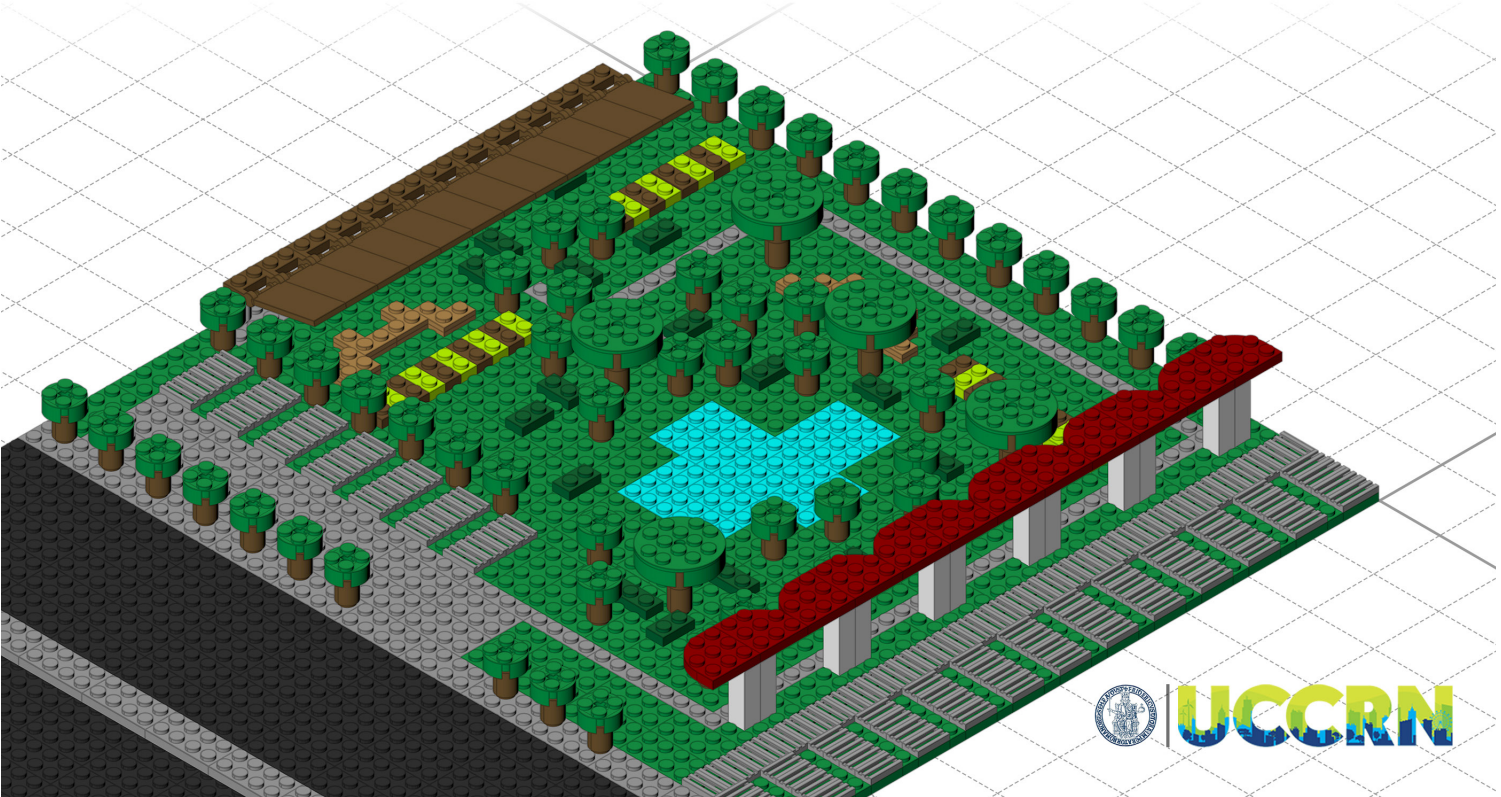


# HOW TO LEGOLIZE YOUR CITY



**UCCRN**



Urban Climate Change Research Network  
The Climate School | Columbia University



UNIVERSITÀ DEGLI STUDI  
DI NAPOLI FEDERICO II

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## THE TEAM:



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## HOW TO LEGOLIZE YOUR CITY

Digital modeling tools are increasingly used to explore urban and climate-related scenarios, but their technical complexity often limits direct participation by local communities. At the same time, effective urban climate transformation requires combining two types of knowledge: local knowledge, based on everyday experience and community priorities, and expert knowledge, based on quantitative climate indicators.

The workflow connects these two domains through a hybrid participatory approach that combines digital and physical models. It begins with the development of a 3D digital model of the urban area using Rhino, which is used to explore different spatial and climate-related scenarios. Based on this digital representation, simplified physical models are then created to support participants' understanding of the main spatial elements.

To actively involve the community and reduce technical barriers, the process uses physical models made with LEGO® bricks. Participants can easily build, modify, and discuss spatial configurations using LEGO, without any digital modeling skills.

These physical configurations are then translated back into the digital model, where they are evaluated using climate performance indicators such as shading, thermal comfort, and environmental benefits.

This iterative exchange between physical and digital models creates a feedback loop: community ideas are tested through digital simulations, and the results are shared and discussed with participants. In this way, local knowledge directly informs the design process, while expert analysis helps make the effects and trade-offs of different choices visible.

The approach supports shared understanding, collaborative learning, and more inclusive decision-making in urban climate transformation.



# FUNCTIONS

# Function 1

## PARKLETS



The Dirt, San Francisco's Mission district (US)



University City, Philadelphia (US)

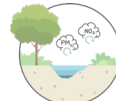


ParkIt, Washington D.C. (US)

## DESCRIPTION

A parklet is a small-scale public space created by converting on-street parking areas or residual paved spaces into green and social areas. Typically composed of modular and reversible elements, parklets introduce vegetation, seating, and shading features without permanently altering existing surfaces. They enhance street-level livability by improving thermal comfort, encouraging social interaction, and increasing the presence of greenery in highly urbanized contexts. Parklet design should consider local climate, pedestrian flows, accessibility, and maintenance requirements to ensure functionality, safety, and long-term usability.

## BENEFITS



**Air Pollution Reduction**



**Climate Mitigation**



**Biodiversity Protection**



**Health and well-being**



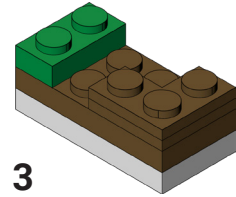
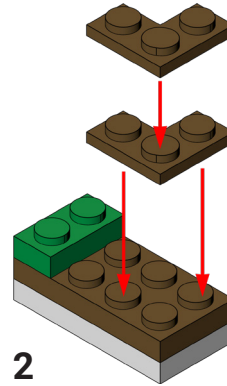
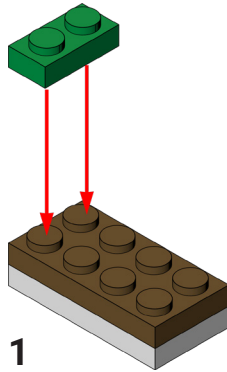
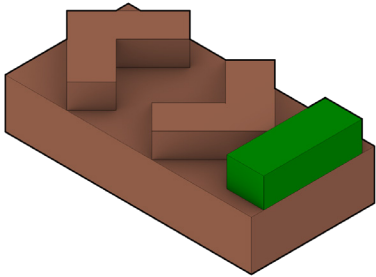
**Aesthetic Improvement**



**Social Inclusion**

Function 1  
**PARKLETS**

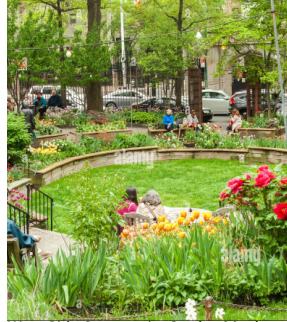
ASSEMBLY



## Function 2 GREEN SPACES



Funan Mall, Singapore (SG)



West Side Community Garden Manhattan, New York (US)

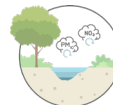


Mall du Marché, Renens (CH)

## DESCRIPTION

Green spaces are areas predominantly covered by vegetation and permeable soil, including parks, gardens, and open green areas within the urban fabric. They provide multiple ecosystem services by supporting microclimate regulation, enhancing biodiversity, and improving environmental quality and human well-being. Green spaces contribute to thermal comfort, carbon sequestration, and stormwater management through soil infiltration and evapotranspiration. The design and management of green spaces should consider local climatic conditions, soil characteristics, and long-term maintenance strategies to ensure resilience, accessibility, and sustained ecological performance.

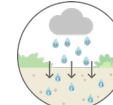
## BENEFITS



**Air Pollution Reduction**



**Climate Mitigation**



**Water regulation**



**Rainwater Infiltration**



**Health and well-being**



**Aesthetic Improvement**



**Social Inclusion**

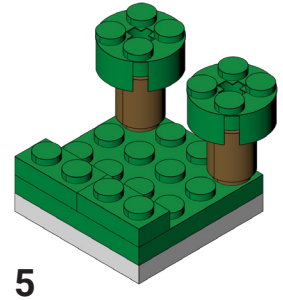
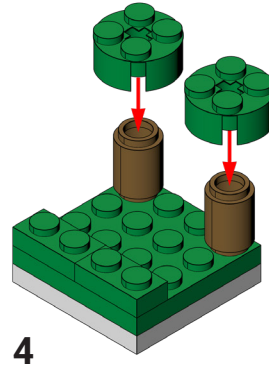
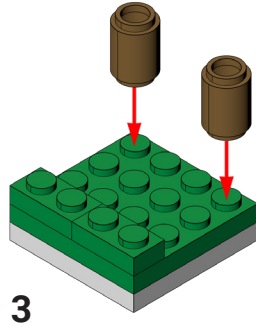
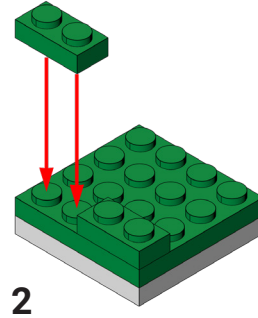
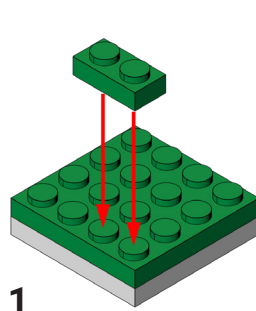
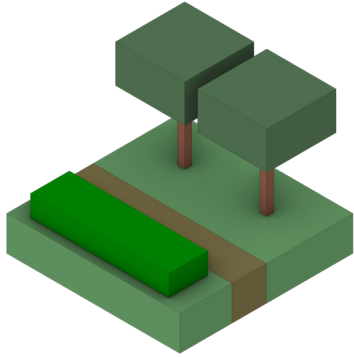


**Biodiversity Protection**

Function 2

## GREEN SPACES

# ASSEMBLY



## Function 3

### BIKE PARKING



University of Applied Sciences Ruhr-West, Bottrop (DE)



West Side Community Garden Manhattan, New York (US)



Venlo Talentencampus, Venlo (NL)

## DESCRIPTION

Bike parking areas are essential urban infrastructures that support active mobility and sustainable transport. When integrated into public space design, bike parking is no longer a purely technical element, but becomes part of a multifunctional and accessible urban environment. Bike parking can be combined with green infrastructure, permeable surfaces, shading elements, and street furniture, contributing to spatial quality and environmental performance.

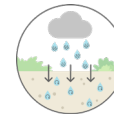
## BENEFITS



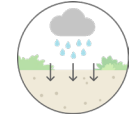
Air Pollution Reduction



Climate Mitigation



Water cycle regulation



Rainwater Infiltration



Health and well-being

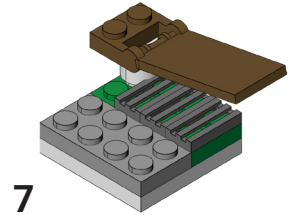
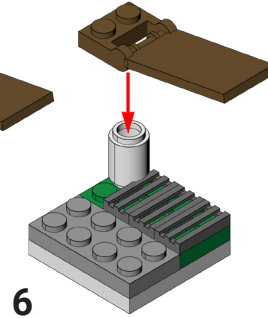
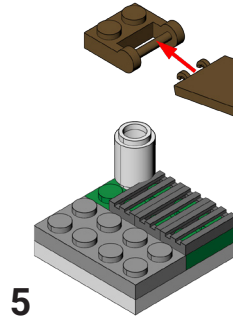
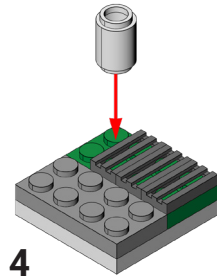
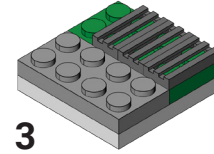
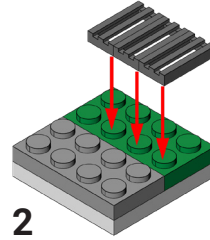
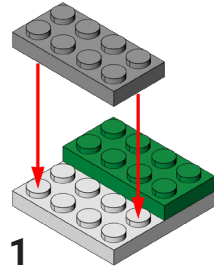
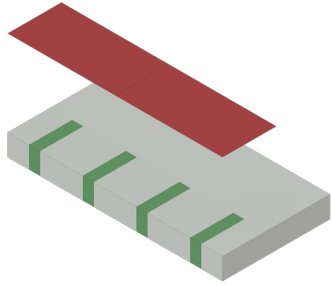


Aesthetic Improvement

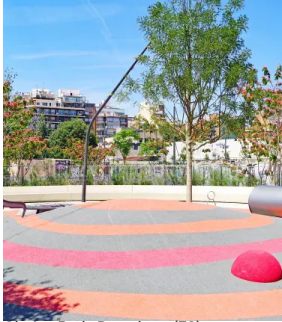


Social Inclusion

Function 3  
**BIKE PARKING**  
ASSEMBLY



## Function 4 **PLAYGROUND**



Glories Park, Barcelona (ES)



Choriner Folk, Berlino (DE)



Mountain Lake Park Playground, San Francisco (US)

### **DESCRIPTION**

Urban playgrounds are public spaces dedicated to play, physical activity, and social interaction, and are essential for children's psychophysical development and for neighbourhood life. Playgrounds can integrate both nature-based and technical solutions, such as permeable surfaces or cool pavements, trees and shading systems, natural materials, and elements for stormwater management. These strategies help reduce surface temperatures, improve microclimatic comfort, and enhance the overall environmental performance of public spaces. At the same time, playgrounds foster social inclusion, physical activity, and contact with the environment, functioning as intergenerational meeting places and local social infrastructure.

### **BENEFITS**



**Air Pollution  
Reduction**



**Climate  
Mitigation**



**Health and  
well-being**



**Aesthetic  
Improvement**

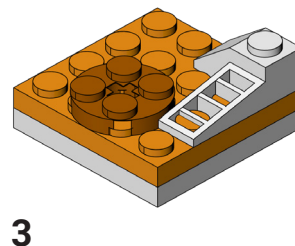
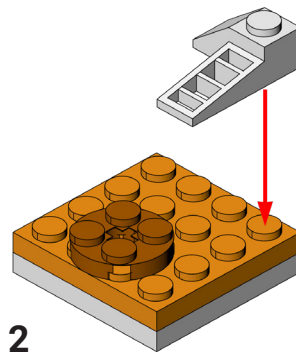
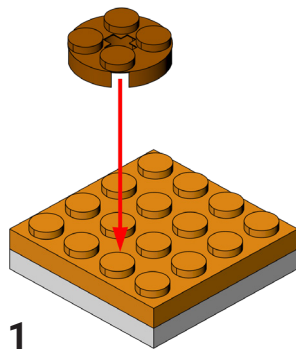
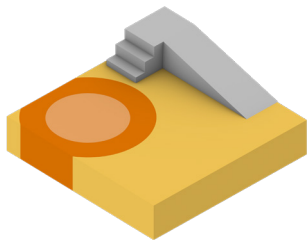


**Social  
Inclusion**

Function 4

## PLAYGROUND

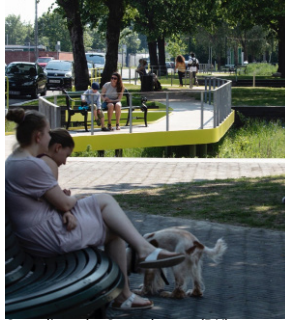
# ASSEMBLY



## Function 5 REST AREA



Immigration Museum Activation Project, Melbourne (AU)



Scandlagade, Copenhagen (DK)



Berta Kröger Plaza, Hamburg (DE)

## DESCRIPTION

Rest areas are public spaces designed to support pause, comfort, and social interaction within the urban environment. They provide opportunities for sitting, resting, and informal gathering, contributing to the overall accessibility and liveability of public spaces. Rest areas can include both primary seating (benches, chairs) and secondary seating elements, such as steps, edges, low walls, or integrated landscape features. When combined with shading, vegetation, permeable or cool materials, and inclusive design solutions, rest areas enhance microclimatic comfort and adapt to different patterns of use throughout the day and across seasons.

## BENEFITS



Climate Mitigation



Health and well-being



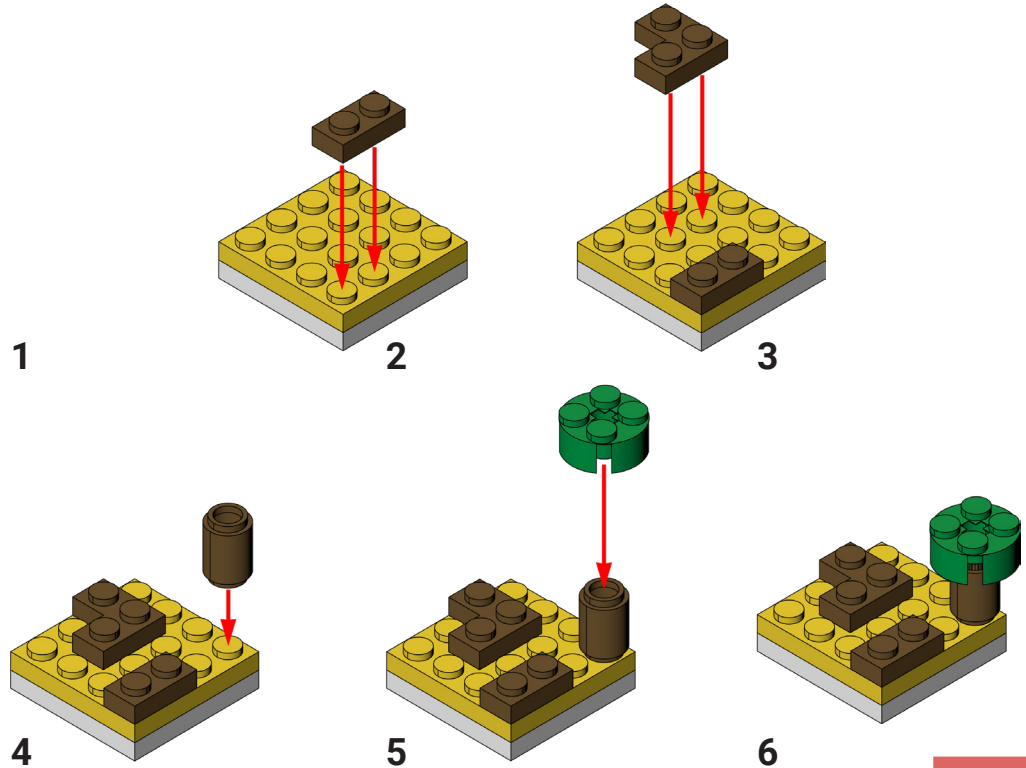
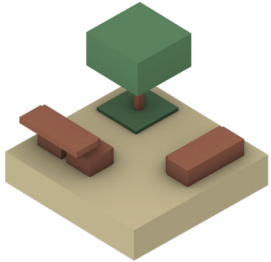
Aesthetic Improvement



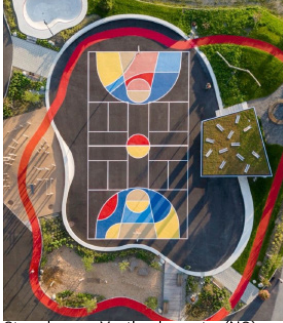
Social Inclusion

Function 5  
**REST AREA**

ASSEMBLY



## Function 6 SPORT FACILITIES



Strondavege, Vestland county (NO)



Caulfield to Dandenong Railway & Linear Park, Melbourne (AU)



Tianjin 4A Sports Park, Tianjin (CN)

## DESCRIPTION

Urban sport facilities are public spaces dedicated to physical activity, recreation, and informal sport practices, contributing to active lifestyles and community well-being. When integrated into the public realm, sport facilities become multifunctional environments that support both organised and spontaneous activities. Sport facilities can be designed as flexible and open systems, combining hard and soft surfaces, shaded areas, vegetation, and climate-responsive materials. Their integration within parks, linear infrastructures, and residual urban spaces improves accessibility, thermal comfort, and spatial quality, allowing year-round use.

## BENEFITS



Climate Mitigation



Health and well-being



Aesthetic Improvement

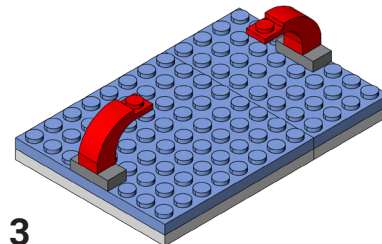
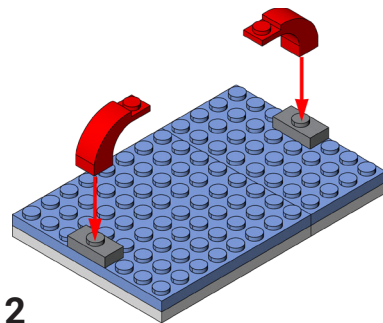
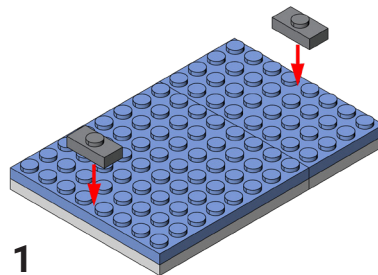
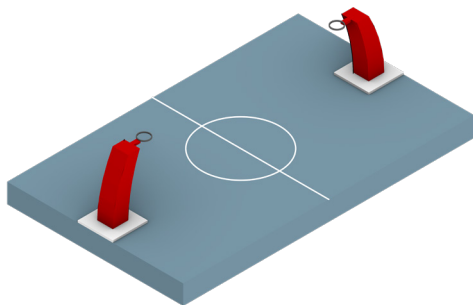


Social Inclusion

Function 6

## SPORT FACILITIES

# ASSEMBLY



## Function 7

### KIOSK / POP-UP STRUCTURE



Harbour Kiosk, Hong Kong (SAR)



Dolce Gusto Neo Flagship Store, Sao Paulo (BR)



River View Service Kiosk, Shanghai (CN)

### DESCRIPTION

Kiosks and pop-up structures are small-scale, flexible elements that support temporary or seasonal activities within public spaces. They can host a wide range of functions, such as food and beverage services, information points, cultural initiatives, or community-oriented uses, contributing to the activation of urban open spaces. Designed as lightweight, modular, and often reversible structures, kiosks can be integrated with shading systems, seating, vegetation, and permeable surfaces. Their adaptability allows them to respond to changing needs over time, supporting different patterns of use throughout the day and across seasons. As part of a multifunctional public space strategy, kiosks and pop-up structures enhance urban vitality, support social interaction, and increase the attractiveness and liveability of public spaces.

### BENEFITS



Aesthetic Improvement



Social Inclusion



Food Production

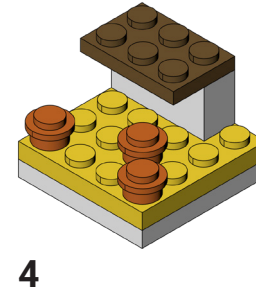
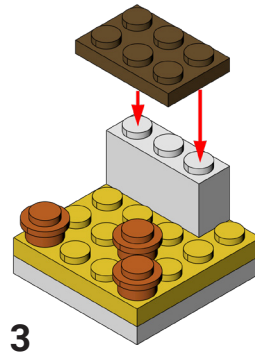
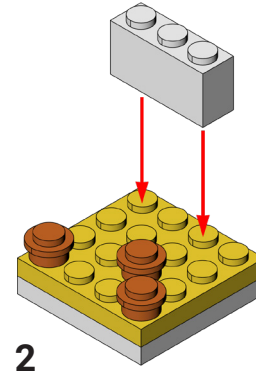
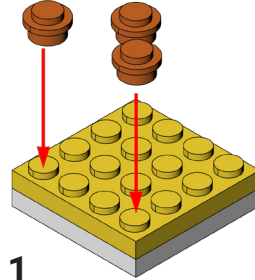
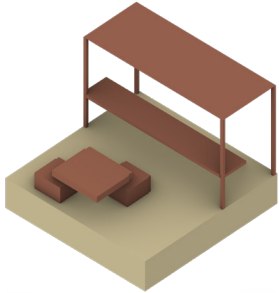


Local Economic Development

Function 7

# KIOSK/ POP UP STRUCTURE

## ASSEMBLY



## Function 8 URBAN GARDEN



Cornellà de Llobregat, Barcelona (ES)



103rd Street Community Garden, New York city (US)



Orti dipinti, Florence (IT)

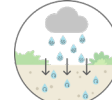
## DESCRIPTION

An urban vegetable garden on natural soil is a cultivable plot created directly in the ground, hosting vegetables, aromatic herbs, medicinal plants, and, if space allows, small fruit trees. This solution is suitable for parks, schools, courtyards, or urban residual areas, supporting social inclusion, environmental education, and the regeneration of anthropized spaces. Community gardens can be assigned to individual citizens, school groups, or local communities, with special attention to vulnerable or marginalized people. Besides their productive and landscape function, vegetable gardens have educational, therapeutic, and cultural roles, strengthening social bonds and environmental skills

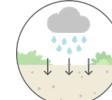
## BENEFITS



Climate Mitigation



Water cycle regulation



Rainwater Infiltration



Biodiversity protection



Health and well-being



Aesthetic Improvement



Social Inclusion



Food Production

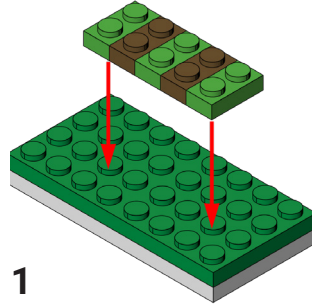
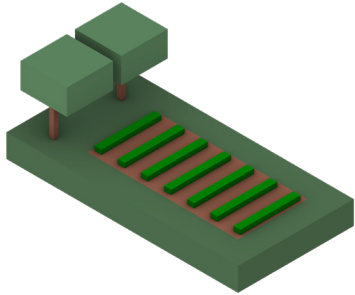


Local Economic Development

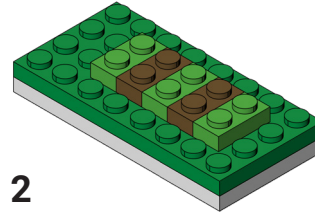
Function 8

# URBAN GARDEN

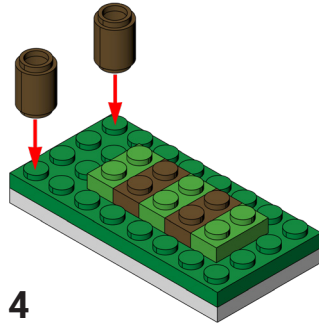
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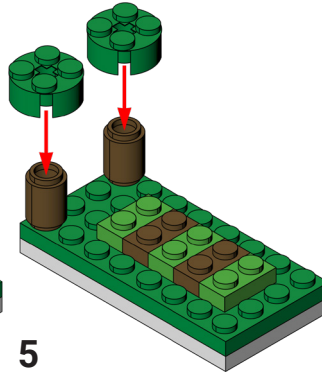
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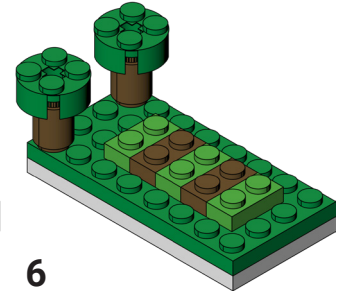
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5



6

## Function 9 **BIKE PATH**



Level Crossing Removal Project – Carrum, Seaford and Kananook, Melbourne (AU)



Kempenstraat, Antwerp (BE)



Cycling Through Limburg, Limburg (BE)

## **DESCRIPTION**

Cycle lanes are dedicated public space infrastructures that support active mobility and sustainable transport within urban environments. Integrated into streets, parks, and linear public spaces, they provide safe and accessible routes for daily commuting, leisure, and short-distance travel.

When designed as part of a multifunctional public space system, cycle lanes can be combined with green infrastructure, permeable surfaces, shading elements, and traffic-calming strategies. These integrations improve user comfort, enhance safety, and contribute to better environmental performance of street spaces.

## **BENEFITS**



**Climate Mitigation**



**Health and well-being**

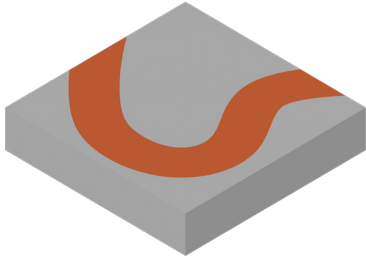


**Social Inclusion**

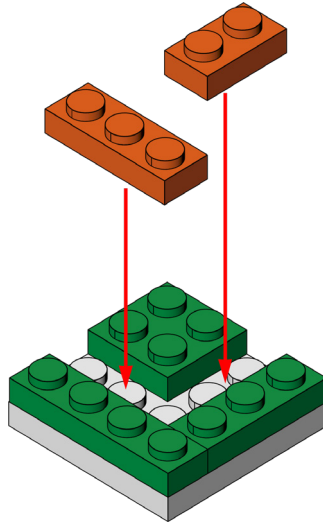
Function 9

## BIKE PATH

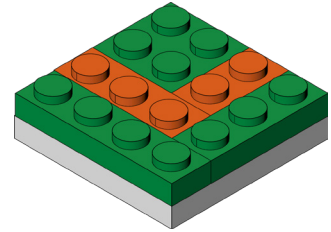
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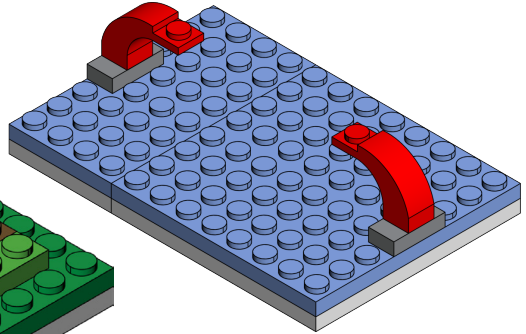
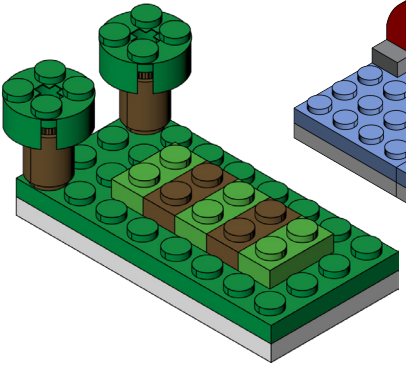
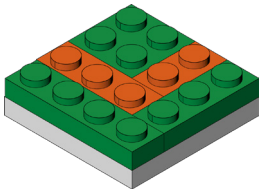
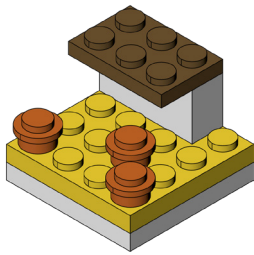
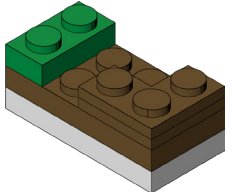
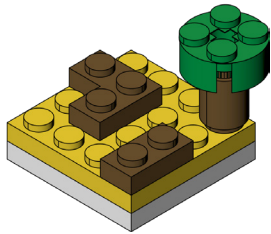
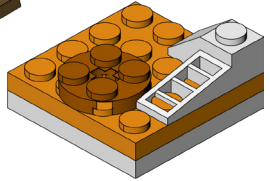
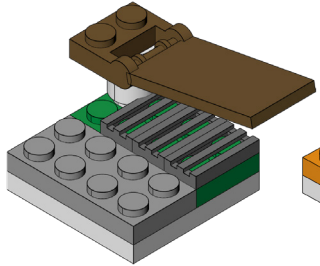
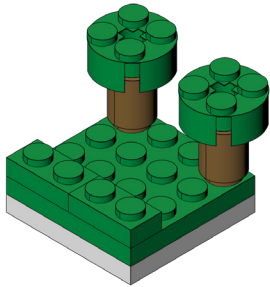


1



2





# ELEMENTS

## Element 1 ROW OF TREES



Place des Voges, Paris (FR)



Midtown, Denver, Colorado (US)



Midtown, Denver, Colorado (US)

## DESCRIPTION

Linear planting of trees on natural soil, typically along streets, pathways, or open spaces. Trees are rooted directly in the ground, allowing proper development of root systems and canopies, and providing continuous shading and microclimate regulation. Compared to isolated trees, rows of trees enhance environmental benefits and ecological continuity within the urban fabric. Species selection and spacing should be adapted to local soil conditions and climatic context, also considering future climate projections over the time required for trees to reach full maturity.

## BENEFITS



Climate Mitigation



Air Pollution Reduction



Water cycle regulation



Rainwater Infiltration



Health and well-being

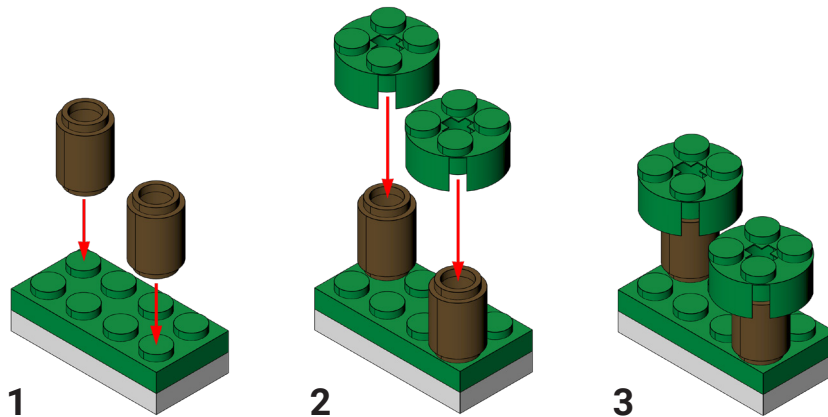
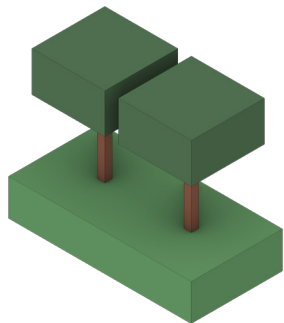


Aesthetic Improvement

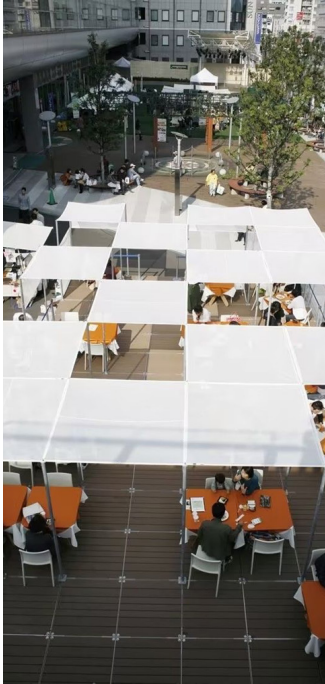


Biodiversity Protection

Element 1  
**ROW OF TREES**  
ASSEMBLY



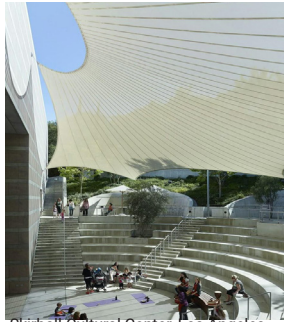
## Element 2 CANOPIES



Tsuboi Hirotosugu Structural Design Office (JP)



Pedestrian street, Pécs (HU)



Skirball Cultural Center, Los Angeles (US)

## DESCRIPTION

The canopy is a lightweight shading structure composed of technical fabric membranes tensioned on steel or timber frames. It is designed to create large shaded areas in public spaces, pedestrian routes, and courtyards, improving thermal comfort and reducing direct solar radiation. It can be built as a fixed or removable system. When made with waterproof fabric, it also provides protection from rain. The quality of the shading depends on the type of material and the texture of the fabric, which can be continuous or open-weave. Outer surfaces are preferably light-colored to ensure high solar reflectance and reduce heat buildup.

## BENEFITS



**Climate Mitigation**



**Health and well-being**



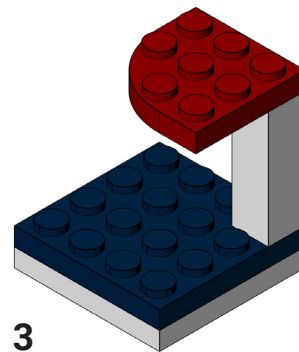
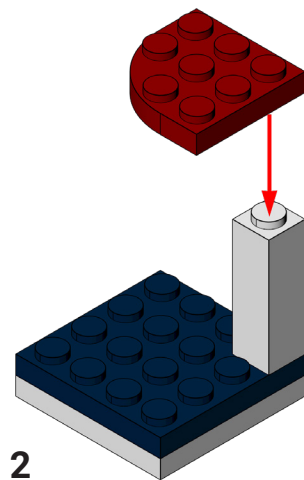
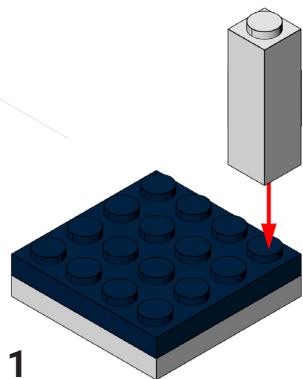
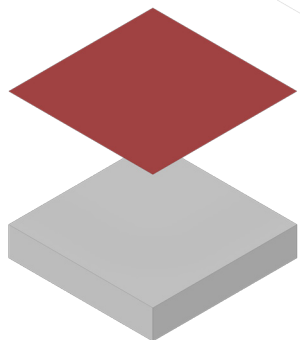
**Aesthetic Improvement**



**Social Inclusion**

Element 2  
**CANOPIES**

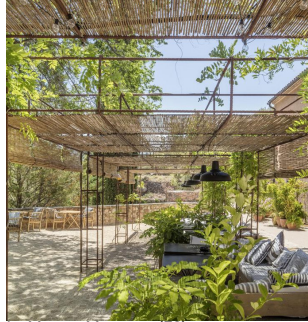
ASSEMBLY



## Element 3 PERGOLA



Morgan North, New York (US)



La Morera, Montsant (ES)



C/ d'Entença, Barcelona (ES)

## DESCRIPTION

Pergolas are lightweight architectural structures composed of vertical posts and horizontal beams, traditionally used to provide shade and define semi-open spaces. In urban environments, they serve as effective shading devices for pedestrian areas, improving thermal comfort and spatial quality in streets and squares. Green pergolas, in particular, integrate climbing and shrubby vegetation within the supporting structure, creating a continuous shaded canopy. This solution combines the functional advantages of artificial shading systems with the environmental benefits of urban greenery, contributing to microclimate regulation, reduction of direct solar radiation, and enhancement of public spaces.

## BENEFITS



Climate  
Mitigation



Health and  
well-being



Aesthetic  
Improvement



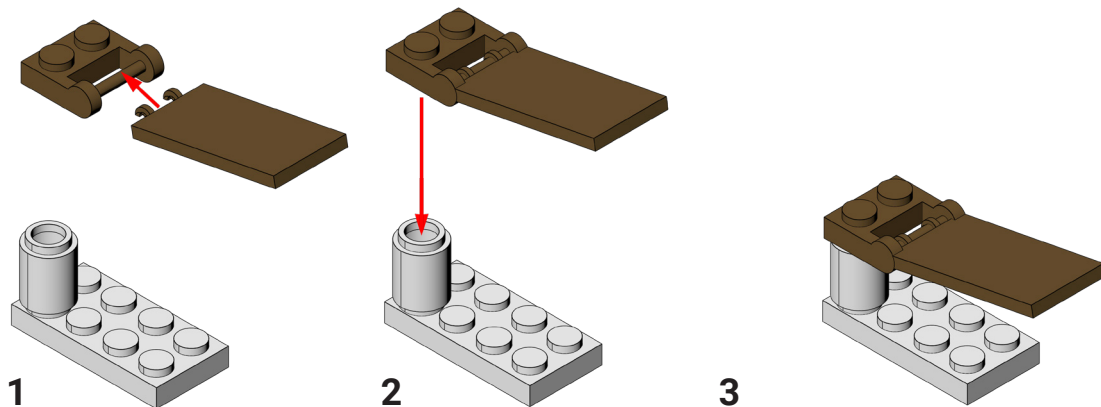
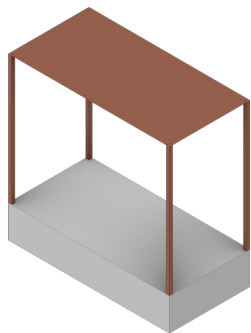
Social  
Inclusion



Biodiversity  
Protection

Element 3  
**PERGOLA**

ASSEMBLY



## Element 4

### PHOTOVOLTAIC PERGOLA



La Ronda, Barcelona (ES)



Silicon Valley campus, California (US)



Photovoltaic shade, Madrid (ES)

### DESCRIPTION

Photovoltaic pergolas are lightweight architectural structures that combine shading functions with on-site renewable energy production. Integrated into public spaces, they provide sheltered areas while supporting sustainable energy strategies at the local scale. Photovoltaic pergolas can host seating, pedestrian paths, or gathering areas, and may be combined with vegetation, permeable surfaces, and urban furniture. By reducing direct solar radiation and generating clean energy for lighting, mobility services, or public amenities, they enhance environmental performance and user comfort.

### BENEFITS



Climate Mitigation



Health and well-being



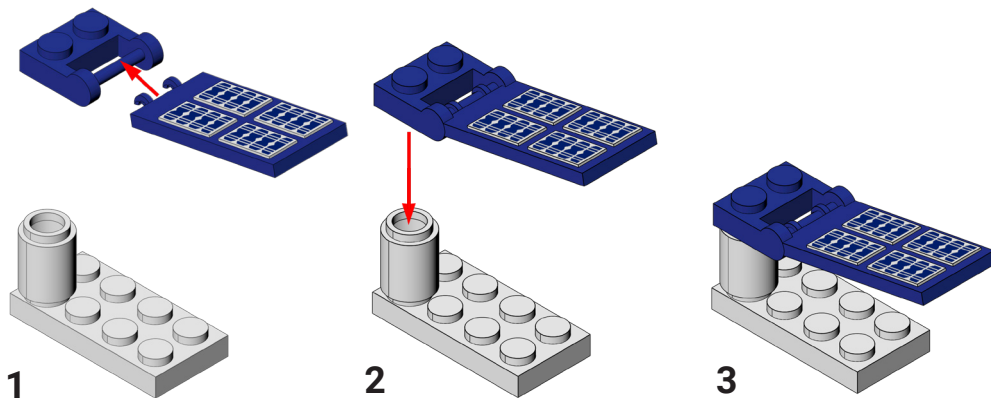
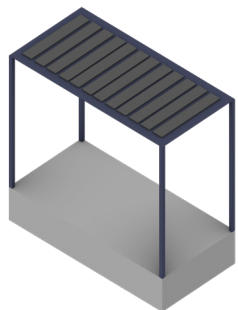
Aesthetic Improvement



Social Inclusion

Element 4  
**PHOTOVOLTAIC  
PERGOLA**

ASSEMBLY



## Element 5

### VEGETATED STRIPS



Grey to Green Project, Sheffield (UK)



Carrer de Joaquin Rubió i Ors, Cornella de Llobregat (ES)



Royal Docks Rain Gardens, London (UK)

## DESCRIPTION

A vegetated strip is a linear green element that can be implemented in different urban contexts, both on paved surfaces and on permeable soil. In areas without natural ground, vegetation is accommodated in linear containers or planters, allowing greenery to be introduced without modifying existing surfaces. Where permeable soil is available, vegetation can be installed directly in the ground, reducing the need for technical systems. Overall, vegetated strips enhance urban spaces by contributing to microclimate regulation, reducing surface runoff, and improving environmental quality. Plant selection and design strategies should be adapted to local climatic conditions, soil availability, and maintenance requirements to ensure long-term performance and resilience.

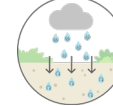
## BENEFITS



**Air Pollution Reduction**



**Climate Mitigation**



**Water cycle regulation**



**Rainwater Infiltration**



**Health and well-being**



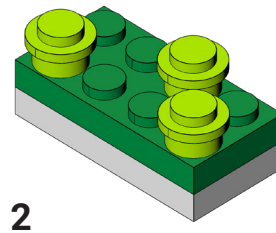
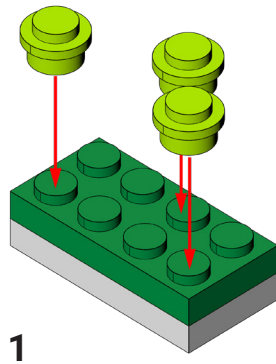
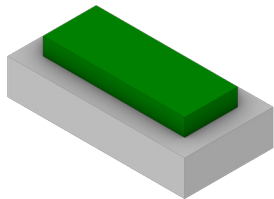
**Aesthetic Improvement**



**Biodiversity Protection**

Element 5  
**VEGETATED  
STRIPS**

ASSEMBLY

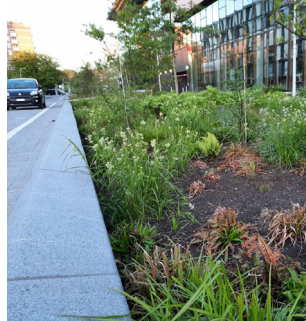


## Element 6

### GRASSY VERGE



Blue Waves, Arnhem (NL)



Amsterdam zuid prinses Irene straat, Amsterdam (NL)



Rosa Luxemburg Garden, Paris (FR)

## DESCRIPTION

Grassy verges are linear green spaces located along streets and urban infrastructures, typically positioned between carriageways, sidewalks, and cycling paths. Traditionally considered residual areas, they are increasingly reinterpreted as active components of the public space sy-

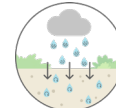
## BENEFITS



**Air Pollution  
Reduction**



**Climate  
Mitigation**



**Water cycle  
regulation**



**Biodiversity  
Protection**



**Aesthetic  
Improvement**

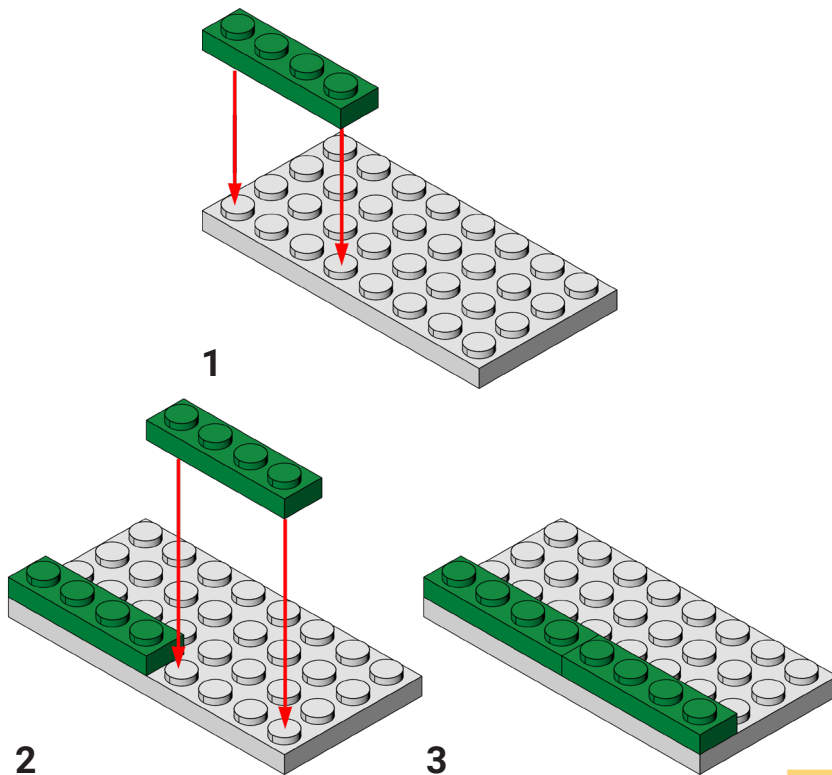
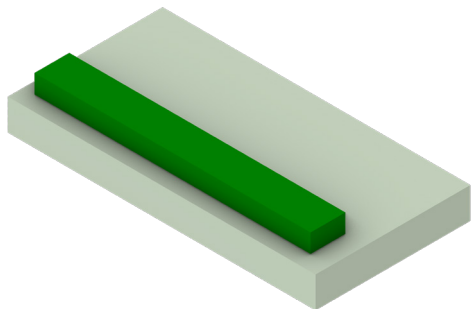


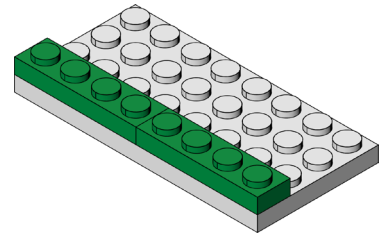
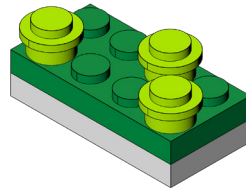
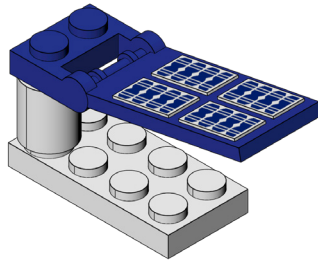
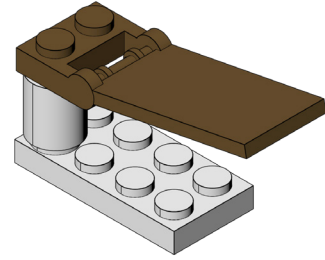
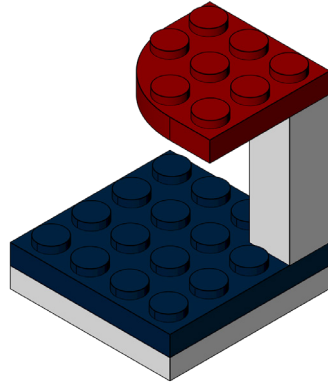
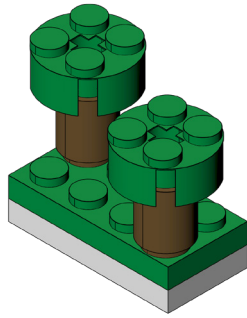
**Rainwater  
Infiltration**

Element 6

## GRASSY VERG

# ASSEMBLY





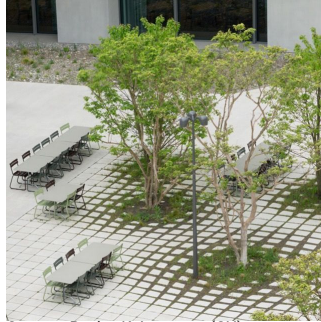
# LANDCOVERS

# Landcover 1

## GRASSY JOINT



Avinguda de la Republica Argentina, Cornella de Llobregat (ES)



Campus Roche, Kaiseraugst (CH)



Passeig de Sant Joan, Barcelona (ES)

## DESCRIPTION

This type of pavement consists of slabs, tiles, or precast blocks (in concrete, stone, or other materials) interspersed with wide joints filled with topsoil and herbaceous species, either spontaneous or selected. The size and number of openings between elements can vary depending on the chosen design, supporting discontinuity and the presence of vegetation. Depending on the substrate and construction technique, it is possible to achieve very high infiltration rates (up to nearly 100%), making this solution particularly suitable for pedestrian paths, internal courtyards, paved gardens, or low-traffic parking areas.

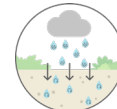
## BENEFITS



Air Pollution Reduction



Climate Mitigation



Water cycle regulation

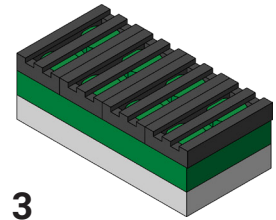
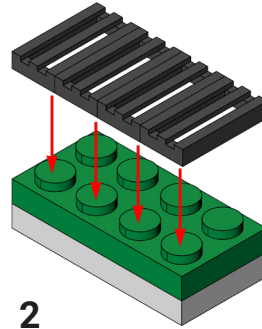
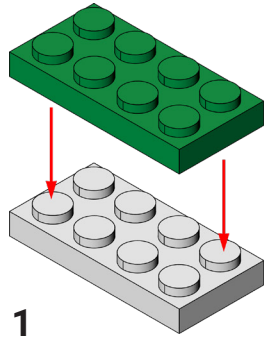
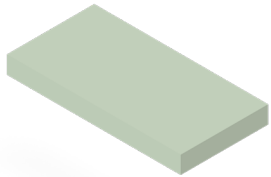


Health and well-being



Rainwater Infiltration

Landcover 1  
**GRASSY JOINT**  
ASSEMBLY



## COOL PAVEMENTS (COOL ASPHALT/CONCRETE LIGHT)



Phoenix Park, Phoenix (US)



Community in Pacoima, Los Angeles (US)



Road of Abdullah bin Jassim Street (QA)

### DESCRIPTION

Cool pavements are made with high solar reflectance (albedo) and high emissivity surfaces, designed to reduce heat accumulation in urban environments. They can be produced with light colors or dark colors treated with reflective pigments, maintaining an aesthetically pleasant appearance while minimizing overheating. These materials reflect solar radiation during the day and release heat more rapidly at night, contributing to urban heat island mitigation. They are suitable for squares, sidewalks, and pedestrian paths, both in new projects and retrofitting. Care must be taken to avoid glare in frequently used areas.

### BENEFITS



Climate Mitigation



Health and well-being

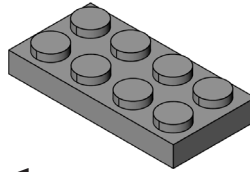
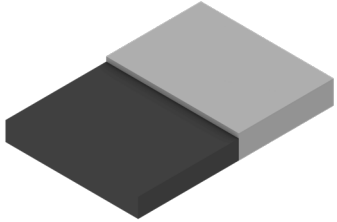


Aesthetic Improvement

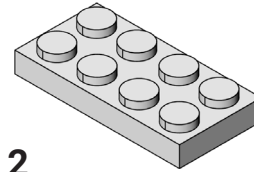
Landcover 2

**COOL PAVEMENTS  
COOL ASPHALT/  
CONCRETE LIGHT)**

ASSEMBLY



1



2

## Landcover 3

### TERRE BATTUE



DNV Gødstrup, Herning (DK)



Mossé Square and the Banks of the Loire, Nevers (FR)



The Parc du Vallon, Metz (FR)

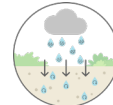
## DESCRIPTION

Terre battue is a semi-permeable ground treatments widely used in urban public spaces, particularly in parks, gardens, pedestrian paths, and resting areas. These surfaces are composed of compacted natural aggregates and soil-based materials, offering an alternative to fully impervious pavements. When properly designed, they allow partial water infiltration, support evapotranspiration, and contribute to groundwater recharge, helping to reduce surface runoff and urban impermeability. Their natural colour and texture enhance visual continuity with green areas and landscape elements.

## BENEFITS



Climate Mitigation



Water cycle regulation



Rainwater Infiltration



Health and well-being

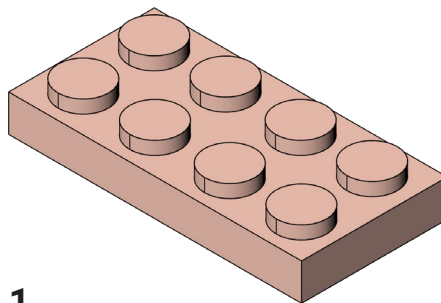
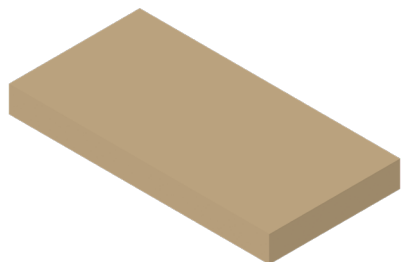


Aesthetic Improvement

Landcover 3

**TERRE BATTUE**

ASSEMBLY



1

# Landcover 5

## AGRICULTURE



Six Senses Douro Valley (PT)



Amsterdam Southeast Food Forest, Amsterdam (NL)

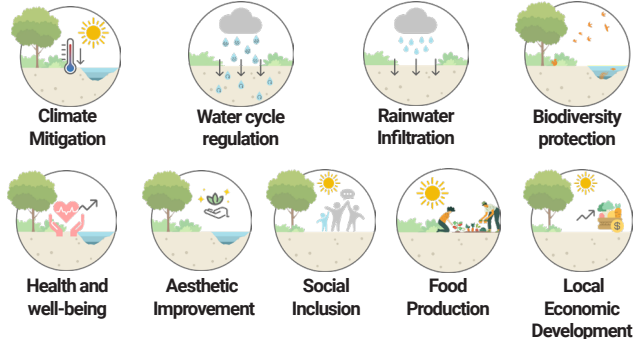


Horizon of Understanding, Manitoba (CA)

### DESCRIPTION

Urban and peri-urban agriculture refers to cultivated land used for food production within or around cities, including community gardens, urban farms, orchards, and productive green areas. Considered as land cover, agriculture represents a continuous and permeable surface that interacts directly with climate, water, and ecological systems. Agricultural land cover contributes to soil permeability, evapotranspiration, and temperature regulation, helping to mitigate urban heat and reduce surface runoff.

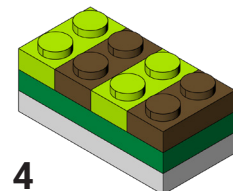
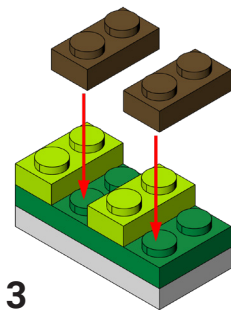
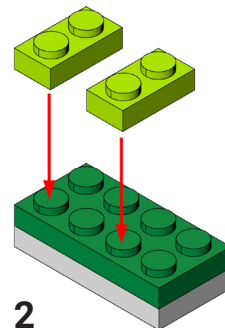
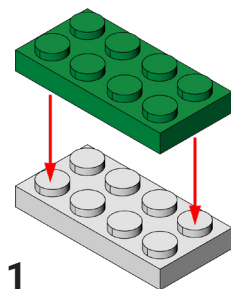
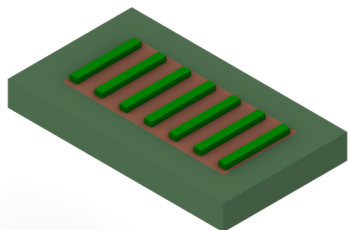
### BENEFITS



Landcover 5

## AGRICULTURE

# ASSEMBLY



## Landcover 6

### URBAN WATER FEATURES



Piazza della Pilotta, Parma (IT)



Pazhou South Waterfront Park, Guangzhou (CN)



Truderinger Straße, Munich (DE)

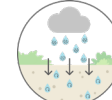
### DESCRIPTION

Urban water features, such as fountains, water mirrors, and cascades, are public space elements that combine environmental, social, and spatial functions. Integrated into squares, parks, and pedestrian areas, they enhance the sensory quality of urban environments and contribute to thermal comfort. Through evaporation, air movement, and visual perception, they help reduce perceived temperatures and improve microclimatic conditions, particularly during warm periods.

### BENEFITS



Climate Mitigation



Water cycle regulation



Social Inclusion

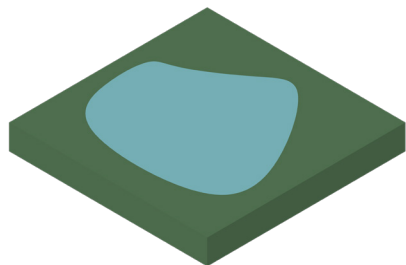


Health and well-being

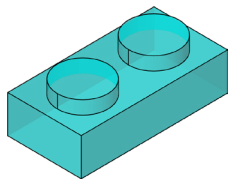


Aesthetic Improvement

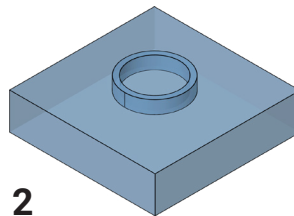
Landcover 6  
**URBAN WATER  
FEATURES**

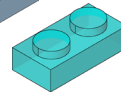
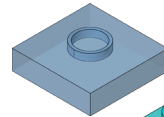
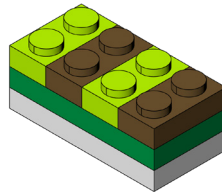
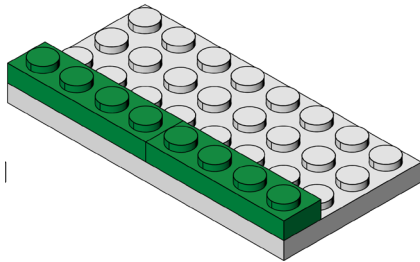
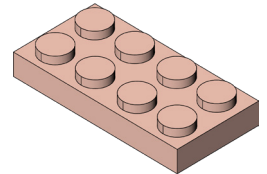
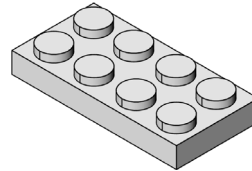
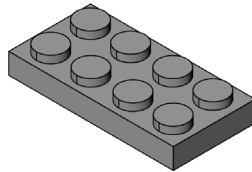
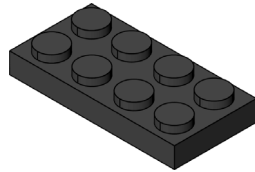
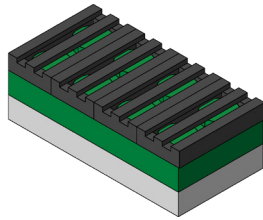


1



2







# Any idea?

Try to sketch something you imagine to plan for your city!



# Any idea?

Try to sketch something you imagine to plan for your city!



## **WEBSITE**

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[www.uccrn.education](http://www.uccrn.education)

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The Climate School | Columbia University