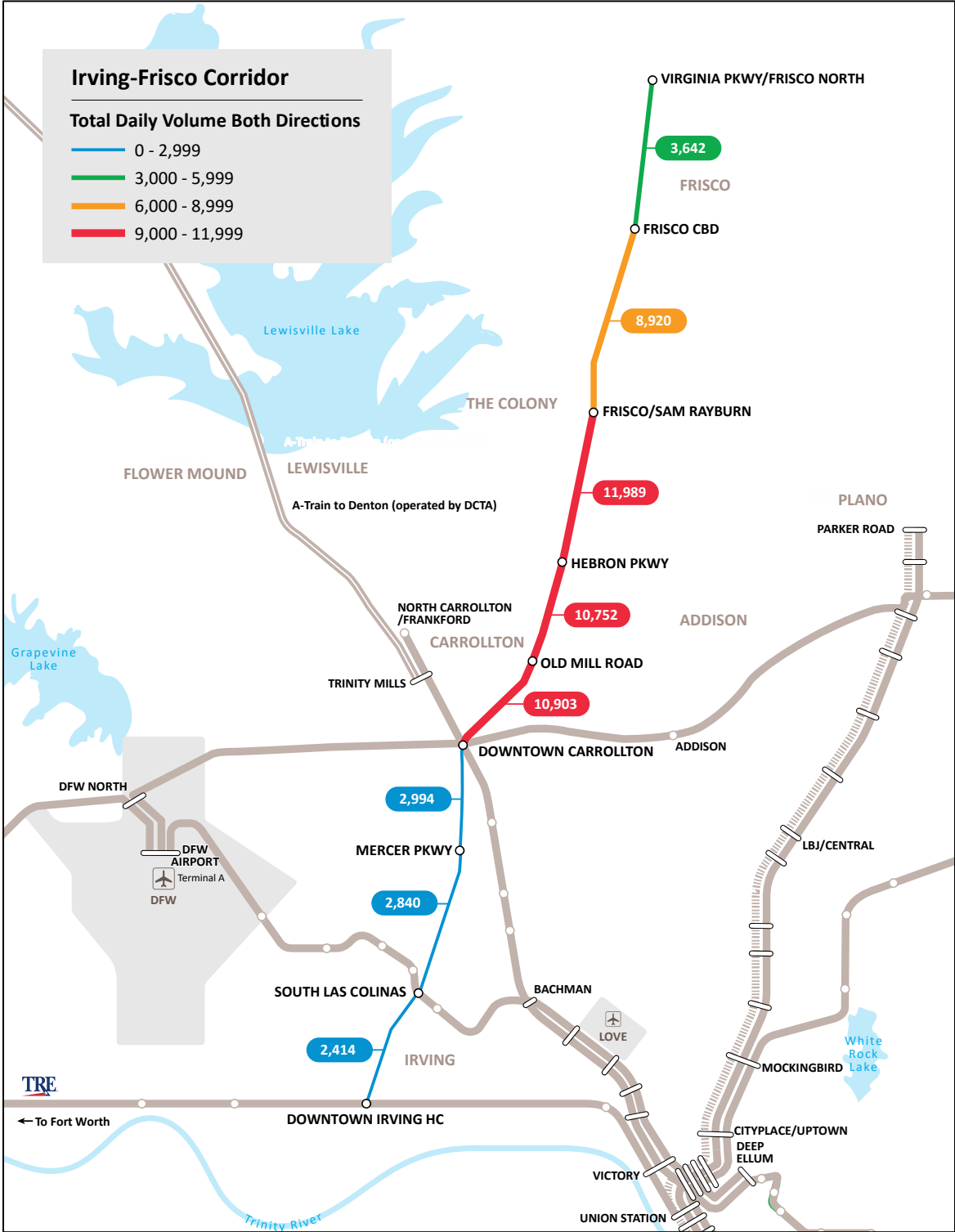
Station Name	Percentage by Mode of Access/Egress			
	Daily Ridership	Walk	Drive	Bus
North Frisco	1,821	31%	54%	15%
Frisco CBD	2,718	7%	71%	22%
SRT/SH 121 (South Frisco)	2,320	5%	45%	50%

Source: DART; Dunbar Transportation Consulting; regional model results from 2040 System Plan Run using Comprehensive Operations Analysis Regional Rail Base (COARR 2040)

Figure 4 shows the total daily volume for both directions along the corridor. The colors show the relative change along the corridor as access and egress occurs at each station. The highest volume sections occur north of the Downtown Carrollton Station heading into Frisco, supporting the future transit potential for Frisco and demonstrating the strong transfer activity in downtown Carrollton. The lowest volumes occur in the Irving area.



Figure 4: Irving-Frisco Regional Rail Corridor 2040 Daily Volumes



Source: HNTB; DART COARR 2040 Forecast; Daily Link Flows both Directions Combined

#### 4.1 DART Rail Interactions and Transfers

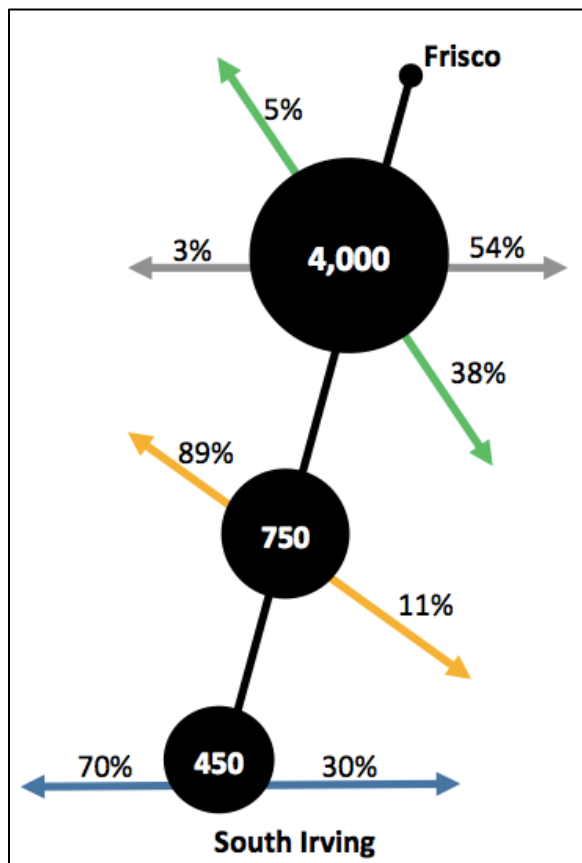
Moving south along the Irving-Frisco Regional Rail line, interactions with other rail lines are important. These interactions occur at three key locations:

- Downtown Carrollton Station with Cotton Belt and Green Line
- South Las Colinas Station (a deferred station) with Orange Line
- South Irving/Heritage Crossing Station with the TRE

Figure 5 illustrates the potential rail transfer activity at each of these locations in year 2040. As shown, Downtown Carrollton Station has the highest level of transfer activity with 4,000 riders moving between lines daily. Most riders are transferring to head east on the Cotton Belt Corridor towards Addison and the Galleria/Tollway area. As noted previously, both areas demonstrate a high TCI score and represent competitive markets for transit service. Approximately 38% transfer to head south on the Green Line toward employment centers in that corridor such as the Medical District, Downtown and Uptown.

Transfer activity drops as you head south with approximately 750 transfers at South Las Colinas, with most heading toward the Las Colinas area. Transfers are less with the TRE, with nearly 70% heading to the west since any trips to the east toward Dallas can be made further north with the Green or Orange Lines.

**Figure 5: Year 2040 Forecast Rail Transfer Activity Daily**



Given that Frisco is out of the DART Service Area, the performance of this corridor was tested with a terminus within the DART boundary near the Legacy/SH121 area. Key impacts with a shortened route are that ridership drops by 50%, drive trips to the three northern stations drop by 70% and transfers to the Cotton Belt line drop by 70%. This demonstrates the importance of northern communities being part of this system.

One of the critical factors to be considered when assessing the potential for regional rail opportunities like the Irving-Frisco Line is the impact the additional rail ridership/rail transfers might have on the DART system. DART Policy IV.14 *Access by Non-DART Shuttle Services from Outside of the Service Area* provides a mechanism for DART to work with cities or service providers whose riders are transferring onto the DART system to address any additional costs incurred because of these additional passenger loads. This DART Policy is implemented through Interlocal Agreement and would only be used if determined to be appropriate by DART and the non-DART jurisdiction.

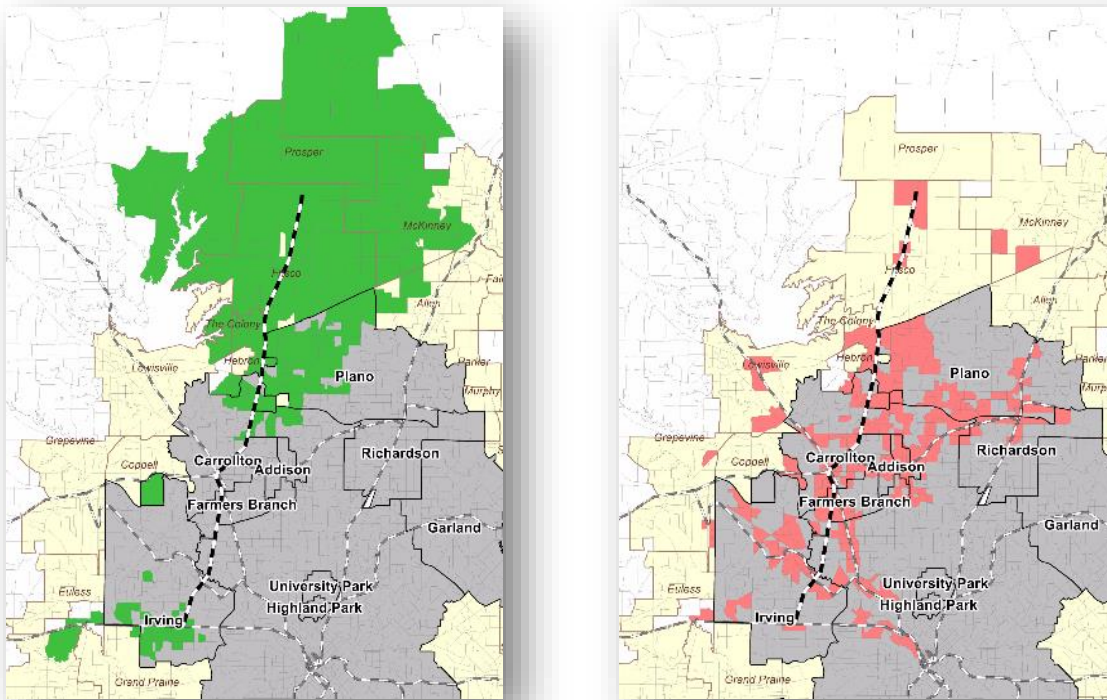
## 4.2 Rail Line Rider Analysis

Further analysis of the nearly 16,000 daily riders using the Irving-Frisco Regional Rail line is shown in the maps below (Figures 6, 7 and 8). This analysis was done using a year 2040 network that includes the committed DART system and regional rail corridors in the NCTCOG Mobility 2040 plan.

Figure 6 shows the origin/production (green zones) and destination/attraction (red zones) of all 16,000 daily riders for zones that have at least 10 trips. Figure 7 shows the origin and destination of the Irving-Frisco line riders boarding/alighting from the northernmost three Frisco Stations only (nearly 6,900 daily riders). Comparison of the maps in Figure 6 and 7 demonstrate the dominance of Frisco station activity on the entire corridor. There are a few origin zones in Figure 7 showing riders coming from the south Irving and Las Colinas areas, but the large green area surrounding the three Frisco stations remains nearly unchanged. Similarly, the distribution of the red destination zones under Figure 6 and 7 is nearly identical, demonstrating the significant influence the Frisco ridership has on the overall corridor performance.

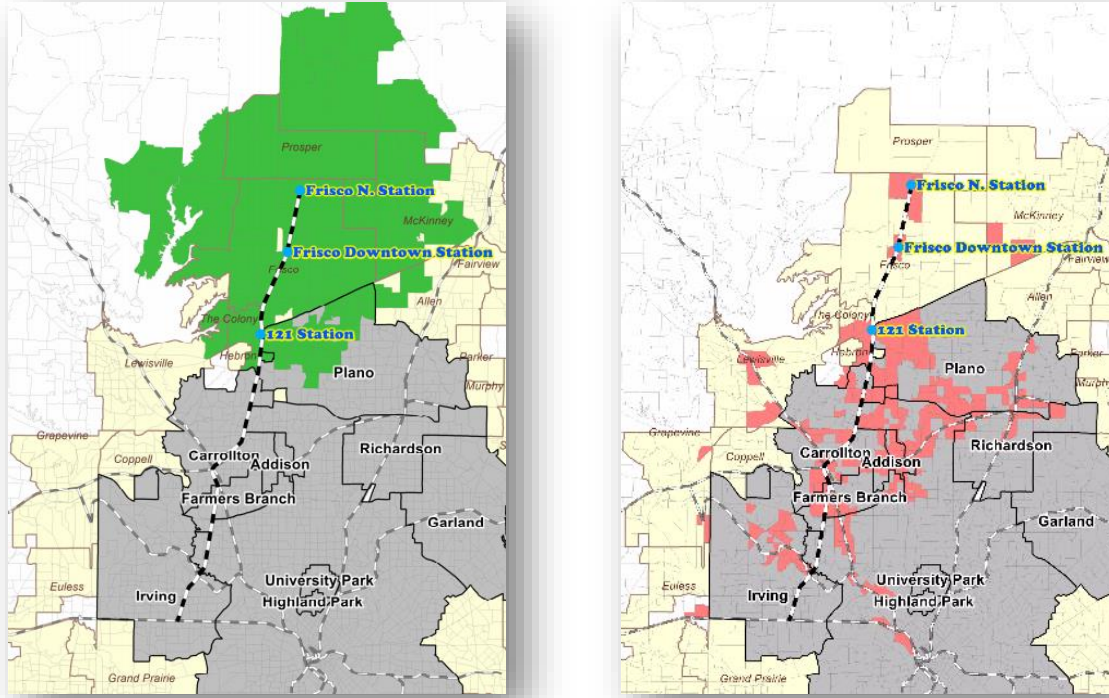
Figure 8 shows the riders boarding/alighting from the three Irving stations (2,300 daily riders). The green zones to the north represent riders getting on in Frisco and off at one of the three Irving Stations, shown in red. The smaller number of green and red zones in Figure 8 is to be expected given the lower ridership activity at the three Irving Stations when compared to the others along the corridor. Seventy eight percent of all productions (green zones) for the Irving-Frisco line come from outside the DART Service area, while 90 percent of the attractions (red zones) land within the DART service area.

**Figure 6: Irving-Frisco Regional Rail Travel Patterns**



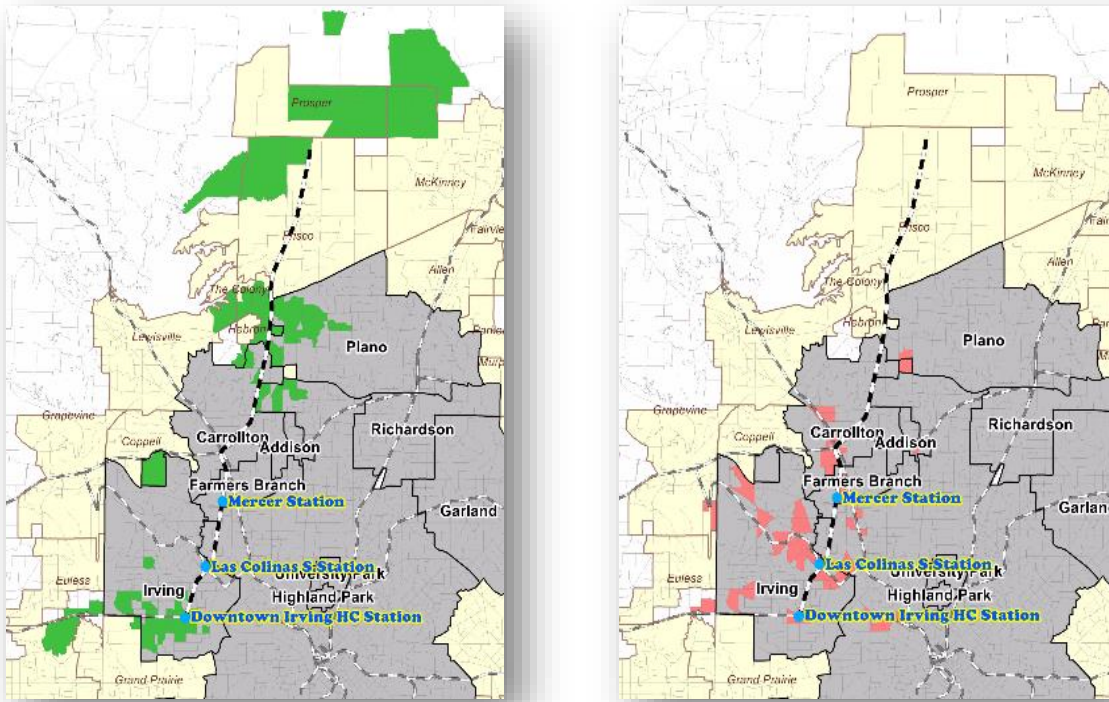
Source: 2040 COARR Forecast Daily Transit Trip Origins and Destinations; DART Selected Link Analysis trips using Irving-Frisco Regional Rail; Highlighted zones contain 10 or more daily transit trip origins/destinations

**Figure 7: Frisco Stations Only Travel Patterns**



Source: 2040 COARR Forecast Daily Transit Trip Origins and Destinations; DART Selected Link Analysis trips using only Frisco stations on Irving-Frisco Regional Rail; Highlighted zones contain 10 or more daily transit trip origins/destinations

**Figure 8: Irving Stations Only Travel Patterns**

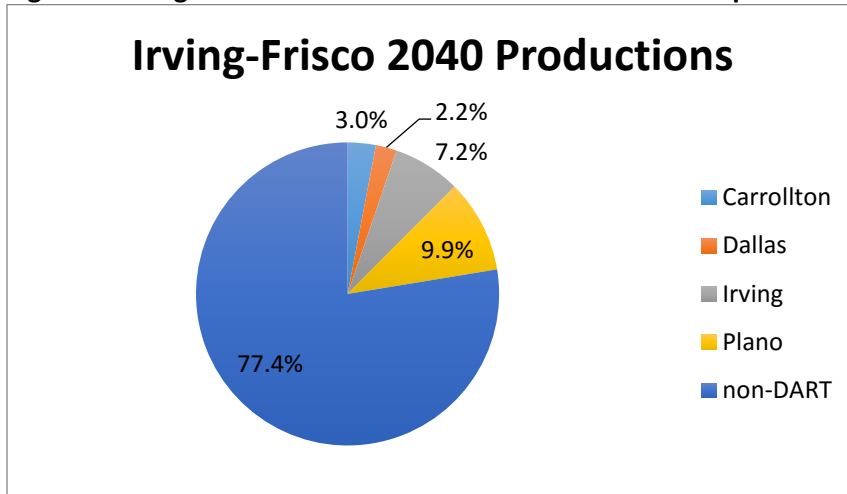


Source: 2040 COARR Forecast Daily Transit Trip Origins and Destinations; DART Selected Link Analysis trips using only Irving stations on Irving-Frisco Regional Rail; Highlighted zones contain 10 or more daily transit trip origins/destinations



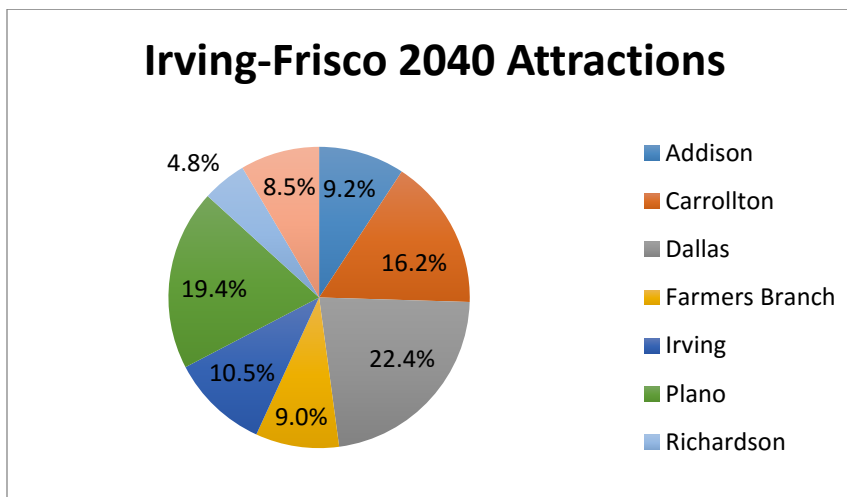
Another way to view this information is shown in Figures 9 and 10 below. The pie chart clearly shows the distribution of the nearly 16,000 Irving-Frisco line riders in terms of where they are coming from (productions) and going to (attractions). This is the same data reflected in the Figure 6 maps. Again, most trips along the rail line begin (productions) outside the DART Service Area and end (attractions) inside.

**Figure 9: Irving-Frisco Rail Corridor - Distribution of 2040 Trips Produced**



Source: 2040 COARR Forecast Daily Transit Trip Origins; DART Selected Link Analysis trips using Irving-Frisco Regional Rail;

**Figure 10: Irving-Frisco Rail Corridor - Distribution of 2040 Trips Attracted**



Source: 2040 COARR Forecast Daily Transit Trip Destinations; DART Selected Link Analysis trips using Irving-Frisco Regional Rail;

This demonstrates the potential benefit to both Frisco and DART by providing this connection. However, further investigation of the first and last mile connections will be important to minimize transfers are limited and optimize access.



## 5.0 SUMMARY

This report has demonstrated the transit potential of providing a regional rail connection from Frisco into the DART Service Area along the Irving-Frisco Regional Rail Line. The growth anticipated for Frisco over the planning horizon (2040) is significant and the opportunity to provide transportation options to residents great. To summarize:

- The competitiveness of transit compared to auto is shown to be high for areas just south of Frisco (Plano Legacy Business Area) and for other key activity centers further to the south (Galleria/Tollway, Addison, Las Colinas).
- Transit access to these competitive market areas would benefit from Irving-Frisco Regional Rail Line.
- Nearly 16,000 daily riders are anticipated for Irving-Frisco Regional Rail in 2040.
- Majority of riders (78%) begin their trip in Frisco and end within the DART Service Area.
- Distribution of riders ending in DART is balanced between Dallas, Plano, Carrollton, Irving, Addison and Farmers Branch; showing the benefit of the Irving-Frisco Line to DART cities.
- Rail station access and egress modes are predominantly walk, drive and bus with drive being the most pronounced for the Frisco stations. First mile/last mile planning is important to capitalize on feeder bus options and provide appropriate facilities for parking and transfers.
- DART Policy IV.14 will be important for evaluating possible cost sharing scenarios if the Irving-Frisco Line is implemented, as demonstrated by the large share of Frisco oriented ridership on the line and the number of riders transferring onto the DART network.
- Green Line, Orange Line, Cotton Belt and TRE are all impacted by added passenger activity due to rail-to-rail transfers from Irving-Frisco Line at key stations. Transfer activity, station platform connections and additional infrastructure or service needs would need to be further evaluated as the project is defined.