

An aerial photograph of a city street. A wide green median with several trees runs down the center of the road. On either side of the median are paved lanes with cars. To the right, there's a sidewalk with more trees and a modern building with a glass facade. The sky is bright and clear.

GREEN & COMPLETE STREETS GUIDEBOOK

PREPARED BY

*Devens Field Project Team
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GRADUATE SCHOOL
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How to Use the Guidebook

- This Green and Complete Streets (GCS) Guidebook was made for the **general public**.
- It is a one-stop resource for a quick explanation of green and complete streets and their benefits.
- It includes **frequently asked questions** and addresses common concerns of street users.
- **Examples** are provided to visually demonstrate common components of GCS and successful implementation.
- A **Tools & Resources** section lists information where help can be found on a wide range of topics related to GCS.

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INTRODUCTION

What are Green and Complete Streets?

By design and function, roads and sidewalks are important infrastructure elements. The Federal Highway Administration estimates that more than 20% of U.S. roads are in urban areas, and that roads, sidewalks, and parking lots are estimated to make up almost two-thirds of the total impervious cover, contributing a similar ratio of runoff (Lukes & Kloss 2008). Effective road drainage and stormwater management systems have been overlooked, which is why green infrastructure is being utilized to mitigate stormwater runoff. Effective road design and drainage makes communities more resilient to climate change.

Stormwater management is an important management technique as it reduces the amount of runoff and runoff pollution. Stormwater runoff is generated from rain and snowmelt and often contains harmful pollutants. Green infrastructure has technologies and approaches to best manage runoff, through infiltration, evapotranspiration, and by capturing and reusing stormwater to maintain or restore natural hydrologies (US EPA OMS 2015). Stormwater management is an opportunity to prevent pollution at its source and an element to tackle in building sustainable, resilient municipalities and communities.

Roads present many opportunities for green infrastructure application. One principle of green infrastructure is green streets. Green streets are planned and designed to manage stormwater onsite, whereas traditional street design practices manage stormwater through sewer and pipe systems (R. 03 US EPA 2015). **Green streets** incorporate green infrastructure (GI) which are natural systems that are installed in a community or city to help treat stormwater runoff (“What is green infrastructure?” 2022). GI often uses vegetation, engineered soil, and permeable surfaces to capture and clean stormwater before infiltrating into the ground or discharging to other watercourses. Benefits can include reduced flooding, reduced waste water pumping and treatment costs, and added urban green space. GI also improves air quality through the reduction in particulate matter and other smog pollutants- an important factor for all, especially people with respiratory illnesses. The design and appearance of green streets will vary, but the goals are the same: manage stormwater and provide environmentally enhanced roads.

Complete streets seek to shift the focus of a traditional auto-centric street design to one that designs the street for the safety and accessibility of all roadway users, regardless of their mode of travel, age, or ability (Active Transportation Alliance 2014). Complete streets provide the benefit of enhanced safety, along with the improvement of public health by providing safe and accessible places for more active modes of transportation and recreation, increasing physical activity (Zaccaro & Atherton 2018). Complete streets can also improve equity and be an economic driver (Prytherch 2021), can increase local connectivity (Marcus 2019), and can encourage mode shift, which can reduce congestion and reduce fuel usage, decreasing carbon emissions (Glazener & Khreis 2019).

Green and complete streets can generate a strong sense of place, known as placemaking. Placemaking is about strengthening the connection between people and the places they share (“What is placemaking?” 2007). Benefits can include increased positive interactions between people, increased sense of inclusion and belonging, and increased comfort and quality of life.



BENEFITS

Why should you care?

Green streets create aesthetically attractive streetscapes, connecting neighborhoods and creating unique community settings while managing stormwater and reducing erosion. Green streets introduce vegetation in urban environments, providing habitat for wildlife and insects. Complete streets create friendly streets, enhancing safety and inviting all to use the street. Together, green and complete streets are not only a climate resiliency strategy, but rather a community enhancement approach providing health, social, economic, and environmental benefits. A community that has green and complete streets is one that can generate a strong sense of place.

Other Public Health Benefits:

Public health benefits are often associated with green spaces and nature as aspects of the living environment can affect the health and wellbeing of people (Van den Berg, Hartig & Staats 2007). Many studies suggest that being near nature is better for mental and physical health. It is shown to increase happiness, improve health, and foster more generous, creative, and compassionate people (Beatley 2016). Research on green spaces has also concluded that they may provide positive influences on social interactions, mitigate mental fatigue and reductions in violent and aggressive behavior. (Wolf 2010; Kuo & Sullivan 2001; Maas et al. 2009).

What are the direct benefits of having green and complete streets in your community?

- Reduced flooding
- Shade and reduced urban heat island effects*
- Increased bike, pedestrian and vehicular safety
- Decreased car dependence
- Increased physical activity and improved health
- Improved traffic flow and connected forms of transit
- Increased positive interactions between people
- Beautification
- Economic growth
- Improved quality of life

*Urban heat islands occur when cities replace natural land cover with dense concentrations of pavement, buildings, and other surfaces that absorb and retain heat. This effect increases energy costs (e.g., for air conditioning), air pollution levels, and heat-related illness and mortality (US EPA 2021).



FAQ

Are GCS only for non-motorized transportation?

No, a GCS addresses the needs of all users of the transportation systems and balances those needs. Motor vehicles can use green and complete streets while traveling at low speeds.

Does a GCS mean all transportation modes on all roads?

No, it is about considering the people who want to use the transportation system and providing transportation choices that address those needs. It is a network and system approach that ensures the entire transportation system provides accessibility and mobility.

Do GCS cause more traffic congestion?

No, on the contrary, one of the benefits of GCS is improved traffic flow as complete streets can ease congestion by allocating space for each mode of transportation.

What are some examples of complete streets improvements?

- Road diet; adding bicycle lanes, inserting a center turn lane, removing excess travel lanes.
- Increases safety for all users
- Reduces motor vehicle speeding
- Higher bicycle comfort and use
- Traffic calming; narrowing vehicular lanes, shortening curb radii.
- Slows traffic, increasing pedestrian safety
- Decreases crossing distance for pedestrians
- Pedestrian improvements; installation of sidewalks, crosswalks / raised crosswalks, curb ramps, curb extensions.
- Improves accessibility
- Increases visibility at crossings
- Curb extensions shorten crossing distance



FAQ



Why is the GCS approach effective for communities?

Green and complete streets consider and accommodate for all user types. For many years, streets have been designed with the prioritization of speed and volume of movement. GCS works for communities because it is not a one-size-fits-all approach, it is context sensitive. Green and complete streets are designed as an inclusive system that connects a network, improves safety, and addresses the transportation needs of all street users. Regardless of where you live, who you are, or how you need to travel, you will get to where you need to be in a safe, reliable, and affordable way.

What are some challenges that communities face when adopting a GCS model?

The biggest obstacle is changing the system and challenging the status quo. Our built environment is predominantly auto-centric and is not reflective of the current and future demands for alternative and multi-modal transportation. There tends to be pushback as many engineers, architects, and developers are used to doing things one way and have not been given the tools and performance metrics to build something differently. Although pushback can be a common challenge, sometimes these professionals want to design something differently but internal factors that they have no control over limit their choices and decisions. Budget and political will are two challenges that can both be overcome through education, advocacy and training.

Pushback also commonly comes from public safety officials and public works officials who are unfamiliar with these approaches. They often think GCS components will cost more to maintain and are the cause of slow emergency response time, when in fact, the opposite is true. Green and complete streets make streets safer, regulate speed to reduce accidents, and have less buried infrastructure making them easier to maintain. GCS are also adaptable to more frequent and intense storm events, which reduces flooding and further improves road safety.

How can complete streets address communities of disinvestment?

The Complete Streets Coalition created elements of an ideal complete streets policy to set up policies and resolutions that translate into implementation and practice, prioritizing equity. The complete streets approach does not look at one street, but rather at the system to see where multimodal access is most needed and the location of where most disinvestment is occurring. It does this by asking questions such as ‘Where are the places with most incomplete streets?’ and ‘What communities have historically received the least amount of investment?’.



successful

EXAMPLES

Village of Great Neck Plaza, New York State: Great Neck Road

BEFORE



AFTER



Green and Complete Streets Components: Changes to the travel lanes, turning restrictions, and pedestrian safety amenities like bulb-out sidewalks to reduce crossing distances and enhance the visibility of pedestrians, pedestrian countdown timers, higher visibility crosswalk markings and warning signs, wider pedestrian median refuges, and a two-foot safety zone between the travel lane and parked vehicles.

1,600+

Complete Streets Policy have been passed in the United States

Hauppauge to Port Jefferson, New York State: Route 347

BEFORE



AFTER



Green and Complete Streets Components: Traffic calming measures, such as narrower lane widths and lower speed limits, a continuous, 15-mile separate bicycle and shared-use pedestrian path, pedestrian refuge areas, a raised, planted median, high-visibility crosswalks, and pedestrian countdown timers. Transit facility improvements, such as bus stops and solar lighting at new bus shelters

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EXAMPLES



Charlotte, North Carolina: East Boulevard



Green and Complete Streets Components: Corridor redesign improved pedestrian and bicycle infrastructure connections to bus routes and light rail, and helped to reconnect the neighborhood landuses.

New York City, New York: 9th Avenue



Green and Complete Streets Components: Reduced travel lanes (lane removal and narrowing), protected bike bath, crosswalks, traffic lights / turn signals, and street trees.

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EXAMPLES: URBAN AREAS

Broadway Street in Somerville, MA



Green and Complete Streets Components: Bus/bike only lane, safety zone between bus lane & bike lane, crosswalks, signage, green corridor and street trees.

North Fremont Street, City of Monterey, California



Green and Complete Streets Components: Protected bike lanes, bicycle signals are coordinated with traffic signals, crosswalks/crossings, and higher curb between street and bike facility.

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EXAMPLES: SUBURBAN AREAS

North Avenue in Wauwatosa, just outside Milwaukee, MN



Green and Complete Streets Components: Dedicated painted bike lanes, crosswalks and curb cuts.

Vancouver, British Columbia, Canada



Photo 1: Traffic Calming at Charles and Lakewood in Commercial, BC



Photo 2: Street-end closure in Mount Pleasant, BC

Green and Complete Streets Components: Photo 1 has a traffic calming diverter, discouraging through traffic on the neighborhood bike lane. Photo 2 has a street-end closure allowing the neighborhood bikes and pedestrians through.

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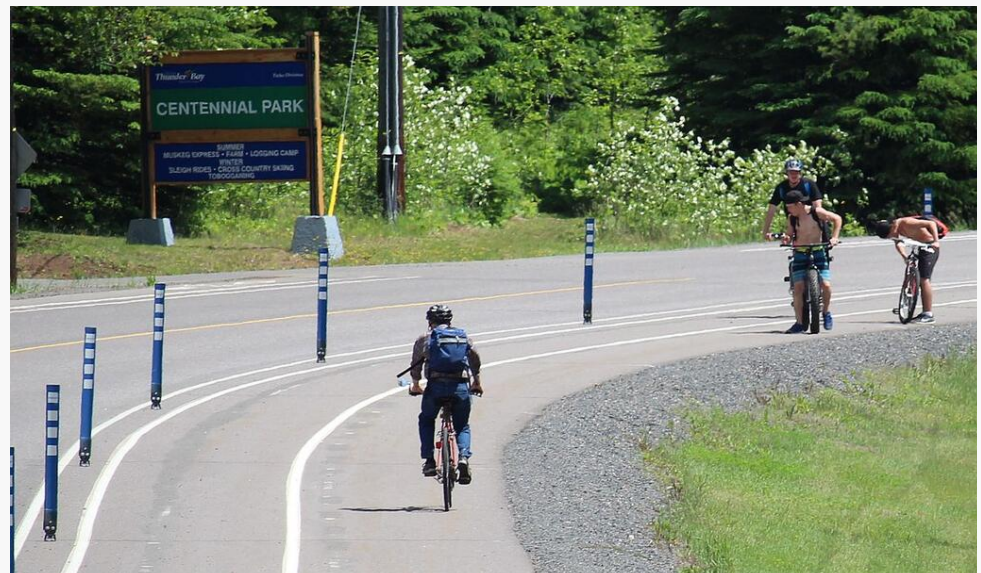
EXAMPLES: RURAL AREAS

Trinity Highway in Willow Creek, a community nestled in California's Six Rivers National Forest



Green and Complete Streets Components:
Dedicated painted bike lanes on either side.

Hudson Avenue in Thunder Bay, Ontario, Canada



Green and Complete Streets Components:
Dedicated active living corridor for pedestrians/bikes and painted buffers.

CASE STUDY: DEVENS, MA

Grant Road in Devens, Massachusetts



Before



After

Green and Complete Streets Components:

- Reduced travel lane widths
- Raised crosswalks
- Dedicated bike lanes
- Street trees
- Street lights
- Signage

Why did Devens implement a Green and Complete Streets Policy?

The intent of the Devens Green and Complete Streets Policy is to facilitate the development of safe, universally accessible, convenient and comfortable routes for a wide range of road users by creating a road network that meets the needs of individuals utilizing a variety of transportation modes while using trees, landscaping and related low impact site design features to capture and filter stormwater runoff within the right of way to the maximum extent practicable, in a manner appropriate to the function and context of the facility. This policy will be considered as part of the decision-making process related to all infrastructure planning, design and construction. Learn more [here](#).

How was Devens able to establish the GCS Policy?

Devens gained community support through education, awareness, incentives, and regulations. The GCS Policy linked above demonstrates how a community can memorialize their commitment to Green and Complete Streets. An example of the educational resources provided by Devens is their [LID case study](#) showing cost comparisons, and the economic, social, and environmental [benefits of street trees](#). The [Devens Green Infrastructure Guidelines](#) is another resourceful tool that recognizes the principles of sustainable development and brings everything together.

TOOLS & RESOURCES



Overview of Complete Streets:

[Smart Growth America](#)

Overview of Green Streets:

[EPA- Learn About Green Streets](#)

[Complete Streets are Green Streets](#)

A more in-depth guide:

[Complete and Green Streets for All](#)



For more **public health benefits** and **research** on the impacts of green streets, Dr. Kathy Wolf at the University of Washington has conducted many studies. Find more at [Green Cities: Good Health](#)

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IMAGE REFERENCES

Village of Great Neck Plaza, NY: Great Neck Road

Hauppage to Port Jefferson, New York State: Route 347

Charlotte, NC

NYC 9th Avenue

Broadway Street in Somerville, MA

City of Monterey, California

North Avenue

Vancouver, Canada

Trinity Highway in Willow Creek, California

Other Images

Page 1 image

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Page 10: photo received from Neil Angus, DEC

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