

# Transit Accessibility Improvement Tool User Guide

2013-2017 AMERICAN COMMUNITY SURVEY EDITION  
NORTH CENTRAL TEXAS COUNCIL OF GOVERNMENTS

## What is NCTCOG?

The **North Central Texas Council of Governments (NCTCOG)** is a voluntary association of, by, and for **local governments** within the 16-county North Central Texas Region. The agency was established by state enabling legislation in 1966 to assist local governments in **planning** for common needs, **cooperating** for mutual benefit, and **coordinating** for sound regional development. Its purpose is to strengthen both the individual and collective power of local governments, and to help them recognize regional opportunities, resolve regional problems, eliminate unnecessary duplication, and make joint regional decisions – as well as to develop the means to implement those decisions.

North Central Texas is a 16-county **metropolitan region** centered around Dallas and Fort Worth. The region has a population of more than 7 million (which is larger than 38 states), and an area of approximately 12,800 square miles (which is larger than nine states). NCTCOG has 229 member governments, including all 16 counties, 167 cities, 19 independent school districts, and 27 special districts.

NCTCOG's **structure** is relatively simple. An elected or appointed public official from each member government makes up the **General Assembly** which annually elects NCTCOG's **Executive Board**. The Executive Board is composed of 17 locally elected officials and one ex-officio non-voting member of the legislature. The Executive Board is the policy-making body for all activities undertaken by NCTCOG, including program activities and decisions, regional plans, and fiscal and budgetary policies. The Board is supported by policy development, technical advisory and study **committees** – and a professional staff led by **R. Michael Eastland**, Executive Director.



NCTCOG's offices are located in Arlington in the Centerpoint Two Building at 616 Six Flags Drive (approximately one-half mile south of the main entrance to Six Flags Over Texas).

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### **NCTCOG's Department of Transportation**

Since 1974 NCTCOG has served as the Metropolitan Planning Organization (MPO) for transportation for the Dallas-Fort Worth area. NCTCOG's Department of Transportation is responsible for the regional planning process for all modes of transportation. The department provides technical support and staff assistance to the Regional Transportation Council and its technical committees, which compose the MPO policy-making structure. In addition, the department provides technical assistance to the local governments of North Central Texas in planning, coordinating, and implementing transportation decisions.

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*The contents of this report reflect the views of the authors who are responsible for the opinions, findings, and conclusions presented herein. The contents do not necessarily reflect the views or policies of the Federal Highway Administration, the Federal Transit Administration, or the Texas Department of Transportation.*

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### Surface Transportation Technical Committee

**Kristina Holcomb, Chair**  
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## About the Transit Accessibility Improvement Tool

Certain demographic groups may be more likely to rely on public transit services to meet their daily needs than others. These demographic groups include those without access to a vehicle and those who are unable to drive. NCHRP Report 532, *Effective Methods for Environmental Justice Assessment*, states that transportation disadvantage refers to “people who face significant, unmet transportation needs” (2004). According to the report, possible indicators of transportation disadvantage include non-drivers, low-income persons, and persons with disabilities.

The Transit Accessibility Improvement Tool (TAIT) is a methodology to map concentrations of transportation disadvantaged individuals based on demographic traits and to point to areas with a greater potential need for public transit. The tool covers the 16-county North Central Texas Council of Governments (NCTCOG) region.

## Methodology

The TAIT base layer is composed of three variables: percent of the population below poverty (also referred to as low income), percent of the population with a disability, and percent of the population age 65 and over. The three variables were chosen based on NCHRP Report 532. Data for the TAIT is from the American Community Survey (ACS) 5-year estimates.

To determine transportation disadvantaged populations, a regional percentage of each variable is calculated by totaling the number of individuals in a variable and dividing this number by the variable’s total population. Block groups are symbolized based on the number of variables for which the block group’s population is above the regional percentage.

Variable	Percent	Table—American Community Survey 5-Year Estimates
<b>Below Poverty</b>	18.34%	C17002
<b>Persons with Disabilities</b>	9.71%	B18101
<b>Age 65 and Over</b>	10.64%	B01001

### Below Poverty

The below poverty population includes any individual whose household income is at or below the poverty threshold that is determined by the Department of Health and Human Services. The Department of Health and Human Services does not provide spatial data associated with the number of people below the poverty level. Therefore, ACS data must be used. The poverty threshold used by the ACS may be less inclusive than the Department of Health and Human Services poverty level in some years and/or in some household sizes; therefore, the TAIT uses as a low-income threshold 125 percent of the ACS poverty level. This poverty threshold is being used by NCTCOG for the first time with the 2013-2017 American Community Survey Edition of the TAIT; therefore, comparisons of low-income populations should not be made with previous editions of the TAIT.

The universe used for determining the regional percentage of individuals below the poverty level is the number of individuals for whom poverty status is determined. Percentages were calculated in this way

because poverty status is not known for the region's total population; percentages could be underestimated had total population been used.

### **Persons with Disabilities**

Persons with disabilities includes civilian, non-institutionalized individuals with at least one disability that may limit the individuals' ability to care for themselves. The universe used for determining the regional percentage of persons with disabilities is the total population of civilian, non-institutionalized individuals of all ages. Due to data limitations, data is taken from the Census tract level and extrapolated to the Census block group level. The distribution of the total population of each block group in a tract is used to determine the number of disabled persons. This method makes the false assumption that the population of disabled persons within each census tract follows the same distribution as the total population in the block groups. When referring to this data specifically, discuss the population in terms of the Census tract rather than the block group.

### **Age 65 and Over**

The age 65 and over population includes all individuals who identified themselves as age 65 or older.

### **Additional Information on Potential Transit Need**

Additional demographic information could help identify potential transit need. These overlay layers include:

- *Zero-Car Households*: The number of housing units that have no vehicle available. The total number of occupied housing units was used to determine the regional percentage.
- *Persons Aged 14 and Under*: All persons aged 14 and younger.
- *Veteran Population*: Any person who has served on active duty in the US Army, Navy, Air Force, Marine Corps, or the Coast Guard, or who has served in the US Merchant Marine during World War II but is not now serving.
- *Population Density*: Persons per square mile of land area in each block group.

### **Calculating the Ratio to Regional Percentage**

A column that calculates the block group's relation to the regional percentage exists for each layer. This column offers data that can indicate a concentration of potential transit need. The ratio is calculated by dividing the block group's percentage for a layer by the regional percentage for that layer. For example:

*A block group in Dallas County has a population that is 27.78 percent Age 65 and Over. The regional percentage for the population Age 65 and Over is 10.64 percent. The ratio is calculated this way:*

$$27.78 \div 10.64 = 2.61$$

*This shows that the block group's percentage of residents Age 65 and Older is more than two-and-a-half times the regional percentage.*

The regional percentage and ratio to the regional percentage are provided for the TAIT variables and for layers providing additional information on potential transit need.

### **Displaying the Results**

The three core TAIT variables are displayed using the following symbology. In mapping, this symbology should be retained:

Symbology	Relationship to TAIT Variable's Regional Percentage
No color	≤ Regional Percentage for All Variables
Gray	> Regional Percentage for One Variable
Mauve	> Regional Percentage for Two Variables
Purple	> Regional Percentage for Three Variables

Layers providing additional information on potential transit need are symbolized in gold, with all block groups outlined in gold. Block groups above the regional percentage for the selected layer are also shaded with gold.

Population density is mapped in the tool using shades of gray; darker shades indicate a higher population density. Unlike NCTCOG's Environmental Justice Index, this layer is not intended to be visualized in conjunction with the TAIT base layer.

## Title VI-Related Layers

The TAIT also provides an overlay layer providing data to support transit agencies' compliance with Title VI of the Civil Rights Act of 1964. The Title VI layer provides data on race, ethnicity, and English proficiency.

- *Racial or ethnic minority groups:*
  - American Indian or Alaska Native Race
  - Asian Race
  - Black or African American Race
  - Hispanic or Latino Ethnicity
  - Native Hawaiian or Other Pacific Islander Race
  - Some Other Race (non-white)
  - Two or More Races (could include white)
- *Total Minority: The sum of the number of individuals who are Hispanic or Latino and the number of non-Hispanic and non-Latino individuals who identify as one of the above minority race categories. This prevents double-counting of Hispanics or Latinos who also identified themselves as a race or races other than white.*
- *Limited English Proficient (LEP) Populations: Individuals who speak English less than "very well"*
  - Total LEP Population
  - Spanish Languages LEP Population
  - Asian Languages LEP Population
  - Other Indo-European Languages LEP Population
  - Other Languages LEP Population

The regional percentage and ratio to the regional percentage are not provided for the Title VI-related layers because these numbers may not be relevant for an equity analysis within a transit agency's individual service area.

### Displaying the Title VI-Related Layers

This layer is symbolized by outlining all block groups with green.

## Transit Service Area Layers

The TAIT tool includes service areas for transit providers, including on-demand providers, in the 16-county NCTCOG region. These are provided to allow providers without Geographic Information Systems software to use the TAIT to observe demographics within their own service area.

### Displaying the Service Area Layers

Layers identifying service areas for transit providers are symbolized by outlining areas in red. Users can filter to a single transit service area by clicking on the filter icon in the top left corner of the map and selecting a transit provider.

## Benefits of the TAIT

The TAIT allows users to locate potential transit-dependent populations based on demographic traits, including income, age, and disability. Transit planners can use the tool as a preliminary indicator of where service should be evaluated. Because the geographic scale for the index is at the block group level, both local and regional planners can utilize the TAIT effectively for their area of interest. Title VI-related layers aid users in fulfilling nondiscrimination requirements under Title VI of the Civil Rights Act of 1964.

## Limitations of the TAIT

The TAIT should not be used to determine what type of transit service should be located at a specific location; rather, the tool should be used as an initial screening tool to locate potential transit users. Further analysis, such as public outreach, field visits, and modeling, should be conducted to determine the appropriate level of transit service. Additionally, there is no ‘critical’ percentage of population for the TAIT variables that indicates a need for transit. Rather, the geographic area analyzed should depend on your project goals and scope.

## Distinguishing between the Environmental Justice Index and TAIT

The TAIT should not be confused with NCTCOG’s Environmental Justice Index (EJI); the tools are composed of different variables and have different regional coverage and intended uses. The EJI differs from the TAIT in the following ways:

EJI	TAIT
12-County Metropolitan Planning Area	16-County NCTCOG Region
Variables: Total Minority, Low-Income	Variables: Below Poverty, Age 65 and Over, Persons with Disabilities
Uses: Preliminary screening tool to address environmental justice responsibilities identified in Executive Order 12898 and related guidance	Uses: Preliminary screening tool to identify areas of potential transit need



## Conclusion

The TAIT can be used to identify demographic traits that suggest greater potential need for public transit. If the tool is used appropriately, local and regional planners will have a better picture of where transportation needs exist in their jurisdiction.

## Appendix

### Reference

National Cooperative Highway Research Program. “NCHRP Report 532: Effective Methods for Environmental Justice Assessment.” Washington D.C.: Transportation Research Board, 2004.

### Regional Percentages and Data Sources

Variable	16-County Regional Percentage	Table—American Community Survey 5-Year Estimates
<b>TAIT Layer</b>		
Age 65 and Over	10.64%	B01001
Below Poverty (Low Income)	18.34%	C17002
Persons with Disabilities	9.71%	B18101
<b>Additional Potential Transit Need Layers</b>		
Age 14 and Under	22.15%	B01001
Veterans	4.86%	B21001
Zero-Car Households	4.89%	B25044
<b>Title VI Layer</b>		
Hispanic or Latino	N/A	B03002
LEP Asian Language	N/A	B16004
LEP Other Indo-European Language	N/A	B16004
LEP Other Language	N/A	B16004
LEP Spanish	N/A	B16004
LEP Total	N/A	B16004
Total American Indian or Alaska Native	N/A	B03002
Total Asian	N/A	B03002
Total Black or African American	N/A	B03002
Total Minority	N/A	B03002
Total Native Hawaiian or Other Pacific Islander	N/A	B03002
Total Some Other Race	N/A	B03002
Total Two or More Races	N/A	B03002

### Data Dictionary

TAIT users who download the Geographic Information System layers will find column headers containing user-friendly aliases. Some actions, such as using geoprocessing tools to clip the layers to the service area of a transit provider, will remove those aliases. The Data Dictionary provides the non-alias column headers that correspond with each alias. The Data Dictionary also provides definitions of the demographic groups that comprise the core variables and overlay layers.

Alias Field	GIS Non-Alias Field	Description
<b>Fields Found in Most Attribute Tables</b>		
GEOID10	GEOID10 (or some variation)	A unique set of 12 numbers that identify a Census block group (and the state, county, and Census tract the block group is nested within).
Total Population	Total_Pop	The total number of people living in the Census block group. Used as the "universe" (or the bottom/denominator of the fraction) for calculating several layers.
Census Tract ID	TractID	A unique set of 11 numbers that identify a Census tract (and the state and county the Census tract is nested within).
County	County	The name of the county the Census block group or Census tract is located within.
<b>Additional Fields found in TAIT Layer</b>		
Age 65 and Over	Age65Over	The sum of all individuals in the block group who are age 65 and older.
Percent Age 65 and Over	Pct65_Over	The share of the block group's population that is age 65 and older.
Ratio Age 65 and Over to Regional Percentage	Rat_65Over	A block group's relation to the regional age 65 and over percentage with 1 equaling the regional percentage. Block groups with a value greater than 1 are above the regional percentage. Block groups with a value less than 1 are below the regional percentage.
Above Regional Percentage Age 65 and Over	ARP_65Over	A "Y" indicates the block group's percentage is greater than the regional percentage for share of the population age 65 and over. An "N" indicates the block group's percentage is less than or equal to the regional percentage.
Individuals for Whom Poverty Status is Known	TotPSK	The total number of individuals for whom poverty status is known; typically smaller than the block group's or region's total population. Used as the "universe" (or the bottom/denominator of the fraction) for the below poverty layer.
Total Below Poverty	BlwPov	The sum of all individuals whose household income in the past 12 months was below 125 percent of the US Census poverty threshold. This is inclusive of individuals whose household income in the past 12 months was below the US Department of Health and Human Services poverty threshold.

Alias Field	GIS Non-Alias Field	Description
Percent Below Poverty	Pct_BlWPov	The share of the population whose household income in the past 12 months was below 125 percent of the US Census poverty threshold. This is inclusive of the share of the population whose household income in the past 12 months was below the US Department of Health and Human Services poverty threshold.
Ratio Below Poverty to Regional Percentage	Rat_BlWPov	A block group's relation to the regional below poverty percentage with 1 equaling the regional percentage. Block groups with a value greater than 1 are above the regional percentage. Block groups with a value less than 1 are below the regional percentage.
Above Regional Percentage Below Poverty	ARP_BlWPov	A "Y" indicates the block group's percentage is greater than the regional percentage for share of the below poverty population. An "N" indicates the block group's percentage is less than or equal to the regional percentage.
Tract Total Population	TotPopTract	The total number of people living in the Census tract. Used as the "universe" for persons with disabilities because this data is not available at the block group scale.
Persons with Disabilities	Sum_PWD	The sum of all civilian, non-institutionalized individuals who identified themselves as having at least one disability that may limit their ability to care for themselves.
Percent Persons with Disabilities	Pct_PWD	The Census tract's share of the civilian, non-institutionalized population who identified themselves as having at least one disability that may limit their ability to care for themselves.
Ratio Persons with Disabilities to Regional Percentage	Rat_PWD	A block group's relation to the regional persons with disabilities percentage with 1 equaling the regional percentage. Block groups with a value greater than 1 are above the regional percentage. Block groups with a value less than 1 are below the regional percentage. Due to data limitations, this data is extrapolated from the Census tract to the block group. This method makes the false assumption that the population of persons with disabilities is evenly distributed within each Census tract. When referring to this data specifically, discuss the population in terms of the Census tract rather than the block group.

Alias Field	GIS Non-Alias Field	Description
Above Regional Percentage Persons with Disabilities	ARP_PWD	A "Y" indicates the Census tract's percentage is greater than the regional percentage for share of the population with a disability. An "N" indicates the Census tract's percentage is less than or equal to the regional percentage.
<b>Additional Fields Found in Population Density Layer</b>		
Population Density	ACS_PopDen	The number of individuals per square mile of land area in the block group.
<b>Additional Fields Found in Additional Potential Transit Need Layers</b>		
Civilian Population 18 and Over	Pop18Over	The number of individuals age 18 and older who are not currently serving in the US Army, Navy, Air Force, Marine Corps, or the Coast Guard. This serves as the "universe" (or the bottom of the fraction/denominator) for calculating the percent veteran population.
Total Veteran Population	TotalVet	The number of individuals who have served on active duty in the US Army, Navy, Air Force, Marine Corps, or the Coast Guard, but who are not now serving.
Percent Veteran Population	Pct_Vet	The share of the Census tract's population that identified themselves as having served on active duty in the US Army, Navy, Air Force, Marine Corps, or the Coast Guard, but who are not now serving.
Ratio Veteran Population to Regional Percentage	Rat_Vet	A block group's relation to the regional veteran population percentage with 1 equaling the regional percentage. Block groups with a value greater than 1 are above the regional percentage. Block groups with a value less than 1 are below the regional percentage.
Total Households	TotalHH	The total number of households (or occupied housing units) in the block group. This serves as the "universe" (the bottom of the fraction/denominator) for calculating the percent zero car households.
Zero Car Households	NoCar	The total number of households in the block group with no working vehicle.
Percent Zero Car	Pct_NoCar	The share of the block group's households that identified as having no working vehicle.

Alias Field	GIS Non-Alias Field	Description
Ratio Zero Car to Regional Percentage	Rat_NoCar	A block group's relation to the regional zero car percentage with 1 equaling the regional percentage. Block groups with a value greater than 1 are above the regional percentage. Block groups with a value less than 1 are below the regional percentage.
Total Population Age 14 and Under	Age14Under	The total number of individuals age 14 or younger in the block group.
Percent Age 14 and Under	Pct14_Unde	The share of the block group's population that is age 14 or younger.
Ratio Age 14 and Under to Regional Percentage	Rat_14Unde	A block group's relation to the regional age 14 and under percentage with 1 equaling the regional percentage. Block groups with a value greater than 1 are above the regional percentage. Block groups with a value less than 1 are below the regional percentage.
<b>Additional Fields Found in Title VI Layer</b>		
Total Minority	TotalMin	The sum of all individuals who identified themselves as having Hispanic ethnicity or as any racial group other than white.
Percent Total Minority	Pct_TotMin	The share of the block group population that identified themselves as having Hispanic ethnicity or as any racial group other than white.
Total Hispanic or Latino	Hispanic	Includes individuals who identify their ethnicity as belonging to Mexican; Puerto Rican; Cuban; Dominican; Salvadoran; Guatemalan; Argentinean; Colombian; Spaniard; or other Hispanic, Latino, or Spanish cultures or origins, regardless of race.
Percent Total Hispanic or Latino	Pct_Hisp	The share of the population who identify their ethnicity as belonging to Mexican; Puerto Rican; Cuban; Dominican; Salvadoran; Guatemalan; Argentinean; Colombian; Spaniard; or other Hispanic, Latino, or Spanish cultures or origins, regardless of race.
Total Black or African American Population	TotBlk	Includes individuals who identify their race as Black or African American and individuals who identify their race as Black or African American and identify their ethnicity as Hispanic or Latino.

Alias Field	GIS Non-Alias Field	Description
Percent Total Black or African American Population	Pct_TotBlk	The share of the population who identify their race as Black or African American and who identify their race as Black or African American and identify their ethnicity as Hispanic or Latino.
Total American Indian or Alaska Native Population	TotAI	Includes individuals who identify their race as American Indian or Alaska Native and individuals who identify their race as American Indian Alaskan Native and their ethnicity as Hispanic or Latino.
Percent Total American Indian or Alaska Native	Pct_TotAI	The share of the population who identify their race as American Indian or Alaska Native and individuals who identify their race as American Indian Alaskan Native and their ethnicity as Hispanic or Latino.
Total Asian Population	TotAsian	Includes individuals who identify as having origins in any of the original people of the Far East, Southeast Asia, or the Indian subcontinent and individuals who identify their race as Asian and their ethnicity as Hispanic or Latino.
Percent Total Asian	Pct_TotAsn	The share of the population who identify as having origins in any of the original people of the Far East, Southeast Asia, or the Indian subcontinent and individuals who identify their race as Asian and identify their ethnicity as Hispanic or Latino.
Total Native Hawaiian or Other Pacific Islander	Tot_HPI	Includes individuals who identify as having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands and individuals who identify their race as Native Hawaiian or Other Pacific Islander and identify their ethnicity as Hispanic or Latino.
Percent Total Native Hawaiian or Other Pacific Islander	Pct_TotHPI	The share of the population who identify as having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands and individuals who identify their race as Native Hawaiian or Other Pacific Islander and identify their ethnicity as Hispanic or Latino.

Alias Field	GIS Non-Alias Field	Description
Total Some Other Race Population	TotOther	Includes individuals who identify themselves as a race other than White; Black or African American; American Indian or Alaska Native; Asian; or Native Hawaiian or Other Pacific Islander. Respondents reporting entries such as multiracial, mixed, interracial, or a Hispanic or Latino group (for example, Mexican, Puerto Rican, Cuban, or Spanish) in response to the race question are included in this category.
Percent Some Other Race	Pct_TotOth	The share of the population who identify their race as Some Other Race or who reported their race as multiracial, mixed, interracial, or a Hispanic or Latino group (for example, Mexican, Puerto Rican, Cuban, or Spanish).
Total Two Races Population	Tot2Race	Includes individuals who identify their race as Two or More Races, including individuals who identified one of their races as Some Other Race. This category also includes individuals who identify their race as Two or More Races and individuals who identify their race as Two or More Races and their ethnicity as Hispanic or Latino.
Percent Total Two Races	Pct_Tot2Ra	The share of the population who identify their race as Two or More Races, including individuals who identified one of their races as Some Other Race. This category also includes individuals who identify their race as Two or More Races and identify their ethnicity as Hispanic or Latino.
Total Population 5 Years	PopOver5	The total population of individuals age 5 years and older.
Total LEP Population	TotalLEP	Individuals age 5 years and older who do not speak English as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Percent Total LEP	Pct_TotLEP	The share of the population age 5 years and older who do not speak English as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.



Alias Field	GIS Non-Alias Field	Description
Total Spanish LEP Population	SpanishLEP	Individuals age 5 years and older who speak Spanish as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Percent Spanish LEP	Pct_SpLEP	The share of the population age 5 years and older who speak Spanish as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Total Indo-European LEP Population	IELEP	Individuals age 5 years and older who speak an Indo-European language other than Spanish as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Percent Total Indo-European LEP	Pct_IE_LEP	The share of the population age 5 years and older who speak an Indo-European language other than Spanish as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Total Asian LEP Population	AsianLEP	Individuals age 5 years and older who speak an Asian or Pacific Island language as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Percent Total Asian LEP	Pct_AsnLEP	The share of the population age 5 years and older who speak an Asian or Pacific Island language as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Total Other LEP Population	OtherLEP	Individuals age 5 years and older who speak a language other than English, Spanish, Indo-European, Asian, or Pacific Island as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.
Percent Total Other LEP	Pct_OthLEP	The share of the population age 5 years and older who speak a language other than English, Spanish, Indo-European, Asian, or Pacific Island as their primary language and who reported that their ability to read, speak, write, or understand English is less than “very well”.