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## Smart Growth and Transportation

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### Background

**Transportation and land use patterns are inextricably linked.** Transportation facilities and networks have the power to shape development, influence property values, and determine a neighborhood's character and quality of life. In addition, transportation investments have important consequences for the environment, including air and water quality, climate change, and open space preservation. How communities develop also affects how convenient and appealing public transportation, bicycling, and walking are for their residents.

**Integrated transportation and land use planning gives people more choices for getting around their town and their region.** When homes, offices, stores, and civic buildings are near transit stations and close to each other, it is convenient to walk, bicycle, or take transit. This expanded transportation choice makes it easier to incorporate physical activity into daily routines, reduces transportation costs, and gives more freedom and mobility to low-income individuals, senior citizens, disabled persons, and others who cannot or choose not to drive or own a car.

**Providing a range of transportation choices and the walkable neighborhoods that support them can help improve air quality and reduce greenhouse gas emissions.** According to EPA's [Inventory of Greenhouse Gas Emissions](#), in 2017, the transportation sector represented the largest source of carbon dioxide emissions from fossil fuel combustion. Roughly 17 percent of U.S. greenhouse gas emissions comes from cars and light-duty trucks (including pickup trucks, SUVs, and minivans). Developing compactly and investing in public transit and other transportation options make it easier for people to drive less, lowering greenhouse gas emissions. These approaches can also help reduce carbon monoxide, sulfur dioxide, particulate matter, and other pollutants emitted by motor vehicles. To learn more about how smart growth affects climate change, see the [Smart Growth and Climate Change](#) page.

**Four transportation and land use strategies enhance quality of life and protect human health and the environment:**

- Smart and sustainable street design.
- Transit-oriented development.
- Parking management.
- Sustainable transportation planning.

*Note: This web page deals exclusively with the intersection of transportation and smart growth. More comprehensive transportation information is available from EPA's [Office of Transportation and Air Quality](#).*

### Smart and Sustainable Street Design

**Historically, transportation planners have overlooked the important role streets play in shaping neighborhoods.** For decades, decisions about street size and design in many communities have focused on getting as many cars as possible through the streets as quickly as possible.

**Street design determines whether an area will be safe and inviting for pedestrians, bicyclists, and transit users,** which affects the viability of certain types of retail, influences land values and tax receipts, and shapes overall economic strength and resilience. (To learn more about how street design affects how quickly emergency response vehicles will be able to reach a fire, police, or medical emergency, see the [Smart Growth Streets and Emergency Response](#) page.)

**Street design also has important environmental impacts.** It can determine the viability of less-polluting modes of transportation, affecting air quality and climate change. Street design also influences the volume of stormwater runoff, the water quality of that runoff, and the magnitude of the heat island effect.

Through approaches such as [complete streets](#) **EXIT** and [context sensitive solutions](#), communities can create attractive streets that also improve mobility and safety.

## Transit-Oriented Development

The United States is in the midst of a demographic shift that will have major effects on the nation's housing market and development patterns.

- A 2007 report from Reconnecting America, [Why Transit-Oriented Development And Why Now](#), **EXIT** shows that the fastest-growing demographic groups — older, single-person households, and non-white households — prefer homes within walking distance of transportation alternatives, shopping, restaurants, parks, and cultural amenities.
- Market surveys and research have consistently shown that at least one-third of homebuyers prefer homes in smart growth neighborhoods, and this share is growing. (To learn more about market preferences, see the [Smart Growth: The Business Opportunity for Developers and Production Builders](#) page.)

**Transit-oriented development (TOD) creates walkable communities for people of all ages and incomes and provides more transportation and housing choices.**

- TOD is compact development built around a transit station or within easy walking distance (typically a half-mile) of a station and containing a mix of land uses such as housing, offices, shops, restaurants, and entertainment.
- TOD can help lower household transportation costs, boost public transit ridership, reduce greenhouse gas emissions and air pollution, spur economic development, and make housing more affordable by reducing developer expenditures on parking and allowing higher-density zoning.

## Parking Management

**Parking requirements can be an obstacle to compact development.** The parking requirements found in many conventional zoning codes often call for off-street parking based on generic standards, not on individual sites' needs and context, and require too much parking to be provided on the development site.

- With their high costs and space requirements, conventional parking regulations can deter compact, mixed-use development and redevelopment in older neighborhoods.
- Large expanses of surface parking and stand-alone parking structures can discourage walking and make driving the only viable transportation between destinations.
- Better-managed parking can support lively, economically strong, mixed-use districts; encourage walking and transit use; and reduce the costs of redevelopment and infill projects.

## Sustainable Transportation Planning

**Transportation planning will get the best results for communities when it is part of a comprehensive approach that includes land use and environmental planning at the local and regional levels.** Transportation planning and design choices have a direct influence on development patterns, travel mode choices, infrastructure costs, redevelopment potential, the health of natural resources, and other community concerns.

This integrated approach requires transportation and land use planners to:

- Examine the effects of transportation projects on future growth, development, and long-range economic goals.
- Assess each project's effects on air and water quality and other environmental resources.
- Determine whether transportation and other infrastructure can be built on a timetable consistent with development or redevelopment projects.

Tools that can help planners effectively link transportation investments with preferred development patterns include:

- Regional transportation models.
- Land use scenario models.
- Local-scale transportation planning tools.
- Performance measurement.

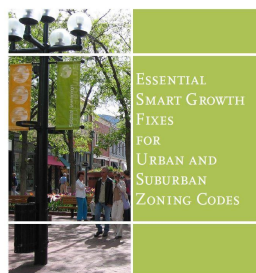
## Publications

Visit our [Publications](#) page for a list of publications about smart growth and transportation.

# EPA Resources

## General Resources

- [Essential Smart Growth Fixes for Urban and Suburban Zoning Codes](#) (2009): Offers 11 "essential fixes" to help local governments amend their codes and ordinances to promote more sustainable communities. It includes chapters on street design, making communities more walkable,



and parking policies that support lively, mixed-use neighborhoods.

- [Smart Growth Implementation Assistance](#) project reports:
  - [California Department of Transportation](#) (2010): Developed a Smart Mobility Framework to guide the state's transportation investments.
  - [College Park, Maryland](#) (2006): Explored why the vision for a local commercial corridor was not being achieved.
  - [Denver, Colorado](#) (2009): Examined how the concept of "living streets" could apply to commercial corridors throughout the city.
  - [Houston, Texas](#) (2006): Examined transit-oriented development market opportunities.
  - [Pamlico County, North Carolina](#) (2008): Looked at options to improve rural highway corridors.
  - [Phoenix and Mesa, Arizona](#) (2009): Looked at tools to implement transit-oriented development.
  - [Sanitation District No. 1, Northern Kentucky](#) (2009): Created green street designs that reduce stormwater runoff and meet other community goals.
  - [Spokane, Washington](#) (2007): Explored ways to make a downtown district more pedestrian friendly.
  - [Sussex County, Delaware](#) (2009): Presented green street design options to manage stormwater runoff and improve safety and aesthetics.
  - [Taos, New Mexico](#) (2006): Developed options to make a highway corridor leading into town fit community character and better serve local needs.

## Smart and Sustainable Street Design

- [Restructuring the Commercial Strip: A Practical Guide for Planning the Revitalization of Deteriorating Strip Corridors](#) (2010): Provides guidance on coordination of public and private investments and essential planning and design strategies to create a multimodal transportation system and thriving neighborhoods.
- [Pedestrian- and Transit-Friendly Design: A Primer for Smart Growth](#), by Reid Ewing for the International City/County Management Association and Smart Growth Network (1999): Suggests design elements that make walking and transit use easier and more comfortable.



## Transit-Oriented Development

- [Infrastructure Financing Options for Transit-Oriented Development](#) (2012): Provides local governments with a comprehensive overview of existing tools and implementation strategies for transit-oriented development, and explores emerging, innovative models for financing.
- [Access to Jobs and Workers Via Transit Tool](#) (2013): Geospatial data resource and web mapping tool for comparing the accessibility of neighborhoods via public transit service.

## Parking Management

- [Parking Spaces / Community Places: Finding the Balance Through Smart Growth Solutions](#) (2006): Highlights proven approaches that balance parking with broader community goals. Communities have found that combinations of parking pricing, shared parking, demand

management, and other techniques have helped them create vibrant places while protecting environmental quality.

## Sustainable Transportation Planning

- [Smart Location Calculator](#): Simple tool, developed by EPA and the U.S. General Services Administration, for exploring how workplace location affects worker commute travel. Indicators include worker commute greenhouse gas emissions, mode-share, vehicle miles traveled, and workplace accessibility via transit.
- [Smart Location Database](#) (2013): Nationwide geospatial database characterizing the built environment for use in travel demand studies and scenario planning.
- [Guide to Sustainable Transportation Performance Measures](#) (2011): Can help transportation agencies incorporate environmental, economic, and social sustainability into decision-making through the use of performance measures.
- [Mixed-Use Trip Generation Model](#) (2011): Spreadsheet tool that makes it easy to estimate trips generated by a new mixed-use development to more fairly assess these projects in development review processes.
- [Transit Sustainability Practice Compendium \(PDF\)](#) (186 pp, 2.84 M, [About PDF](#)) [EXIT](#) (2009): Completed under an EPA grant, includes sustainability and smart growth information supporting best practices for making transit systems more sustainable while providing high-quality service. These guidelines address all modes of transit and all service areas and provide more detailed information than the Transit Sustainability Guidelines.
- [Measuring the Air Quality and Transportation Impacts of Infill Development](#) (2007): Illustrates how regions can calculate the transportation and air quality benefits of infill, based on standard transportation forecasting models used by metropolitan planning organizations across the country. The results suggest that strong support for infill development can be one of the most effective transportation and emission reduction investments regions can pursue.
- [The Transportation and Environmental Impacts of Infill Versus Greenfield Development: A Comparative Case Study Analysis \(PDF\)](#) (35 pp, 382 K, [About PDF](#)) (1999): Models the transportation and environmental impacts of locating the same development on two sites, one infill and one suburban edge/greenfield, and compares the results. The analysis was conducted in three regions: San Diego, California; Montgomery County, Maryland; and West Palm Beach, Florida.
- [Delaware Department of Transportation Workbook for Innovative Corridor Capacity Preservation Pilot Program](#): Discusses strategies to delay system expansion, focus development, and preserve quality of life.

## Webinars

Visit our [webinars page](#) for information about EPA webinars on smart growth and transportation.

## Other Resources

The following links exit the site [EXIT](#)

## General Resources

- [The Innovative DOT \(PDF\)](#), by [Smart Growth America](#) and the [State Smart Transportation Initiative](#) (2016): Provides 34 recommendations state transportation officials can use as they position their agencies for success in the new economy. Developed with input from top transportation professionals and officials at state agencies around the nation, the handbook documents many of the innovative approaches state leaders are using to make systems more efficient, government more effective, and constituents better satisfied.
- [Policies that Work: A Governors' Guide to Growth and Development](#), by the Governors' Institute on Community Design (2009): Provides state policymakers with samples of policies, administrative actions, and spending decisions that have helped other states grow smarter. The [transportation section](#) recommends approaches to creating a more balanced transportation system that allows for better mobility and more choices. Funded by an EPA grant.
- The American Public Transportation Association's [Sustainability and Urban Design Standards](#) include best practices for sustainable urban design and issues associated with design, such as complete streets, livability, partnerships and more.
- The [SmartCode](#), by Duany Plater-Zyberk & Company: A model form-based development code, centered around the concept of the rural-to-urban transect and available for all scales of planning, from the region to the community to the block and building.

## Smart and Sustainable Street Design

- [Complete Streets](#), Institute of Transportation Engineers: Web page with links to resources on active transportation and context-sensitive design.
  - [Designing Walkable Urban Thoroughfares: A Context Sensitive Approach](#), Institute of Transportation Engineers (2010 update of the 2006 *Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities*): Provides guidance on applying context-sensitive solutions in communities that support compact development, mixed land uses, walking, and bicycling. It was developed by ITE and the Congress for the New Urbanism with support from EPA.
- [Context Sensitive Solutions](#), Federal Highway Administration: Website with many resources to help design streets that fit the context of the neighborhood.
- [Emergency Response and Traditional Neighborhood Street Design](#), Local Government Commission: Case studies of how three cities handled smart growth street designs and emergency response concerns.
- [Emergency Response and Narrow Streets](#), Local Government Commission: Describes strategies for traffic calming and emergency response street design.
- [National Complete Streets Coalition](#): Offers resources to help communities transform the way they plan, design, and construct roads so they are safe and convenient for all users.

- [Access Management Manual](#), Transportation Research Board (2015): Provides technical information on access management (the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway) and how to develop and administer effective access management programs.
- [Ten Principles of Access Management](#), Transportation Research Board (2008): Presentation that introduces the concept of access management and provides graphic illustrations of its ten principles.
- [Neighborhood Street Design Guidelines: An Oregon Guide for Reducing Street Widths \(PDF\)](#) (30 pp, 3.56 M, [About PDF](#)), Neighborhood Streets Project Stakeholders (2000): Recommends a process for developing street standards, provides information to help communities select appropriate standards, and includes model designs.
- [Model Regulations and Plan Amendments for Multimodal Transportation Districts \(PDF\)](#) (48 pp, 1 M, [About PDF](#)), by Kristine Williams and Karen Seggerman for the Florida Department of Transportation (2004): Provides model comprehensive plan amendments and land development regulations to help local governments implement multimodal transportation districts that support walking, bicycling, and transit use.

## Transit-Oriented Development

- [Mixed-Income Transit-Oriented Development Action Guide](#), developed by the Center for Transit-Oriented Development, Federal Transit Administration, and U.S. Department of Housing and Urban Development: Online tool designed to help local governments identify the most appropriate and effective planning tools for achieving mixed-income, transit-oriented development.
- [Center for Transit-Oriented Development](#): National nonprofit organization dedicated to providing best practices, research, and tools to support market-based, transit-oriented development.
- [Effects of TOD on Housing, Parking, and Travel](#), Transit Cooperative Research Project (2008, Report 128): Provides original data on transit-oriented development residential trip generation and parking, as well as the mode choices of residents and employees of transit-oriented developments. It also identifies best practices to promote, maintain, and improve transit-oriented development-related transit ridership.

## Parking Management

- [Parking Management Strategies for More Efficient Use of Parking Resources](#), Victoria Transportation Policy Institute: Describes various management strategies that result in more efficient use of parking resources, including sharing, regulating and pricing of parking facilities, more accurate requirements, use of off-site parking facilities, improved user information, and incentives to use alternative modes.
- [The High Cost of Free Parking](#), by Donald Shoup (2005): Detailed analysis of the transportation and land use impacts of free parking. [Chapter 1 is available for free online \(PDF\)](#).
- [Reforming Parking Policies to Support Smart Growth: Parking Best Practices and Strategies for Supporting Transit Oriented Development in the San Francisco Bay Area \(PDF\)](#) (66 pp, 484 K, [About PDF](#)), Metropolitan Transportation Commission (2007): Identifies techniques, strategies, programs, and tools that can help local jurisdictions better manage parking resources and facilitate transit-oriented development.
- [Driving Urban Environments: Smart Growth Parking Best Practices](#), Maryland Governor's Office of Smart Growth (2006): Presents an overview of parking strategies that meet the challenges faced by projects in the context of smart growth, including parking management, parking design, and parking financing.

## Sustainable Transportation Planning

- [Smart Transportation Guidebook \(PDF\)](#) (92 pp, 5.3 MB, [About PDF](#)), New Jersey Department of Transportation and the Pennsylvania Department of Transportation (2008): Integrates the planning and design of transportation systems in a manner that fosters development of sustainable communities.
- [Sacramento Region Blueprint Transportation and Land Use Plan](#) (2004): Vision for growth that promotes compact, mixed-use development and more transit choices as an alternative to dispersed development. This site describes the plan and details how it was created, including how the I-PLACE3S scenario planning software was used to model land use and travel impacts.
- [Regional Transportation Plan](#), Puget Sound Regional Council: Action plan for transportation in the central Puget Sound region that identifies investments to support expected growth and improve transportation service, lays out a financing plan that increases reliance on users paying for transportation improvements, and proposes a strategy for reducing transportation's contribution to climate change and its impact on important regional concerns such as air pollution and the health of Puget Sound.
- [Blueprint Denver](#): Land use and transportation plan first adopted in 2002 and updated in 2019 that aims to create complete neighborhoods and complete networks, take a common-sense approach to where growth should go and how it should fit in, and consider social equity factors to tailor solutions to each neighborhood's needs.
- [LUTRAQ: Making the Land Use, Transportation and Air Quality Connection](#), Calthorpe Associates (1997): Used principles of transit-oriented development to accommodate Washington County, Oregon's projected population growth of 160,000 in mixed-use neighborhoods served by planned light rail and bus network extensions.