

GREEN & COMPLETE STREETS GUIDEBOOK

DEVELOPERS & PLANNERS

PREPARED BY

*Devens Field Project Team
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GRADUATE SCHOOL
OF ARTS AND SCIENCES

Urban and Environmental
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How to Use the Guidebook

- This Green and Complete Streets (GCS) Guidebook was made for the **developers and planners**.
- 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.

TABLE OF CONTENTS

01	INTRODUCTION
02	BENEFITS
03	FREQUENTLY ASKED QUESTIONS
05	EXAMPLES
11	TOOLS & RESOURCES
12	REFERENCES
14	IMAGE REFERENCES

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 developers and planners care?

Increase Home Value

GCS designs are proven to improve residential units' aesthetics and home values. Shared streets designs in the Netherlands and United Kingdom have been received favorably by residents, with 70% to 80% of residents reporting their streets as attractive or highly attractive after redesign (Collarte 2014). In the Netherlands, residential shared streets with GCS elements have 10% to 15% higher home values than residential non-shared streets (Appleyard and Cox 2006).

Mental/Physical Health

Incorporating nature into street designs can have direct health benefits. Being near nature is shown to improve mental and physical health. It increases happiness, improves health, and fosters more generous, creative, and compassionate people (Beatley 2016). Studies have also found higher rates of children engaged in play activities in shared streets compared to conventional streets (Biddulph 2012).

Accessibility

Accessibility increases when GCS elements are implemented, with notable improvements in ease of walking and higher levels of active participation by older residents (Curl, Ward Thompson, and Aspinall 2015). GCS that include even pavements and low or no curbs help improve older residents' activity levels (Ståhl, Horstmann, and Iwarsson 2013).

What are the direct benefits of having GCS 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 more costly than conventional streets?

While GCS is an emerging concept that currently lacks standardized approaches, some treatments can be implemented inexpensively and have a similar cost to conventional street treatments. Painting a more visible crosswalk and implementing “bump-outs” at intersections with planters can help slow down traffic and improve pedestrian visibility while adding a greening effect to the street. While some GCS treatments may have higher upfront costs than conventional treatments, the lower long-term maintenance cost and improved benefits in health and safety for residents can help offset the initial costs.

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?

GCS considers and accommodates all user types. For many years, streets have been designed with the prioritization of speed and volume of movement. Green and complete streets work for communities because it is not a one-size-fits-all approach, it is context sensitive. GCS 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.

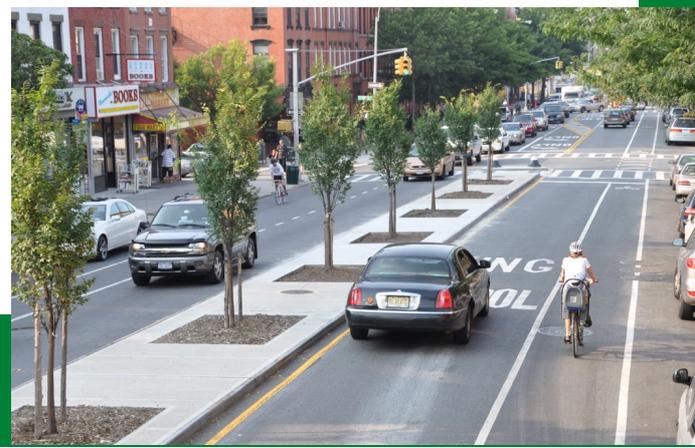
What are some challenges that communities face when adopting a GCS model?

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. GCS 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 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



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



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

Brady 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/crosswalks, 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



Green and Complete Streets Components:

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

Why did Devens implement a GCS Policy?

The intent of the Devens GCS 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

Hauppauge 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

Cover photo, page 2 & 4 background pictures

Page 2 bottom image

Page 3 image

Page 4 bottom image

Page 10: photo received from Neil Angus, DEC

All five images on page 11