



Jobs within a 45-Minute Drive (Weighted)

This EnviroAtlas Smart Locations map estimates the relative accessibility to jobs from residences via automobile (in terms of street network travel time) for each U.S. Census block group, compared to other block groups in the same metropolitan region. Jobs in nearby block groups (based on travel time) are weighted more heavily (i.e., given more prominence) than those further away.

Why is accessibility to jobs important?

The locations of workplaces are critical to a region's sustainability. Workplaces that are centrally located and accessible to more households can reduce vehicle miles traveled (VMT), energy use, and [greenhouse gas emissions](#) (GHGs) associated with employee commuting trips. Three out of 4 people in the U.S. drive to work. Between 1950 and 2011, while the population of the U.S. doubled, vehicle miles traveled increased sixfold.¹ Locating residences and services in development centers that also offer jobs helps reduce driving and the costs associated with it.

From a city planning perspective, it is most efficient to have concentrations of jobs near a large working age population. A regional balance of jobs and housing reduces fuel consumption and congestion as it benefits the local economy and standard of living. Researchers in Britain found that earnings and productivity increased in neighborhoods where residents lived within an optimal range of driving times to jobs. They demonstrated that the positive influence of worker proximity to jobs extended as far as 80 minutes driving time, though the influence was stronger for shorter time periods.² A similar study in the U.S. found that doubling the number of jobs accessible to working age populations within 20 minutes driving time led to a 6.5% increase in real average wages.³

Many communities across the U.S. have experienced a decline in traditional downtown employment centers in favor of office parks and retail in outer suburbs. Such dispersion of employment to the suburbs can result in reduced accessibility by workers due to longer average trip distances, increased traffic, and lack of public transit. Unfortunately, the movement of jobs to the suburbs has been most pronounced in industries that offer low- and middle-skill jobs.⁴ Job dispersion creates additional hardships for lower income residents in the form of increased transportation costs (automobile ownership, maintenance, and fuel).



Photo: Bike commuters, U.S. DOT

Besides being an indicator of drive-time accessibility to jobs by neighborhood, this metric also suggests the presence or absence of land use diversity. Local land use and transportation network features interact to affect destination accessibility and ease of travel.⁴ Communities that pursue compact growth patterns, mixed use development, and strong central cities facilitate workplace accessibility by automobile, transit, biking, and walking. Authors of a travel survey study of traffic generated by mixed-use development in 6 metropolitan regions found that about 1/3 of the trips from mixed-use developments resulted in very few vehicle miles traveled, suggesting the use of alternate travel modes. They also found that the relative size of the population and available employment in the area were important elements in reducing vehicle traffic near mixed-use developments.⁵

How can I use this information?

This map, Jobs within a 45-Minute Drive, allows users to evaluate various neighborhoods in terms of their accessibility to jobs via auto commute. Comparing this map to areas of relatively high working age population density may indicate the effectiveness of community design and road networks to link potential workers with job opportunities. Communities seeking to decrease vehicle miles traveled may encourage new housing in areas with existing job opportunities. Economic development agencies in regions with limited transit service may use this map to encourage the siting of new workplaces and housing.

This information may also be useful when marketing the availability of areas for development. Planners can use the

information to help evaluate whether proposed commercial development may improve or exacerbate regional imbalances between the location of job centers and residential areas. New employment in areas with poor accessibility to residential neighborhoods would likely result in longer commutes and additional traffic on regional highways. New employment in areas of high accessibility, on the other hand, can provide more residents with opportunities to live closer to jobs, shopping, and services.

This map may be compared with any of the other Smart Location or EnviroAtlas community data layers relative to jobs, demographics, or road networks. Finally, Jobs within a 45-Minute Drive can be used as an input variable in transportation models that estimate travel demand, vehicle miles traveled, transit mode share, walking, and bicycle trips.

How were the data for this map created?

The metric, Jobs within a 45-Minute Drive (Smart Location variable D5ar) represents accessibility from residences to jobs. Auto accessibility metrics were developed using NAVSTREETS (2011), a NAVTEQ data layer. NAVSTREETS includes attributes like functional class, speed categories, and vehicular and pedestrian restrictions. EPA obtained employment data for 2010 from the [Census LEHD](#) (Longitudinal Employer-Household Dynamics) tables and aggregated the data by block group. For each census block group, EPA calculated drive times to all other census block groups within 45 miles. Drive time was calculated by network travel on roadways using assumptions about travel speed based on the roadway speed class. A time decay formula was used to give more weight to jobs that were closer to the origin block group than those that were further away in travel time. For more information about this calculation, see the [Smart Location Database User Guide](#).

Selected Publications

1. Kramer, M. 2013. . [Our built and natural environments: A technical review of the interactions among land use, transportation, and environmental quality, Second edition](#). Environmental Protection Agency, Washington, D.C. 139 p.
2. Rice, P., and A.J. Venables. 2004. [Spatial determinants of productivity: Analysis for the regions of Great Britain](#). Discussion Paper No. 4527, Centre for Economic Policy Research, London, United Kingdom. 32 p.
3. Melo, P.C., D.J. Graham, D. Levinson, and S. Aarabi. 2012. [Agglomeration, accessibility, and productivity: Evidence for urbanized areas in the U.S.](#) Paper submitted to the Transportation Research Board 92nd Annual Meeting, January 13–17, 2013, Washington, D.C. 20 p.
4. National Research Council. 2009. [Driving and the built environment: The effects of compact development on motorized travel, energy use, and CO₂ emissions, Special Report 298](#). The National Academies Press, Washington, D.C. 240 p.
5. Ewing, R., M. Greenwald, M. Zhang, J. Walters, M. Feldman, R. Cervero, L. Frank, and J. Thomas. 2011. [Traffic generated by mixed-use developments: Six-region study using consistent built environmental measures](#). *Journal of Urban Planning and Development* (September): 248–261.

What are the limitations of these data?

Travel times do not reflect traffic congestion. Accessibility may be exaggerated in areas with high traffic congestion. Accessibility can also vary considerably across large census block groups. The accessibility statistics calculated for this indicator rely on network travel distance to and from the population-weighted centroids of block groups.

How can I access these data?

EnviroAtlas data can be viewed in the interactive map, accessed through web services, or downloaded. This data layer is incorporated into a larger EPA data product called the [Smart Location Database](#). The Smart Location Database is a nationwide geographic data resource for measuring location efficiency. Most attributes are available for every census block group in the United States.

Where can I get more information?

A selection of resources on the relationships among city planning, transportation choices, and environmental quality is listed below. EPA's [Smart Growth Program](#) provides tools, resources, and technical assistance to communities seeking to pursue vibrant compact, mixed-use, walkable, and transit-oriented development strategies to reduce trip distances and vehicle miles traveled. For additional information on the data creation process, access the metadata for the data layer from the drop down menu on the interactive map table of contents and click again on metadata at the bottom of the metadata summary page for more details. To ask specific questions about this data layer, please contact the [EnviroAtlas Team](#).

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