

As part of the Chicago Neighborhoods 2015 (CN2015) project, the **Institute for Housing Studies at DePaul University** collected data and built metrics to help The Chicago Community Trust and the City of Chicago understand existing conditions across a range of capital planning issue areas. These data on conditions can be used to inform the case for intervention strategies and compare needs across submarkets.

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METRIC DESCRIPTIONS

Descriptions found below are intended as a narrative explanation of the data presented in each metric and includes some guidance in how each should be interpreted as well as the geographic resolution of the data in the accompanying spreadsheet. For a more in-depth accounting of data sources and means of calculation, please see the Data Sources and Methodology section on page 7.

1. DEMOGRAPHICS

1.1 – Total Population, 1970 to 2010 – Counts of all people living in a geography. Change in population over time is foundational to understanding the changing demand for housing, transportation, jobs, and public goods in an area. These data are provided as counts at both the census tract and district levels.

1.2 – Population Aged 17 Years and Under, 1970 to 2010 – Share of the population aged under age 18. Beyond the reasons given for tracking population change overall, tracking the share of the population that consists of children is important given the specific needs of this population. These data are provided as a count at the census tract level and as a share at the district level.

1.3 – Population Aged 60 Years or Older, 1970 to 2010 – Share of the population age 60 or older. Beyond the reasons given for tracking population change overall, tracking the share of the population that consists of seniors is important given the specific needs of this population. These data are provided as a count at the census tract level and as a share at the district level.

1.4 – Population in Poverty, 1970 to 2010 – Represents the share of the population below the official poverty line in a geography. Measured over time, this metric speaks to the level of economic distress present in a geography. Changing levels of poverty over time is an indicator of increasing or decreasing economic well-being for area residents. Additionally, a high level of concentrated poverty is important to monitor given the increased difficulties in access to housing and need for services characteristic of populations with high levels of poverty, as well as existing policy goals directed at deconcentrating poverty. These data are provided as a count at the census tract level and as a share at the district level.

1.5 – Population Aged 25 Years or Older by Educational Attainment, 2012 – For all adults aged 25 and older, the shares of an area's population by their highest level of education attainment (population is limited to adults 25 years or older as persons under age 25 are more likely to still be enrolled in school). This metric may inform trends related to income and employment in a geography. These data are provided as a count at the census tract level and as a share at the district level.

1.6 – Average Household and Family Size, 2012 – Represents the range of average numbers of household residents and family size for tracts in a geography. Beyond its value as an indicator of population size and density, household size can inform other metrics such as those pertaining to economic well-being, family size and composition, or age. Average household and family size can be

affected by the types of housing units available in an area and should be viewed in conjunction with that data. These data are provided as a mean at the census tract level and minimum, median, and maximum mean values are provided for tracts within each district.

1.7 – Race and Ethnicity, 2010 – Share of district population by the race or ethnicity by which residents identify. This metric provides a snapshot of the racial and ethnic composition of the population as of the 2010 census. These data are provided as a count at the census tract level and as a share at the district level.

1.8 – Households by Income Level, 2012 – Shares of households earning incomes divided into six income cohorts. This metric provides an understanding of the range, as well as the concentration or diversity of incomes earned by households in a geography. These data are provided as a count at the census tract level and as a share at the district level.

2. HOUSING

2.1 – Housing Units by Occupancy Status and Tenure, 1970 to 2010 – Shares of housing units by vacancy status and tenure, either owned or rented. Change over time measures trends in demand for housing generally, as well as different forms of housing tenure within a geography. These data are provided as a count at the census tract level and as a share at the district level.

2.2 – Price Trends for Single Family Homes, 1997 to 2013 – This metric measures changes in prices of single family homes over time. Price index values are calculated from data on single family properties with repeat sales from the first quarter of 1997 through the second quarter of 2014 and are seasonally adjusted. Changes in house prices are one of the most significant indicators of the broader health of regional and neighborhood economies, and understanding trends in house prices is important for creating policies that are responsive to the dynamics of the housing markets in different communities. These data are available at the district level only for districts with enough single family properties to reliably calculate a quarterly index value.

2.3 – Share of Total Addresses vs. Share of Long-Term Vacant Addresses, 4Q 2013 – Shares of the total number of addresses and the total number of long-term vacant addresses in a geography. Comparing these two values demonstrates the relative concentration or absence of long-term vacant addresses in a geography relative to its share of total addresses. This relationship, if higher shares of long-term vacant addresses are present, is an indicator of concentrated levels of housing distress and low demand for housing. These data are provided as a count at the census tract level and as a share at the district level.

2.4 – Cumulative Levels of Foreclosure Activity, 2005 to 2013 – This represents the annually reported cumulative percent of parcels impacted by foreclosure since 2005. Measuring foreclosure activity in this way allows for an assessment of the degree to which a given area has been impacted by foreclosure throughout the crisis, is an indicator of the level of distress in a market, and allows for comparison

across geographies that may have different densities of residential properties. Areas with significant concentrations of foreclosure distress also typically have had significant declines in house prices, high levels of long-term vacancy and extremely low-value transactions, and low levels of mortgage credit. These data are only available at the district level.

2.5 – Composition of Residential Units by Building Type, 2013 – Data on the housing stock provides context about the underlying characteristics of a neighborhood’s housing market and helps in the interpretation of patterns and trends in property sales, mortgage lending activity, foreclosure filings, and completed auctions activity. This metric can help determine the appropriate targeted strategies for stabilizing local housing markets, preserving and creating affordable rental housing, and promoting neighborhood investment. These data are only available at the district level.

2.6 – Composition of City of Chicago Parcels by Property Type, 2013 – Data on land use in an area provides context about the underlying characteristics of a geography’s economic, social, and physical role in the city and helps in the interpretation of patterns and trends in the area. This metric represents the share of total land square footage by type and provides a mechanism to assess current basic land use. Based on their classification in Cook County Assessor data, each parcel is coded as a residential, commercial, industrial, vacant, or a tax-exempt property. These data are only available at the district level.

2.7 – Annual Levels of Mortgage Activity on Residential Parcels, 2005 to 2013 – This metric represents a normalized level of mortgage lending in an area per 100 residential parcels. Mortgage activity data measures the flow of mortgage credit into an area and is indicative of the level of lender investment. The level of mortgage activity in a neighborhood relative to other areas can be used to assess how access to credit has changed over time in a community and how the flow of credit differs across geographies and for different property types within a geography. These data are only available at the district level.

2.8 – Composition of Purchase Type and Acquisition Method, 2005 to 2013 – Represents the characteristics of residential property sales on an annual basis. Transactions are classified in one of four ways depending on the circumstances of their transfer – financed or acquired with cash, and purchased out of a foreclosure distressed situation or non-distressed. This metric relates to the availability of traditional mortgage lending in a community, the level of likely investor activity in an area, and the overall level of foreclosure distress experienced in a local housing market. These data are only available at the district level.

2.9 – Annual Levels of Low Value Sales on Non-Condominium Residential Properties, 2005 to 2013 – This metric represents the share of all non-condo transactions that had sales prices less than \$20,000. Areas with higher shares of extremely low-value transactions likely suffer from weak demand and are therefore susceptible to other problems symptomatic of weak markets like foreclosure, vacancy, and high levels of investor buying. These data are only available at the district level.

2.10 – Population Paying More Than 30 Percent of Their Income Toward Housing Cost by Tenure, 2012

– Represents the share of the population devoting 30 percent or more of their income to housing costs by tenure. This measures the relative burden that paying for housing places on households in a particular area and can be an indicator of high housing costs, troubled economic circumstances among households, or a mixture of both. These data are provided as a count at the census tract level and as a share at the district level.

2.11 – Median Gross Rent, 2012 – Represents a range of median gross rents, in 2012 dollars, for tracts in a geography. Gross rent includes utilities and other costs borne by the tenant in addition to rent payments. Gross rents paid are indicative of the relationship between the demand for and supply of rental units in a particular area. As these data are calculated by the Census Bureau at the tract level, reliable district-level mean rent calculations are not available and the range of values is substituted. These data are provided as a mean at the census tract level and as minimum, median, and maximum median values at the district level.

3. TRANSPORTATION

3.1 – Method of Transportation to Work for Employed Population Aged 16 Years or Older, 2012 – This metric communicates how workers commute between home and work. This is an indicator of the availability of transportation resources as well as the reliability of those transportation resources, and can assist in the interpretation of employment metrics. These data are provided as a count at the census tract level and as a share at the district level.

3.2 – Population within ½ Mile of Rail Transit, 2010 – This metric represents the share of the total population in an area with easy access to rail transit. This speaks to the availability of housing near rail stations and the regional access that this proximity may provide. These data are provided as a count at the census tract level and as a share at the district level.

3.3 – Households by Vehicle Availability, 2012 – This metric represents the share of households that own at least one automobile and, when considered with other metrics, may demonstrate limited access to transportation resources in a geography. In areas with low rates of automobile ownership, the provision of transit is more necessary to ensure accessibility to economic opportunities throughout the region. These data are provided as a count at the census tract level and as a share at the district level.

3.4 – Commuting Workers, Aged 16 Years or Older with Commutes Longer than 60 Minutes, 2012 – This metric represents the share of workers whose commute to employment is more than one hour. Excessively long commute times may indicate limited access to alternative transportation, availability or cost of housing near employment, or job/industrial centers that have relocated away from regional housing resources. These data are provided as a count at the census tract level and as a share at the district level.

3.5 – Average Distance to Work, 2011 – This metric calculates the average distance traveled between work and home for residents of a geography. Viewed in tandem with the share of workers whose commute exceeds 60 minutes, areas with more significant transportation needs can be identified (i.e., those with relatively short to moderate distance commutes but a large share of the population with a commute exceeding 60 minutes). These data are provided as an average only at the district level.

4. PUBLIC GOODS

4.1 – Population within ½ Mile of Open Space, 2010 – This represents the share of the population in an area with easy access to open space resources. This is an indicator of the accessibility of the local open space network to the population. These data are provided as a count at the census tract level and as a share at the district level.

4.2 – Acres of Open Space per 1,000 Residents, 2010 – Represents a normalized measure of acres of open space per 1,000 residents. This metric is a measurement of the demand placed on the open space resources in a neighborhood by the nearby population. The number of acres per 1,000 residents is a normalized value and can be compared across geographies to assess where needs for additional open spaces exist. Combined with measures of population within ½ mile of open space, this metric can indicate how well a neighborhood’s open space is distributed throughout a geographic area. These data are only available at the district level.

5. EMPLOYMENT

5.1 – Employed Workers by Industry, 2011 – This metric represents the distribution of resident workers employed, classified by the NAICS codes associated with the industry in which they work. This is an indicator of the relative importance of certain industries to the economic well-being of a geography. These data are provided as counts at both the census tract and district levels.

5.2 – Unemployment Rate, Civilian Labor Force, 2012 – This metric represents the share of workers actively searching for, but unable to find a job. This is an indicator of the level of economic distress in a geography. These data are provided as a count at the census tract level and as a share at the district level.

5.3 – Private Sector Workers, 2005 to 2011 – This metric represents the total number of resident workers employed in private industry by year. Measuring how the employment base has changed over time provides an indicator as to the health of the local economy and how that health is impacting local workers. These data are provided as counts at both the census tract and district levels.

5.4 – Industries by Number of Workers Employed, 2005 and 2011 – This represents the counts of total employment in a geography by industry in a sortable format. The composition of this list, as well as the

overall size of their employment figures, indicates the relative importance of different industries in an area. Moreover, the changing nature of this list, both its composition as well as employment figures, provide an indicator of how the local mix of firms has changed over the study period. These data are provided as counts at the district level. Note that due to formatting constraints, this metric is presented as its own standalone file.

5.5 – District Jobs Held by District Residents, 2011 – This metric represents the share of jobs in an area filled by individuals living in the area and may indicate the accessibility of local job opportunities to the local population. These data are provided as a share at the district level.

6. RETAIL/COMMERCIAL REAL ESTATE

6.1 – Commercial Real Estate Square Footage by Use and Occupancy, 2005 Q4* and 2013 Q4 –

Represents the total square footage of commercial space by use and share of total square footage occupied for 4Q 2005 and 4Q 2013. The combination of occupancy rate and use is an indicator as to the desirability of commercial space in an area. Areas with low demand will likely see higher vacancy levels and lower-rent tenants than would an area of high demand. These data are only available at the district level. *Note that data on retail space only extends back to 2006, therefore the historic period for retail is Q4 2006 rather than Q4 2005.

DATA SOURCES AND METHODOLOGY

1. DEMOGRAPHICS

1.1 – Total Population, 1970 to 2010

Source: US2010 Project at Brown University, Longitudinal Tract Data Base (LTDB), Full data for 1970-2010.

Frequency of Updates: The data are updated after each decennial census.

Description: Brown University’s Longitudinal Tract Database provides full count and sample count census data for the years 1970-2010, adjusted to 2010 census tract boundaries. Further reading on the methodology employed is available at the LTDB’s website [here](#) and [here](#).

Total population by census tract is available in the full count dataset. Population counts are provided for each decennial census in the variable “POP##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts for census tracts in each given year were aggregated up to the level of CN2015 districts and rounded to the nearest whole number if the total number was a decimal (a result of the conversion process to 2010 tracts) to find the total district population by census year.

1.2 – Population Aged 17 Years and Under, 1970 to 2010

Source: US2010 Project at Brown University, Longitudinal Tract Data Base (LTDB), Full data for 1970-2010.

Frequency of Updates: The data are updated after each decennial census.

Description: Brown University’s Longitudinal Tract Database provides full count and sample count census data for the years 1970-2010, adjusted to 2010 census tract boundaries. Further reading on the methodology employed is available at the LTDB’s website [here](#) and [here](#).

Total population and population 17 years and under by census tract are available in the full count dataset. Population counts are provided for each decennial census in the variable “POP##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of population 17 years and under are provided for each decennial census in the variable “A18UND##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of each variable at tract levels in each census year were aggregated up to CN2015 districts and rounded to the nearest whole number (a result of the conversion process to 2010 tracts) to find the total population

and population 17 years and under by census year. Share of population 17 years and under was found by dividing population 17 years and under by total population at the CN2015 district level.

1.3 – Population Aged 60 Years or Older, 1970 to 2010

Source: US2010 Project at Brown University, Longitudinal Tract Data Base (LTDB), Full data for 1970-2010.

Frequency of Updates: The data are updated after each decennial census.

Description: Brown University’s Longitudinal Tract Database provides full count and sample count census data for the years 1970-2010, adjusted to 2010 census tract boundaries. Further reading on the methodology employed is available at the LTDB’s website [here](#) and [here](#).

Total population and population 60 years and over by census tract are available in the full count dataset. Population counts are provided for each decennial census in the variable “POP###” adjusted to 2010 census tract boundaries (with “###” signifying the year: 70, 80, 90, 00, or 10). Counts of population 60 years and over are provided for each decennial census in the variable “A60UP###” adjusted to 2010 census tract boundaries (with “###” signifying the year: 70, 80, 90, 00, or 10). Counts of each variable at tract levels in each census year were aggregated up to CN2015 districts and rounded to the nearest whole number (a result of the conversion process to 2010 tracts) to find the total district population and population 60 years and over by census year. Share of population 60 years and over was found by dividing population 60 years and over by total population at the CN2015 district level.

1.4 – Population in Poverty, 1970 to 2010

Source: US2010 Project at Brown University, Longitudinal Tract Data Base (LTDB), Sample data for 1970-2010.

Frequency of Updates: The data are updated after each decennial census.

Description: Brown University’s Longitudinal Tract Database provides full count and sample count census data for the years 1970-2010, adjusted to 2010 census tract boundaries. Further reading on the methodology employed is available at the LTDB’s website [here](#) and [here](#).

Population in poverty and population for whom poverty status is determined by census tract are available in the sample count dataset. Population in poverty is provided for each decennial census in the variable “NPOV###” adjusted to 2010 census tract boundaries (with “###” signifying the year: 70, 80, 90, 00, or 10). Counts of population for whom poverty status is determined is provided for each decennial census in the variable “DPOV###” adjusted to 2010 census tract boundaries (with “###” signifying the year:

70, 80, 90, 00, or 10). Counts of each variable at tract levels in each census year were aggregated up to CN2015 districts and rounded to the nearest whole number (a result of the conversion process to 2010 tracts) to find the total district population in poverty and total population for whom poverty status is determined by census year. Share of population in poverty was found by dividing population in poverty by population for whom poverty status is determined at the CN2015 district level.

1.5 –Population Aged 25 Years or Older by Educational Attainment, 2012

Source: 2012 5 Year American Community Survey, Table B15002 - Sex by Educational Attainment for the Population 25 Years and Over.

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Counts provided for Male and Female separately. Counts for each sex for each field were summed to create total counts for each tract. Counts of individuals 25 years or older by educational attainment were aggregated at the tract, then CN2015 district levels. The categories “No schooling completed”; “Nursery to 4th grade”; “5th and 6th grade”; “7th and 8th grade”; “9th grade”; “10th grade”; “11th grade”; and “12th grade, no diploma” were combined into “Less than High School Diploma.” The categories “Some college, less than 1 year” and “Some college, 1 or more years, no degree” were combined into “Some College, No Degree.” All other fields remain as presented from the Census Bureau. Shares were calculated by dividing population in each aggregated category by the population 25 years or older at the CN2015 district level.

1.6 –Average Household and Family Size, 2012

Source: 2012 5 Year American Community Survey, Table S1101 - Households and Families

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Mean household size and mean family size are provided at the tract level in ACS results. Among all of the tracts in each CN2015 district, the minimum average household size and the maximum average household size are reported. The median average household size of tracts within each district is reported as well. The process is repeated for average family size.

The minimum, median, and maximum values are reported because it is not possible to calculate a true median for CN2015 districts based on data from the ACS. It would only be possible to calculate a mean

of medians which is not a true median value. Calculating a mean of medians discounts the differentials in population that occurs among census tracts and therefore builds in a potentially significant error.

1.7 – Race and Ethnicity, 2010

Source: 2010 Decennial Census, SF1, Table DP-1 - Profile of General Population and Housing Characteristics: 2010.

Frequency of Updates: The data are updated after each decennial census.

Description: Counts for population by race and ethnicity are provided by census tract. Population is first segmented by Hispanic/Latino identification. Anyone identifying as “Hispanic or Latino,” regardless of race, is classified as “Hispanic or Latino.” Anyone identifying as “Not Hispanic or Latino” is classified into one of five racial groups: “White alone”; “Black or African American alone”; “Asian Alone”; “Other Alone” (the sum of “American Indian and Alaska Native alone,” “Native Hawaiian and Other Pacific Islander alone,” and “Some Other Race alone”), and “Two or More Races.” Counts by racial or ethnic category by tract were aggregated to CN2015 districts. Shares were calculated by dividing the total population in each of the aggregated categories by the total population in the CN2015 district.

While these data are also available via the annual ACS, the figures from the Decennial Census were selected for two reasons. First, the greater accuracy that comes with Decennial Census counts versus estimates from the ACS outweighed the relative gain from an annual update for this metric. Additionally, it was thought best to align this metric with the total population figures provided in Metric 1.1 which also relies on Decennial Census counts.

1.8 – Households by Income Level, 2012

Source: 2012 5 Year American Community Survey, Table B19001 - Household Income in the Past 12 Months (in 2012 Inflation-Adjusted Dollars).

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Counts of households by income category were aggregated at the tract, then CN2015 district levels. The categories “Less than \$10,000”; “\$10,000 to \$14,999”; “\$15,000 to \$19,999”; and “\$20,000 to \$24,999” were combined into “Households Earning Less than \$25,000.” The categories “\$25,000 to \$29,999”; “\$30,000 to \$34,999”; “\$35,000 to \$39,999”; “\$40,000 to \$44,999”; and “\$45,000 to \$49,999” were combined into “Households Earning \$25,000 to \$49,999.” The categories “\$50,000 to \$59,999” and “\$60,000 to \$74,999” were combined into “Households Earning \$50,000 to \$74,999.” The

categories “\$100,000 to \$124,999” and “\$125,000 to \$149,999” were combined into “Households Earning \$100,000 to \$149,999.” The categories “\$150,000 to \$199,999” and “\$200,000 or More” were combined into “Households Earning \$150,000 or More.” All other fields remain as presented from the Census Bureau. Shares were calculated by dividing total households in each aggregated category by the total number of households in the geography.

2. HOUSING

2.1 – Housing Units by Occupancy Status and Tenure, 1970 to 2010

Source: US2010 Project at Brown University, Longitudinal Tract Data Base (LTDB), Full data for 1970-2010.

Frequency of Updates: The data are updated after each decennial census.

Description: Brown University’s Longitudinal Tract Database provides full count and sample count census data for the years 1970-2010, adjusted to 2010 census tract boundaries. Further reading on the methodology employed is available at the LTDB’s website [here](#) and [here](#).

Count of total housing units, vacant housing units, occupied housing units, owner-occupied housing units, and renter-occupied housing units by census tract are available in the full count dataset. Counts of total units are provided for each decennial census in the variable “HU##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of vacant housing units are provided for each decennial census in the variable “VAC##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of occupied housing units are provided for each decennial census in the variable “OHU##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of owner-occupied housing units are provided for each decennial census in the variable “OWN##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of renter-occupied housing units are provided for each decennial census in the variable “RENT##” adjusted to 2010 census tract boundaries (with “##” signifying the year: 70, 80, 90, 00, or 10). Counts of each variable at tract levels in each census year were aggregated up to CN2015 districts and rounded to the nearest whole number (a result of the conversion process to 2010 tracts) to find the total number of housing units, vacant housing units, occupied housing units, owner-occupied housing units, and renter-occupied housing units by census year. Counts of occupied and vacant housing units should be equal to total housing units. Counts of owner-occupied and renter-occupied housing units should be equal to total occupied housing units. Share of occupied housing units was found by dividing count of occupied housing units by total housing units at the CN2015 district level. Share of vacant housing units was found by dividing the count of vacant housing units by total housing units at the CN2015 district level. Share of owner-occupied housing units was found by dividing count of owner-occupied housing units by occupied housing units at the CN2015

district level. Share of renter-occupied housing units was found by dividing the count of renter-occupied housing units by occupied housing units at the CN2015 district level.

2.2 – Price Trends for Single Family Homes, 1997 to 2013

Source: IHS Calculations of Data from Cook County Recorder of Deeds via Property Insight, Midwest Real Estate Data, and Cook County Assessor

Frequency of Updates: Not applicable as data are proprietary.

Description: Price trends for single family homes are derived from the IHS Cook County House Price Index and reflect calculations of data on single family properties with repeat sales from the first quarter of 1997 through the fourth quarter 2013. More detail on how the Index is calculated can be found [here](#). Index values are normalized to 100 for prices in 2000 Q1. This facilitates the calculation of price changes from 2000 Q1 to any subsequent point in time. For instance, in 2005 Q1, the Calumet district's index value was 155.12. This indicates that prices for single family homes in Calumet increased by 55.12 percent between 2000 Q1 and 2005 Q1. The index data are seasonally adjusted, so price trends can be calculated between any two points in time. Price trends for the Bronzeville, Central Area, Near West Side, North Lakefront and Pilsen/Little Village districts were unable to be calculated because these areas have a smaller share of total residential housing units in single family homes and therefore too few single family sales to reliably calculate an index.

2.3 – Share of Total Addresses vs. Share of Long-Term Vacant Addresses, 4Q 2013

Source: IHS calculations of data from HUD/USPS

Frequency of Updates: Not applicable as data are proprietary.

Description: Counts of total residential addresses and residential addresses vacant for more than 24 months are provided at the tract level. Q4 2013 counts of total residential addresses and residential addresses vacant for more than 24 months are aggregated up to CN2015 districts and City of Chicago totals. Each CN2015 district's share of the City of Chicago's total residential addresses was calculated by dividing the district's count of residential addresses by City of Chicago's count of residential addresses. Each CN2015 district's share of the City of Chicago's total residential addresses vacant for more than 24 months was calculated by dividing the district's count of residential addresses vacant for more than 24 months by City of Chicago's count of residential addresses vacant for more than 24 months.

Note: the universe of residential parcels provided by the USPS vacancy data is different from the residential parcel universe in the IHS Data Clearinghouse due to different primary sources.

2.4 – Cumulative Levels of Foreclosure Activity, 2005 to 2013

Source: IHS Calculations of Data from Cook County Recorder of Deeds via Property Insight, Record Information Services, Cook County Assessor.

Frequency of Updates: Not applicable as data are proprietary.

Description: For the period 2005 to 2013, every parcel that has experienced at least one foreclosure filing is aggregated up to tract levels and then CN2015 district levels. Shares were calculated by dividing the total number of parcels experiencing at least one foreclosure filing by the total number of residential parcels in the geography.

2.5 – Composition of Residential Units by Building Type, 2013

Source: IHS Calculations of Data from Cook County Assessor.

Frequency of Updates: Not applicable as data are proprietary.

Description: Residential parcels are classified as Single Family, Condo, 2 to 4 Unit, or 5+ Unit buildings, based on their classification in Cook County Assessor data. Counts of units associated with each parcel are aggregated at the tract, then CN2015 district levels. Shares are calculated by dividing the unit total for each building type by the count of units within the CN2015 district. Within IHS data, any multi-unit building made up of condominium units is classified as a condo building; any multi-unit building not made up of condominium units is assumed to be a multi-unit rental building and is classified by the number of units it contains.

2.6 – Composition of City of Chicago Parcels by Property Type, 2013

Source: IHS Calculations of Data from Cook County Assessor.

Frequency of Updates: Not applicable as data are proprietary.

Description: All parcels are classified as Exempt/Not For Profit, Vacant, Residential, Commercial, or Industrial based on their classification in Cook County Assessor data. Totals of parcel square footages by use classification were aggregated at the census tract level then the CN2015 district level.

Note on exempt properties: Tax exempt properties make up a substantial portion of the land within Cook County and largely consist of properties owned by government agencies and nonprofit organizations such as educational and religious institutions. This class also includes railroad property, which is not exempt from taxes, but is classified as such in assessor data since it is assessed by the State instead of the County Assessor Office. Areas with a large concentration of exempt properties likely

include land uses such as public parks, forest preserves, highways, university campuses, hospitals, airports, rail yards, public housing projects, stadiums, museums, public buildings, or government-owned vacant lots.

2.7 – Annual Levels of Mortgage Activity on Residential Parcels, 2005 to 2013

Source: IHS Calculations of Data from Cook County Recorder of Deeds via Property Insight, Cook County Assessor.

Frequency of Updates: Not applicable as data are proprietary.

Description: Count of mortgages by year among residential parcels are aggregated up to the tract, then CN2015 district levels. Count of total mortgages in the geography are divided by the total number of residential parcels and multiplied by 100. The result is a figure of ‘mortgages per 100 residential parcels,’ a normalized figure that enables comparison across geographies.

2.8 – Composition of Purchase Type and Acquisition Method, 2005 to 2013

Source: IHS Calculations of Data from Cook County Recorder of Deeds via Property Insight, Cook County Assessor, Record Information Services, Midwest Real Estate Data (MRED)

Frequency of Updates: Not applicable as data are proprietary.

Description: Transactions are classified in one of four ways depending on the circumstances of their transfer – cash or financed, and distressed or non-distressed. Financed sales are sales associated with a mortgage, cash sales are all sales for which no accompanying mortgage has been identified. Distressed sales are sales out of REO inventory, short sales, deed-in-lieu of foreclosure, or other transactions out of or to avoid the foreclosure process, whereas non-distressed sales consist of all other sales. Every transaction for each year is classified as one of the following:

- Cash, Distressed;
- Cash, Non-Distressed;
- Financed, Distressed;
- Financed, Non-Distressed.

Counts of each transaction type are aggregated at the tract, then CN2015 district by year. Shares are calculated by dividing the count of each transaction type by the total number of transactions at the CN2015 district level.

For more information on the way cash sales and distressed sales are defined in IHS Data Clearinghouse, please review the IHS report [Cash or Credit: The Role of Cash Buyers in Cook County's Housing Market](#).

2.9 – Annual Levels of Low Value Sales on Non-Condominium Residential Properties, 2005 to 2013

Source: IHS Calculations of Data from Cook County Recorder of Deeds via Property Insight, Cook County Assessor.

Frequency of Updates: Not applicable as data are proprietary.

Description: Total transactions on all non-condominium residential properties are aggregated at the tract, then CN2015 district level. Among non-condo sales, the subset with sales prices less than \$20,000 are identified and classified as ‘extremely low value transactions.’ Shares are calculated by dividing extremely low value non-condominium transactions by all non-condominium transactions in the geography. Condominium units are excluded from this metric due to the comparatively low price of condominium units relative to other housing types.

2.10 – Population Paying More Than 30 Percent of Their Income Toward Housing Cost by Tenure, 2012

Source: 2012 5 Year American Community Survey, Table B25106 - Tenure by Housing Costs as a Percentage of Household Income in the Past 12 Months.

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Counts are provided of the number of households paying “Less than 20 percent,” “20 to 29 percent,” and “30 percent or more” of their income for housing in one of five income brackets, organized by tenure. For each tenure class, the numbers of households paying “Less than 20 percent” or “20 to 29 percent” of their income for housing across all income brackets were summed; similarly, all households paying “30 percent or more” of their income for housing across all income brackets were summed. Households in other situations, either with “Zero or negative income” or “No cash rent” (in the case of renters), were classified as “Other.” Shares were calculated by dividing the counts of each of the three aggregated categories for each tenure- “Less than 30 Percent,” “30 Percent or More,” or “Other”- by the total number of households at the CN2015 district level.

2.11 –Median Gross Rent, 2012

Source: 2012 5 Year American Community Survey, Table B25064 - Median Gross Rent (Dollars).

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Median gross household rent is provided at the tract level in ACS results. Among all of the tracts in each CN2015 district, the minimum median gross rent and the maximum median gross rent are reported. The median gross rent of tracts within each district is reported as well.

Median gross rent includes the base rent plus any additional costs associated with utilities to reflect the more complete cost of renting a unit in that location. Since the census figures used do not control for the type of unit, areas with more single family homes being rented may indeed have higher rental costs due to the higher utility costs associated with that building type. Therefore, when considering the median gross rents for each geography, it is important to consider the building types typical in that area.

The minimum, median, and maximum values are reported because it is not possible to calculate a true mean for CN2015 districts based on data from the ACS. It would only be possible to calculate a mean of medians which is not a true mean value. Calculating a mean of medians discounts the differentials in population that occurs among census tracts and therefore builds in a potentially significant error. Note that while most values are numeric for tract level values, in one tract the value is listed as 'Greater than \$2,000'. Caution should be used therefore when performing operations on this field.

3. TRANSPORTATION

3.1 – Method of Transportation to Work for Employed Population Aged 16 Years or Older, 2012

Source: 2012 5 Year American Community Survey, Table B08006 - Sex of Workers by Means of Transportation to Work

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Counts are provided for all workers 16 Years of age and older, divided on the basis of their means of transportation to work, as well as for workers segmented by gender. Only the total population of workers are used; Male and Female counts are discarded. Counts of workers aged 16 years or older by their means of travel to work were aggregated at the tract, then CN2015 district levels. The total number of workers aged 16 years or older is presented as “Population of Workers, 16 Years of Age and Older” in the CN2015 table. The category “Worked at Home,” the count of workers working from home and therefore not commuting, is subtracted from the total count to generate a new category in the tract-level table named “Population of Commuting Workers, 16 Years of Age and Over,” which serves as the denominator in share calculations. Counts of subclasses under the census categories “Carpooled” and “Public Transportation (excluding taxicab)” were discarded. The subclasses of “Public Transportation” include counts of individuals using subway/elevated train, railroad, and bus which may have meaningful implications for Chicago and could be worthwhile to aggregate separately in the future.

Shares were calculated by dividing total workers in each aggregated category by the total number of commuting workers in the geography.

3.2 – Population within ½ Mile of Rail Transit, 2010

Source: 2010 Decennial Census, SF1, Table P1 – Total Population; City of Chicago Data Portal Shapefiles of CTA Stations, Metra Stations, and City of Chicago Street Network; 2010 TIGER/Line Shapefiles of Cook County Census Blocks.

Frequency of Updates: Block population data are updated after every decennial census. At the point of project completion, the shapefiles of CTA Stations, Metra Stations, and the City of Chicago Street Network were last updated on January 29th 2014, September 7th 2012, and July 31st 2013, respectively; there is no update schedule available. TIGER/Line Shapefiles of Cook County Census Blocks are updated after every decennial census and released in the third quarter of the same year.

Description: Count of population within ½ mile of a CTA or Metra rail station. Census blocks are the unit of geography used in the analysis. Each block's geographic centroid is understood to represent that block, therefore the distance between the centroid and the nearest transit station equals the 'average' distance all residents in that block are from the nearest transit station. Distance from the census block centroid to the nearest CTA or Metra station was calculated via the street network geography provided by the City of Chicago via the Data Portal. Counts of census blocks, and therefore block populations, within ½ mile of a transit stop were aggregated from among all blocks located within each CN2015 district. Shares were calculated by dividing the population in blocks within ½ mile of a transit station in a CN2015 district by the population of all blocks within a CN2015 district.

Additional information on the technical steps used to generate the distances for each census block centroid to the nearest transit station is available in the Technical Appendix to this document.

3.3 – Households by Vehicle Availability, 2012

Source: 2012 5 Year American Community Survey, Table B08201 - Household Size by Vehicles Available.

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Counts of the number of households by the number of vehicles available are given at the tract level in the following categories: "No vehicle available"; "1 vehicle available"; "2 vehicles available"; "3 vehicles available"; "4 or more vehicles available." Counts of households by vehicle availability are also provided by household size ("1-person household," "2-person household," etc.), but

only figures for total households are used. Counts of households by vehicles available for each census tract are aggregated to the CN2015 district level. Shares of households by vehicle availability are calculated by dividing the count of households in each category of vehicle availability by the total number of households in the CN2015 district. The counts of households with any number of vehicles, as in all households that are not in the “No vehicle available” category, can be added together and divided by the total number of households in order to calculate the share of households with at least one vehicle available.

3.4 – Commuting Workers, Aged 16 Years or Older with Commutes Longer than 60 Minutes, 2012

Source: 2012 5 Year American Community Survey, Table B08012 - Sex of Workers by Travel Time to Work.

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Count of workers in each census tract that are 16 years and over and who did not work at home, in total as well as segmented by gender, are divided into categories based on the travel time (commute) to work. Only the total population of workers who did not work at home are used; Male and Female counts are discarded. The categories are as follows: “Less than 5 minutes”; “5 to 9 minutes”; “10 to 14 minutes”; “15 to 19 minutes”; “20 to 24 minutes”; “25 to 29 minutes”; “30 to 34 minutes”; “35 to 39 minutes”; “40 to 44 minutes”; “45 to 59 minutes”; “60 to 89 minutes”; and “90 or more minutes.” Counts of workers at the census tract level in each commute time category were aggregated up to the CN2015 district level. Share of a district’s working population whose commute time exceeds 60 minutes was calculated by summing the count of workers commuting “60 to 89 minutes” and “90 or more minutes” and dividing this figure by the district’s total commuting population.

3.5 – Average Distance to Work, 2011

Source: Longitudinal Employer-Household Dynamics [LEHD], 2011 LODES7 Origin-Destination Data; 2010 TIGER/Line Shapefiles of Census Blocks.

Frequency of Updates: This dataset is typically released at the end of the year following the measured year. For example, 2015 data should be available at the end of 2016. However, the data for 2012 and 2013 have been delayed until January 2015.

Description: The Longitudinal Employer-Household Dynamics (LEHD) data provided by the Census Bureau includes data on all the jobs located within a geography as well as the jobs of residents that live within a geography. Using this information, LEHD publishes data that describes the origin-destination

trips of every census block linked by a worker (connecting a block where a worker works and where a worker lives). Records for every census block pair for a resident living in Cook County and working in Illinois, Indiana, Michigan, or Wisconsin were collected and aggregated into a single file. The Euclidean distance between the centroids of each census block in the pair was used as the distance traveled to work. This value is multiplied by the number of workers making that trip and aggregated at the CN2015 district level. The cumulative distances traveled by workers within each CN2015 district are divided by the total number of workers residing in that CN2015 district to generate the ‘average’ distance to work. Using Euclidean distance, it is understood this value will likely underestimate the distance traveled to work but will provide a relatively accurate distance.

Additional information on the average distance to work calculations is available in the Technical Appendix to this document.

4. PUBLIC GOODS

4.1 – Population within ½ Mile of Open Space, 2010

Source: 2010 Decennial Census, SF1, Table P1 – Total Population; City of Chicago Data Portal Shapefiles of CPD Parks, FPDCC Forest Preserves, CPS Campus Parks, City of Chicago-identified wildlife habitat, and City of Chicago Street Network; 2010 TIGER/Line Shapefiles of Cook County Census Blocks.

Frequency of Updates: Block population data are updated after every decennial census. At the point of project completion, the shapefiles of CPD Parks, FPDCC Forest Preserves, CPS Campus Parks, City of Chicago-identified wildlife habitat areas, and the City of Chicago Street Network were last updated on September 7th 2012, April 22nd 2013, September 7th 2012, September 7th 2012, and July 31st 2013, respectively; there is no update schedule available. TIGER/Line Shapefiles of Cook County Census Blocks are updated after every decennial census and released in the third quarter of the same year.

Description: Count of population within ½ mile of a recreational open space accessible by the general public. Census blocks are the unit of geography used in the analysis. Each block’s geographic centroid is understood to represent that block, therefore the distance between the centroid and the nearest transit station equals the ‘average’ distance all residents in that block are from the nearest recreational open space. Distance from the census block centroid to the nearest recreational open space was calculated via the road network geography provided by the City of Chicago via the Data Portal. Counts of census blocks, and therefore block populations within ½ mile of a recreational open space were aggregated from among all blocks located within each CN2015 district. Shares were calculated by dividing the population in blocks within 2,640’ of a recreational open space in a CN2015 district by the population of all blocks within a CN2015 district.

Chicago Park District facilities, Forest Preserve District of Cook County facilities, Chicago Public School’s campus parks, and City of Chicago-identified wildlife habitat were used to generate the open space

universe as they provide the opportunity of freely accessible recreational space (either to use or to view) for any member of the public.

Additional information on the technical steps used to generate the distances for each census block centroid to the nearest recreational open space is available in the Technical Appendix to this document.

4.2 – Acres of Open Space per 1,000 Residents, 2010

Source: 2010 Decennial Census, SF1, Table P1 – Total Population; City of Chicago Data Portal Shapefiles of CPD Parks, FPDCC Forest Preserves, CPS Campus Parks, and City of Chicago-identified wildlife habitat.

Frequency of Updates: Block population data are updated after every decennial census. At the point of project completion, the shapefiles of CPD Parks, FPDCC Forest Preserves, CPS Campus Parks, and City of Chicago-identified wildlife habitat were last updated on September 7th 2012, April 22nd 2013, September 7th 2012, and September 7th 2012, respectively; there is no update schedule available.

Description: Open space acreage (defined as the combination of Chicago Park District Parks, Forest Preserve District of Cook County holdings, Chicago Public Schools Campus Parks, and City of Chicago-identified wildlife habitat) within each CN2015 district is aggregated, divided by the total population within the district, and then multiplied by 1,000.

5. EMPLOYMENT

5.1 – Employed Workers by Industry, 2011

Source: Longitudinal Employer-Household Dynamics [LEHD], 2011 LODES7 Residence Area Characteristics (RAC) data for Illinois.

Frequency of Updates: This dataset is typically released at the end of the year following the measured year. For example, 2015 data should be available at the end of 2016. However, as of the completion of this project the data for 2012 and 2013 have been delayed until January 2015.

Description: Local Employment-Household Dynamics (LEHD) data are the result of a partnership between the Census Bureau and U.S. states to provide high-quality local labor market information and to improve the Census Bureau's economic and demographic data programs. Further information about the LEHD program is available [here](#) and a description of data found within LEHD data releases is available [here](#).

Counts are provided of the total number of employed residents at the census block level. Subtotals are provided of counts of residents in a census block by the industry in which they are employed, classified into the 20 main NAICS industry sectors. Counts of all workers and the counts of workers in each of the

20 NAICS sectors were aggregated up to the CN2015 district level. The count of all workers residing in each CN2015 district is given, as well as the share of workers in each NAICS sector in each district.

5.2 – Unemployment Rate, Civilian Labor Force, 2012

Source: 2012 5 Year American Community Survey, Table DP03 - Selected Economic Characteristics.

Frequency of Updates: New ACS 5-Year Estimates are released annually, coming out at the end of the year following the last year in the 5-year period. For example, 2009-2013 estimates are released at the end of 2014.

Description: Counts of the total population of each census tract are provided at the census tract level, as well as counts of the population in the following labor categories: “In labor force,” “Civilian labor force,” “Employed,” “Unemployed,” “Armed forces,” and “Not in labor force.” The Civilian labor force is the sum of the population in the “Employed” and “Unemployed” categories, therefore the unemployed population is a subset of the Civilian labor force only. An “unemployed” person is one who (1) was neither “at work” nor “with a job but not at work” during the reference week, and (2) was actively looking for work during the last 4 weeks, and (3) was available to start a job. Counts of all the variables listed were aggregated from tracts up to the CN2015 district level. Share of population unemployed is found by dividing the population unemployed in the civilian labor force by the population in the civilian labor force at the CN2015 district level.

5.3 – Private Sector Workers, 2005 to 2011

Source: Longitudinal Employer-Household Dynamics [LEHD], 2005 to 2011 LODES7 Residence Area Characteristics (RAC) data for Illinois.

Frequency of Updates: This dataset is typically released at the end of the year following the measured year. For example, 2015 data should be available at the end of 2016. However, the data for 2012 and 2013 have been delayed until January 2015.

Description: Local Employment-Household Dynamics (LEHD) data are the result of a partnership between the Census Bureau and U.S. states to provide high quality local labor market information and to improve the Census Bureau’s economic and demographic data programs. Further information about the LEHD program is available [here](#) and a description of data found within LEHD data releases is available [here](#).

Counts are provided of the total number of employed residents at the census block level. The count of total private sector workers was aggregated up from the census block level to the CN2015 district level. Counts of private sector workers residing in each district are provided for each of the years 2005-2011.

5.4 – Industries by Number of Workers Employed, 2005 and 2011

Source: Longitudinal Employer-Household Dynamics [LEHD], 2005 and 2011 LODES7 Workplace Area Characteristics (WAC) data for Illinois.

Frequency of Updates: This dataset is typically released at the end of the year following the measured year. For example, 2015 data should be available at the end of 2016. However, the data for 2012 and 2013 have been delayed until January 2015.

Description: Local Employment-Household Dynamics (LEHD) data are the result of a partnership between the Census Bureau and U.S. states to provide high quality local labor market information and to improve the Census Bureau’s economic and demographic data programs. Further information about the LEHD program is available [here](#) and a description of data found within LEHD data releases is available [here](#).

Count is provided of the total number of persons whose place of employment lies within a census block. Subtotals are provided by counts of employed persons working in a census block by the industry in which they are employed, classified into the 20 main NAICS industry sectors. For the years 2005 and 2011, counts of total employed persons and counts of employed persons in each of the 20 NAICS sectors were aggregated up to the CN2015 district level. For the years 2005 and 2011 the count of all employed persons working in each district is given, as well as counts of employed persons working in each NAICS sector in each CN2015 district. Counts of workers by industry sector are organized to display the top 10 industries in each district by the number of employed persons. Note that due to formatting constraints, this metric is presented as its own standalone file.

5.5 – District Jobs Held by District Residents, 2011

Source: Longitudinal Employer-Household Dynamics [LEHD], 2011 LODES7 Origin-Destination Data.

Frequency of Updates: This dataset is typically released at the end of the year following the measured year. For example, 2015 data should be available at the end of 2016. However, the data for 2012 and 2013 have been delayed until January 2015.

Description: Local Employment-Household Dynamics (LEHD) data are the result of a partnership between the Census Bureau and U.S. states to provide high quality local labor market information and to improve the Census Bureau’s economic and demographic data programs. Further information about the LEHD program is available [here](#) and a description of data found within LEHD data releases is available [here](#).

Counts of persons traveling between two census blocks for work (from their residential block [Origin] to their employment block [Destination]) are provided for all census blocks in Cook County. Each residential block and each employment block is assigned the CN2015 district into which it falls. The

number of workers in each CN2015 district living and working within the district is divided by the total number of persons whose place of employment lies within the district to generate the share of district jobs filled by district residents.

Additional information on the technical steps used to generate the share of district residents employed in the district is available in the Technical Appendix to this document.

RETAIL/COMMERCIAL REAL ESTATE

6.1 – Commercial Real Estate Square Footage by Use and Occupancy, 2005 Q4* and 2013 Q4

Source: IHS Analysis of CoStar data.

Frequency of Updates: The data are made available for the most recent quarter. Note that data are revised over time as mentioned below. These data are proprietary however, and requires access to the CoStar database.

Description: Square footage totals for rentable building area (occupied and vacant) were generated by CoStar at the CN2015 district level. Each CN2015 district was entered manually via the Custom Geography tool; therefore minor errors in the drawing may leave out a small number of properties. CoStar is a constantly updating database which may cause future data queries to return slightly different totals than are reported here. Data for this report was retrieved on October 21, 2014, October 22, 2014, and October 29, 2014. *Note that data on retail space only extends back to 2006, therefore the historic period for retail is Q4 2006 rather than Q4 2005. Additionally, due to the method of data collection, the total for City of Chicago is not a direct summation of the 16 district square footage totals.

TECHNICAL APPENDIX

The Technical Appendix provides detailed information on the steps required to calculate four of the project metrics. This is provided in addition to the Methodology and Data Sources section for cases where multiple data processing tools were implemented or multiple datasets combined. Three of the four metrics described here (Share of Population within 1/2 Mile of Rail Transit, Share of Population within 1/2 Mile of Open Space, and Average Distance to Work) are spatial variables that combined multiple datasets and require significant work in ArcGIS to complete. The fourth, Share of District Jobs Held by District Residents, combined two different datasets from LEHD LODES7.

PROXIMITY TO CTA/OPEN SPACE

Goal: Establish a procedure for measuring distance and spatial relationships between an Origin dataset and a Destination dataset. For instance, establish the distance between the center point of a census block (Origin) and the nearest transit stop or edge of the nearest park (Destination).

For the CN2015 project, the distance calculations were largely a question of access – how proximate are residents to an amenity. Therefore, it was decided that distance was to be measured via the street network to best approximate the experience of accessing these amenities for residents.

Software:

- ArcGIS 10.0 – ArcView License
- ArcGIS 10.2 – ArcInfo License, with Network Analyst enabled
- SPSS 21
- Excel
- Notepad

Data:

- ORIGIN
 - The Origin is the point from which distance will be calculated to a Destination;
 - Origins used:
 - Census block TIGER geography;
 - Available from the census' TIGER data;
 - Centroids are calculated for the geography file using the 'Calculate Geometry' feature within the Attribute Table in ArcGIS, specifying the X and Y coordinates of the centroid, in IL State Plane East, in Decimal Degree units;
 - Records are limited to only those within the City of Chicago due to the use of the Chicago street centerlines file as the road network;

- 15-digit census block FIPS code will be classified as BlockFIPS_10 and used as the ID field for each block in analysis;
- DESTINATIONS
 - The destination file is the feature to which a distance is to be measured from origin geography;
 - For polygon geometries, polygons must be converted to points to complete the Network Analyst solvers. The Feature Vertices to Points tool is used to complete this process;
 - NOTE: Points are only created at vertices of each polygon; therefore, to a certain degree the distance to this feature is determined by how the destination feature is drawn. Polygons with long, straight edges will have fewer vertices and therefore will add some distance to reach. Polygons with curving or irregular edges will have many vertices and therefore require less additional distance to reach. Visual inspection finds that only in rare cases does the length between vertices of any single destination feature exceed 1/2 mile meaning that, at most, this condition may add 1/4 mile of distance more than would be expected. The longest single face of any destination feature was 2/3 of a mile. Any of the data sets below using the Feature Vertices to Points tool will have this condition;
 - Destinations used:
 - [CTA Stations](#);
 - CTA stations layer from City of Chicago Data Portal;
 - Clipped to City of Chicago boundaries;
 - NOTE: IHS employs City of Chicago boundaries created from dissolved census tracts which causes minor differences between IHS City of Chicago boundaries and actual municipal boundaries;
 - [METRA Stations](#);
 - METRA stations layer from City of Chicago Data Portal;
 - Clipped to City of Chicago boundaries;
 - NOTE: IHS employs City of Chicago boundaries created from dissolved census tracts which causes minor differences between IHS City of Chicago boundaries and actual municipal boundaries;
 - The METRA stations layer, to accommodate stations with multiply entry/exit points is a multipoint file as downloaded from the Data Portal (a file in which multiple points constitute one feature). The file must be converted from multipoint to simple point feature class to process in Network Analyst using the Feature to Point tool;
 - [Chicago Park district Parks](#);
 - Chicago Park district layer from City of Chicago Data Portal;

- Points generated from the polygon file retrieved from the City of Chicago Data Portal using the Feature Vertices to Points tool;
- [Forest Preserve district of Cook County Facilities;](#)
 - Cook County Forest Preserve district layer from City of Chicago Data Portal;
 - Clipped to City of Chicago boundaries;
 - NOTE: IHS employs City of Chicago boundaries created from dissolved census tracts which causes minor differences between IHS City of Chicago boundaries and actual municipal boundaries;
 - Points generated from the polygon file retrieved from the City of Chicago Data Portal using the Feature Vertices to Points tool;
- [City of Chicago-identified wildlife habitat;](#)
 - Chicago open space/wildlife habitat layer from City of Chicago Data Portal;
 - Points generated from the polygon file retrieved from the City of Chicago Data Portal using the Feature Vertices to Points tool;
- [Chicago Public Schools Campus Parks;](#)
 - Chicago Public Schools' campus parks layer from City of Chicago Data Portal;
 - Points generated from the polygon file retrieved from the City of Chicago Data Portal using the Feature Vertices to Points tool;
- NETWORK
 - The network file will provide the street network over which to measure distance;
 - Network used:
 - [City of Chicago streets centerline file;](#)
 - Available from the City of Chicago Data Portal;
 - Limit to only those streets that are realistically accessible to someone on foot. [Metadata](#), provided on the Data Portal, codes used to limit street network displayed;
 - Class codes retained for use in this network are:
 - 2- Arterials;
 - 3- Collectors;
 - 4 – Other Streets;
 - 5 – Named Alleys;
 - 7 – Tiered;
 - E – Extent (plazas and non-traditional access);
 - S – Sidewalk;
 - Class codes not used in this analysis are as follows:
 - 1 – Expressway;

- 9 – Ramps;
- RIV – River;
- 99 – Unclassified (O’Hare);
- Since the idea is that this network could be used by someone on foot, one way directions will not be applied as a limiter of connectivity.

Technical Outline:

- DATA
 - Retrieve data and process for analysis;
 - Data sources and processes performed on each data set to prepare for analysis outlined in the *Data* section above;
- BASE FILE
 - In ArcGIS, prepare a base file that includes the following layers:
 - Origin – Census block centroids;
 - Destinations – CTA stations, METRA stations, Chicago Park district Parks, Forest Preserve district of Cook County facilities, City of Chicago-designated open spaces, and Chicago Public Schools Campus Parks;
 - Network – City of Chicago street centerlines file;
 - Other – IHS-derived City of Chicago boundary based on dissolved 2000 tract geography;
- CREATE THE NETWORK DATASET
 - Enable Network Analyst
 - Create New Network Dataset using the following settings:
 - Name: Chicago_Street_Centerline_Network_ND
 - Type: Geodatabase-Based Network Dataset
 - Version: 10.0
 - Sources:
 - Edge Sources:
 - Chicago_Street_Centerline_Network
 - Turns:
 - <Global Turns>
 - Connectivity:
 - Group 1:
 - Edge Connectivity:
 - Chicago_Street_Centerline_Network (End Point)
 - Elevation Model: Elevation Fields
 - Attributes:
 - Length:
 - Usage Type: Cost
 - Data Type: Double

Units Type: Feet
Use by Default: True
Source Attribute Evaluators:
Chicago_Street_Centerline_Network (From-To): Field
Language: VBScript
Expression: [Shape]
Chicago_Street_Centerline_Network (To-From): Field
Language: VBScript
Expression: [Shape]
Default Attribute Evaluators:
Default Edges: Constant = 0
Default Junctions: Constant = 0
Default Turns: Constant = 0

Directions:

Directions Ready: Yes
General Directions:
Display Length Units: Miles
Length Attribute: Length
Source Directions:
Chicago_Street_Centerline_Network:
Street Name Fields:
Primary:
Prefix: PRE_DIR Name:
STREET_NAM Suffix
Type: STREET_TYP Suffix:
SUF_DIR

- o Street network was built using all default settings as entered in GIS. The only exception is to remove the One-way restriction manually.
- RUN DISTANCE SOLVER IN NETWORK ANALYST
 - o Within Network Analyst create a new [OD Cost Matrix](#) [ODCM] solver;
 - ODCM solver was used in place of the Closest Facility solver as had originally been envisioned. The Closest Facility solver calculates the distance from an origin to the nearest destination over the road network and produces a line output over the path. However, this was found to be too resource intensive and did not allow for efficient processing. ODCM solver runs the same process but does not produce a line output over the network path, but rather a straight line that includes the distance measurement over the network path. [ESRI explains the two in the following ways:](#)
 - Closest Facility – This uses a multiple-origin, multiple-destination algorithm based on Dijkstra’s algorithm. It has options to only compute

- the shortest paths if they are within a specified cutoff or to solve for a fixed number of closest facilities;
- OD Cost Matrix – This uses a multiple-origin, multiple-destination algorithm based on Dijkstra's algorithm. It has options to only compute the shortest paths if they are within a specified cutoff or to solve for a fixed number of closest destinations. The ODCM solver is similar to the Closest Facility solver but differs in that it does not compute the shape of the resulting shortest path for less overhead and faster performance;
 - Each destination requires its own ODCM solver. For each, load the census block centroids as the origin, the Chicago_Street_Centerline_Network_ND as the network, and the desired destination file as the destination. Other features (barriers) are left blank and not used in the analysis;
 - Limit the search to one destination in the Solver's Properties' Analysis Settings tab which calculates the distance to only the nearest destination;
 - Run the ODCM solver;
 - Save the resulting Lines output to the working geodatabase as a feature class;
 - Total_Length is the field that includes distance over the street network;
 - Repeat for each destination;
 - Due to idiosyncrasies in the street network (a small number of disconnected streets and the isolation of O'Hare's street grid) a small number of census blocks cannot have a distance to the nearest transit facility or open space calculated because a street path does not exist. Between 120 and 130 census blocks are affected representing 550-560 residents. For these blocks, the distance of its nearest neighbor with a calculated difference was assigned using procedure below. The furthest from any population block a calculated distance was pulled from was roughly 1/8th of a mile (681');
 - SOLUTION FOR RECORDS WITH NO CALCULATED DISTANCE
 - Join ODCM solver line output feature class to original Origin feature class;
 - Using Select Attributes, select records where the calculated distance field IS NULL (to capture those records without a calculated distance or the "UNMATCHED") and create a new feature class of the selected records;
 - Using Select Attributes, select records where the calculated distance field IS NOT NULL (to capture those records with a calculated distance or the "MATCHED") and create a new feature class of the selected records;
 - Using Spatial Join, join the MATCHED records to the UNMATCHED records to assign a calculated distance from the nearest record for which a distance was able to be calculated;
 - CALCULATE THE SHARE WITHIN 2,640'
 - Join the original ODCM output and the UNMATCHED records with assigned calculated distances to a census block base file;

- o Join 2010 Decennial Census population information for each block;
- o For each distance calculation, retain the calculated distance, a calculated distance flag, and the assigned distance if calculated distance flag = 0. Remove all other added fields;
- o For each destination, create a flag for those records where calculated or assigned distance is less than or equal to 2,640’;
- o For each destination, sum population within 2,640’ on the proximity flag by CN2015 district and divide by total population of CN2015 district to generate the share living within ½ mile.

AVERAGE DISTANCE TO WORK

Goal: Establish a procedure for using Longitudinal Employer-Household Dynamics (LEHD) data from the census to approximate an average distance traveled to work.

For the CN2015 project, this meant using the Origin-Destination data provided at the census block level in the LEHD, to find the distance between the block where every resident with a job lives and the block where every resident with a job works, multiplying that by the number of job-holders making that journey, then summing at the district level and dividing by the total number of residents in the district.

Software:

- ArcGIS 10.0 – ArcView License
- ArcGIS 10.2 – ArcInfo License, with Network Analyst enabled
- SPSS 21
- Excel
- Notepad

Data:

- LEHD 2011 LODES7 ORIGIN-DESTINATION DATA
 - The 2011 Origin-Destination data (OD) provides the number of jobs/residents connecting a pair of census blocks (i.e. where a resident works in Block X and lives in Block Y, forming a connection with 1 job). Each states' blocks are provided in two files based on the block of employment – one for employment blocks paired with residential blocks in the same state (main) and one for employment blocks paired with residential blocks in a different state (auxiliary);
 - Origins used:
 - 2011 Illinois – Main (IL employment blocks with residential blocks in IL);
 - 2011 Indiana – Auxiliary (IN employment blocks with residential blocks outside IN);
 - 2011 Michigan – Auxiliary (MI employment blocks with residential blocks outside MI);
 - 2011 Wisconsin – Auxiliary (WI employment blocks with residential blocks outside WI);
 - These files will capture (the majority of) residents residing in Cook County and their place of employment. This will be the census block of their home and the census block of their place of employment. While Cook County residents may work in Census blocks located in other states, these four states capture the vast majority of workers residing in Cook County.

Technical Outline:

- CREATE A BASE FILE FOR RESIDENTIAL CENSUS BLOCKS IN COOK COUNTY, ILLINOIS
 - Isolate the records within the LEHD files specified above where the first 5 digits of the FIPS code of the residence block (h_geocode) are '17031' indicating the block is located in Cook County (031), Illinois (17).
 - Illinois – 1,964,836 origin-destination pairs representing 2,144,853 total jobs;
 - Indiana – 22,505 origin-destination pairs representing 22,881 total jobs;
 - Michigan – 3,003 origin-destination pairs representing 3,020 total jobs;
 - Wisconsin – 7,804 origin-destination pairs representing 7,913 total jobs;
 - This totals to 2,178,667 jobs for residents of Cook County Census blocks in IL, IN, MI, or WI. LEHD's On-the-Map function reports 2,192,042 jobs for residents of Cook County;
 - 13,375 jobs are not captured using this method. These jobs are spread among census blocks in the other 46 states (territories and overseas dependencies as well);
 - Combine four state files into a single Cook County origin-destination base file by residential block;
- ADD SPATIAL DATA FOR ALL CENSUS BLOCKS
 - Calculate centroids for every block in each state of interest;
 - Download the block shapefiles for the following states from the census' TIGER (2013) geography interface;
 - Illinois (461,065 blocks);
 - Indiana (269,419 blocks);
 - Michigan (331,348 blocks);
 - Wisconsin (256,217 blocks);
 - 1,318,049 blocks total
 - Load each shapefile into ArcGIS;
 - Within the TIGER files are blocks that include a letter suffix at the end of the 15-digit block FIPS code. This prevents some blocks from joining to LEHD OD data which does not include suffixes.
 - Create a new field in the attribute table for each state's TIGER block feature class (named BlockFIPS_10) and truncate the suffix from the GEOID field, leaving each geography with only the 15-digit block FIPS code;
 - Dissolve on the BlockFIPS_10 field created above;
 - Records removed:
 - IL – 9,511 records removed – correct;
 - IN – 2,348 records removed – correct;
 - MI – 1,463 records removed – correct;

- o WI – 3,121 records removed – off by two? Two IL blocks are included in the file, both with a suffix of B thus inflating the total count of eliminated tracts by 2 (2 that will not be removed in the dissolve), explaining the discrepancy.
 - These do not have any jobs located in them – they will be deleted from the WI file in GIS.
 - Create two new fields within each new dissolved feature class' attribute table – X_COORD and Y_COORD;
 - Calculate centroids using the 'Calculate' feature within the Attribute Table in ArcGIS, specifying the X and Y coordinates of the centroid, in IL State Plane East, in Decimal Degree units;
- GENERATE DISTANCE
 - o Returning to the base file of residential blocks in Cook County created above, for each OD pair, join the XY coordinates for the employment block and the XY coordinates of the residential block on BlockFIPS_10;
 - o Concatenate the 15-digit FIPS codes for the employment block and the residential block into a unique 30-digit code for the origin-destination pair;
 - o Create a new file that is only the 30-digit unique OD ID, the XY coordinates of the employment block and the XY coordinates of the residential block;
 - o Bring into GIS to use the [XY to Line](#) tool to find the point-to-point distance;
 - Major problems getting the XY to Line tool to work correctly in ArcGIS 10.0. Use 10.2 for more reliable results;
 - Use GCS NAD 1983 as the projection system for the XY to line function;
 - Use geodesic as the line type for the XY to line function (default);
 - o Copy the resultant shapefile into a working geodatabase which adds a distance value to each line;
- CALCULATE AVERAGE DISTANCE
 - o Export file with calculated distance from GIS geodatabase as a CSV and return to SPSS;
 - o Join calculated distance to base file of residential blocks in Cook County created above on the 30-digit unique OD ID;
 - o Multiply the number of jobs in the OD pair by distance for each OD pair (generate 'job feet');
 - o Sum 'job feet' and count of jobs by CN 14 district and City of Chicago;
 - o Divide total 'job feet' for each geography by total number of jobs for which OD information is available (the total number of jobs in the OD base file of residential blocks in Cook County created from OD data for IL, IN, MI, WI);
 - o Divide result by 5,280 to generate average distance to work;
 - Result can be checked against [LEHD On-the-Map tool](#) for City of Chicago.

PERCENT OF DISTRICT JOBS FILLED BY DISTRICT RESIDENTS

Goal: Establish a procedure for using Longitudinal Employer-Household Dynamics (LEHD) data from the census to determine what share of jobs in a geography are held by residents of that geography.

For the CN2015 project, this meant using the Origin-Destination data provided at the census block level in the LEHD, to determine cases where employment block and residential block are both located within the same CN2015 district. The same process was also applied to the City of Chicago. Total jobs by district are provided by the LEHD workplace area characteristic (WAC) data provided at the block level.

Software:

- SPSS 21
- Excel

Data:

- BLOCK-TO-CN14¹ DISTRICT RELATIONSHIP FILE
 - Based on IHS tract-to-Community Area tract relationship, a block-to-tract-to-Community Area-CN14 relationship file;
 - Join CN14 district definition based on CA;
 - Join census block definition based on tract information (TRACTCE10);
- LEHD 2011 LODES7 WORKPLACE AREA CHARACTERISTIC
 - The 2011 workplace area characteristic (WAC) data provides the number of jobs located within a census block;
- LEHD 2011 LODES7 ORIGIN-DESTINATION DATA
 - The 2011 Origin-Destination data (OD) provides the number of jobs/residents connecting a pair of census blocks (i.e. where a resident works in Block X and lives in Block Y, forming a connection with 1 job). Each state's blocks are provided in two files based on the block of employment – one for employment blocks paired with residential blocks in the same state and one for employment blocks paired with residential blocks in a different state;
 - Origin-Destination files used:
 - 2011 Illinois – Main (IL employment blocks with residential blocks in IL);

Technical Outline:

- GENERATE COUNT OF TOTAL JOBS BY GEOGRAPHY
 - In the Illinois workplace area characteristic (WAC) data, join the block-to-tract-to-CN14 district relationship file on FIPS code of employment (w_geocode) blocks;

¹ For the purposes of this workflow log only, the labels remain “CN14” the original project name, rather than “CN2015” the current name and the name used in the rest of the report.

- Sum total number of jobs by CN14 district and City of Chicago;
- GENERATE COUNT OF JOBS IN GEOGRAPHY HELD BY RESIDENTS OF THAT GEOGRAPHY
 - In the Illinois Main OD file, join the block-to-tract-to-CN14 district relationship file on FIPS code of employment (w_geocode) and residential (h_geocode) blocks;
 - Create a flag where employment block-to-CN14 district is the same as residential block-to-CN14 district (CN14_W_H_Match_FLAG) and filter for cases where both ends of an OD pair are located in Cook County;
 - Sum the number of jobs by CN14 district where CN14_W_H_Match_FLAG = 1
- CALCULATE SHARE OF DISTRICT JOBS HELD BY DISTRICT RESIDENTS
 - Divide sum of jobs in OD job pairs located entirely within geography by the total number of jobs in each geography from the WAC data calculated above;
 - Result can be checked against [LEHD On-the-Map tool](#) for City of Chicago.