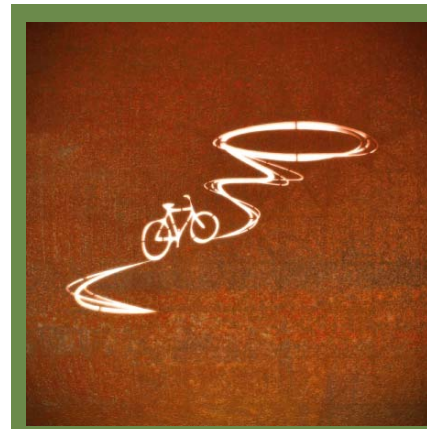
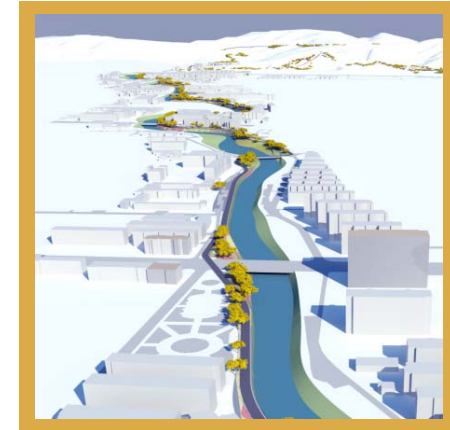
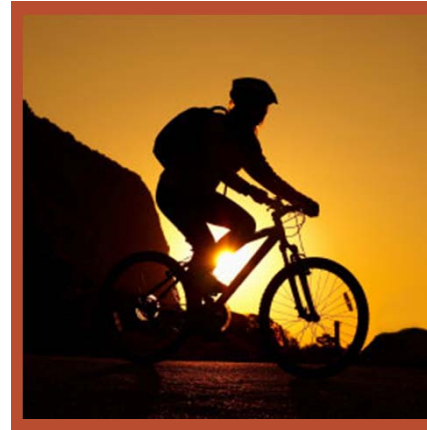


Cycling the golden ribbon Jiaozuo, China



The Design of Bicycle Corridor Connecting the City and the Nature: A Case Study in Jiaozuo, China

Xiaolin Lu, Shasha Wang, Nan Zou, Willem Jan.Snel

Shandong University, China
Mecanoo International



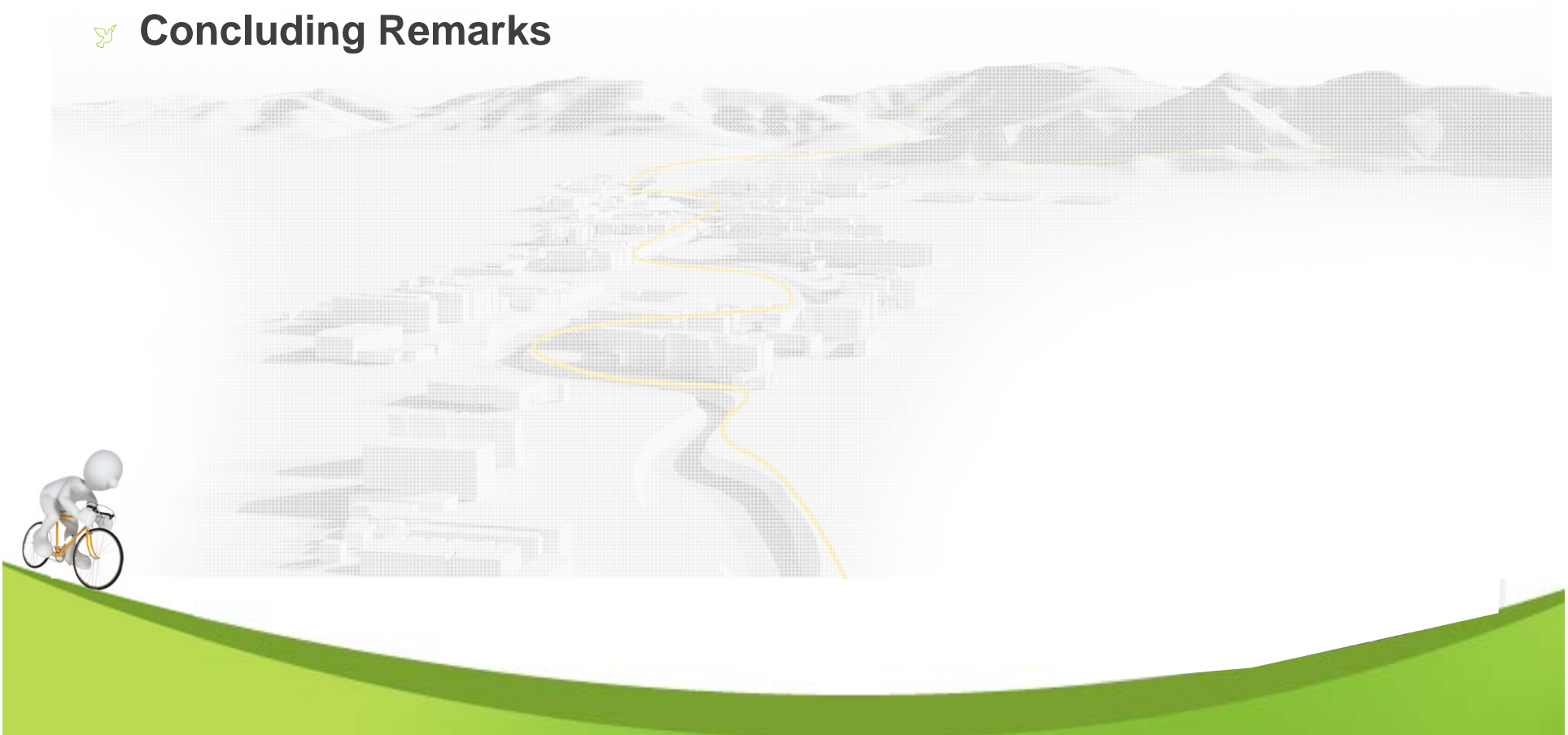
山東大學
Shandong University



mecanoo

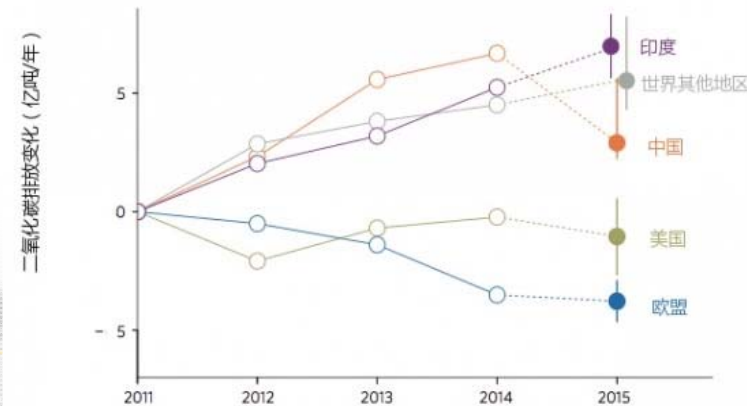
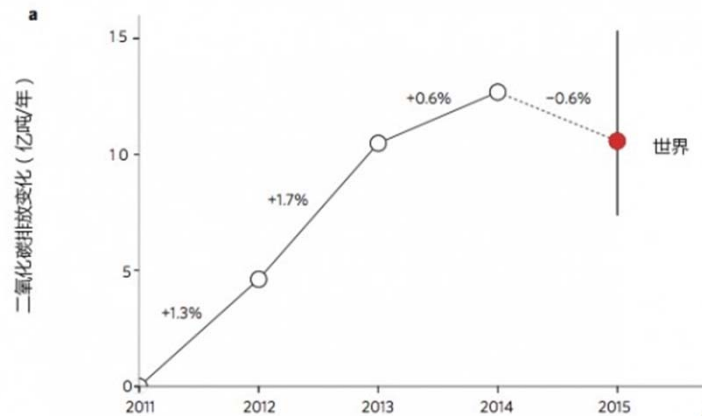
Contents

- ✎ **Introduction**
- ✎ **Design of the route**
- ✎ **Benefit**
- ✎ **Concluding Remarks**

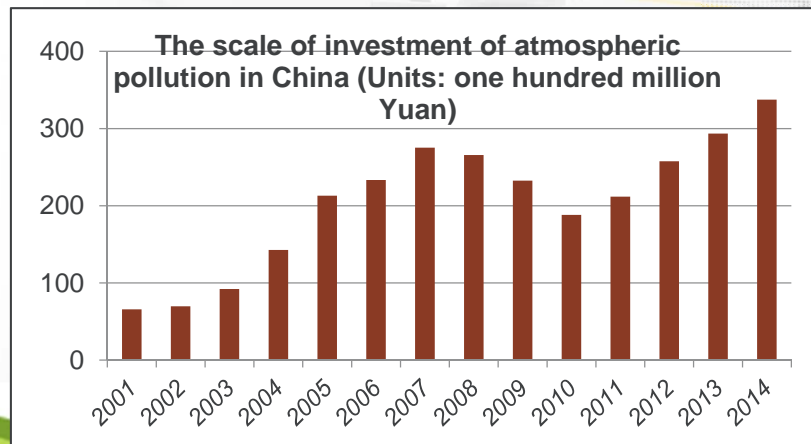


Introduction

✎ “Although the city comprises only 2% of the total surface area of Earth, 80% of the world’s greenhouse gases is emitted from urban regions.”



Reference: 《Chinese Journal of Nature》, 2015.12.7)



How to Reduce CO2 Emission, Atmospheric Pollution?

Reference: Research of atmospheric pollution control industry and analysis of investment prospects in China from 2015 to 2020



Introduction

- ✎ Excessive urbanization development
- ✎ Lack of enough public open space, green leisure space

Urban development

What can we do to achieve a “low-carbon-and-green-growth” in urban development?



An image of current urban development at Jinan, China

Introduction

What are Jiaozuo's strengths?

Scenery, people, culture, history



Travel characteristics of residents:

Pedestrian is the main mode, representing 29.7% of total trips

Share of bicycles: 9.7%

Share of e-bicycles/motorcycles: 29.7%

Share of public transport: 12.3%

Tourism resources:

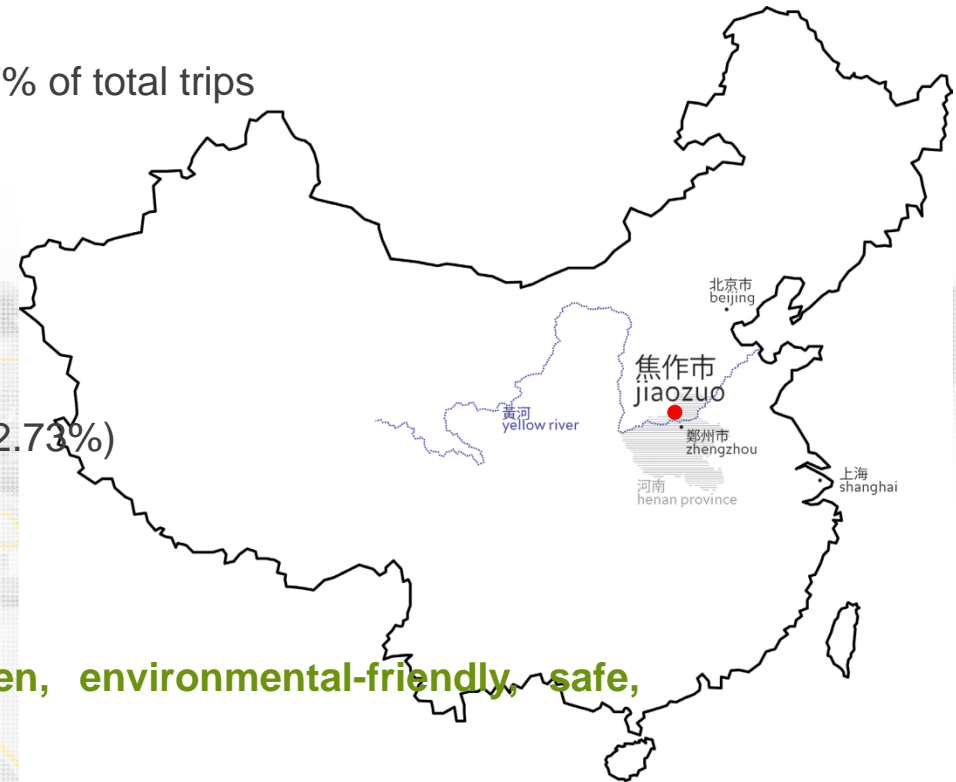
Cycle tourism is particularly popular in Jiaozuo
– a key market for growth (annual growth rate: 2.73%)

What are Jiaozuo's challenges?

Environment pollution, traffic congestion

Urban city managers seeking more green, environmental-friendly, safe, convenient leisure trips.

Increasing environmental consciousness amongst residents.



Introduction

🌿 Questions:

- 🌿 How to Reduce CO2 Emission, atmospheric pollution?
- 🌿 What can we do to achieve a “low-carbon-and-green-growth” in urban development?

🌿 Answer:

🌿 An Urban Design Approach thru **GREENWAYS**

Workplace



Habitation



Nature reserve



Culture feature



Historical



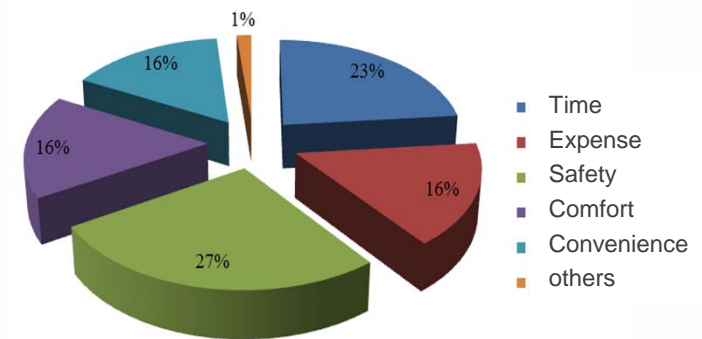
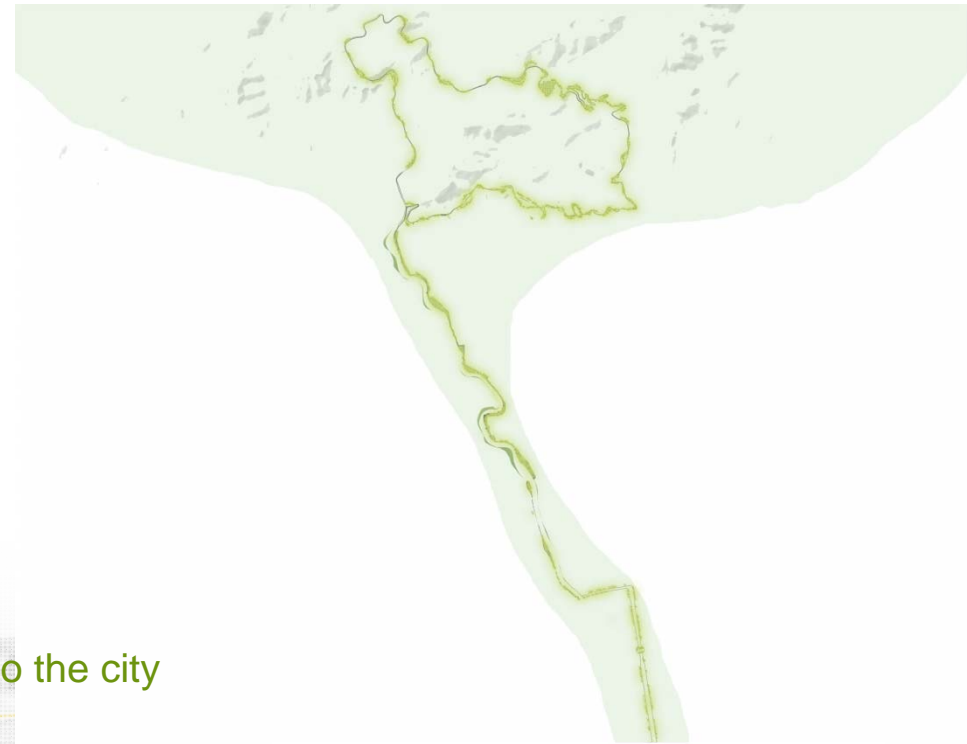
Our mission is to reclaim Jiaozuo's streets or urban space from the automobile, and to advocate for bicycling, walking as the best transportation alternatives.



Design of the route

What makes a good cycling route ?

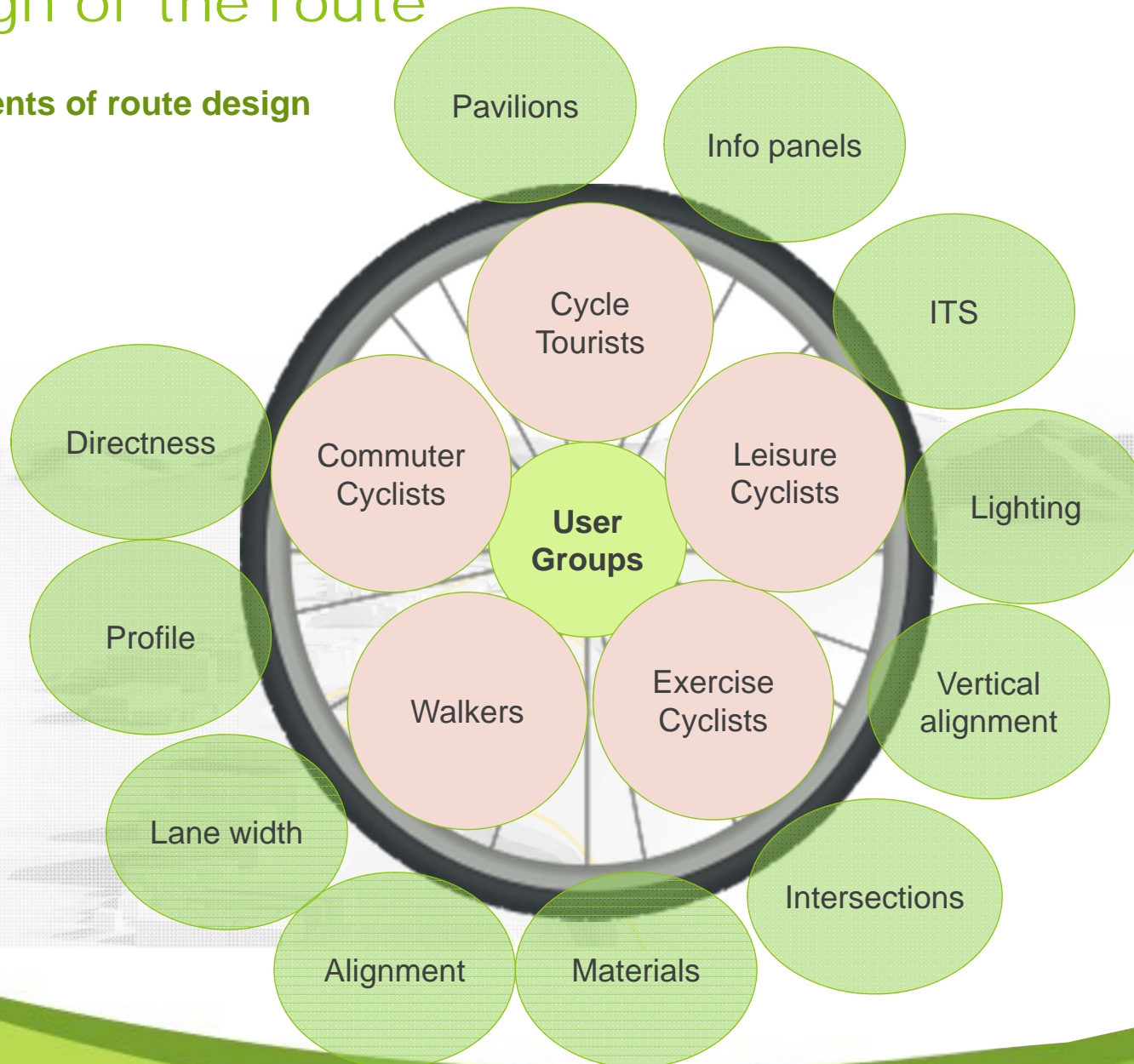
- ✦ Comfort
- ✦ Smooth surface and alignment
- ✦ Divided profile where appropriate
- ✦ Connectivity
- ✦ Bring people out of the city, bring nature into the city
- ✦ Place the route in a bigger network
- ✦ Connect to attractions
- ✦ Experience
- ✦ Pavilions or resting places placed in strategic locations
- ✦ Safety
- ✦ Set apart from the motorized network
- ✦ Limited number of crossing points with roads



Impact factor of cycling route selection
Date from Tourist traffic survey in 2013

Design of the route

🦋 Elements of route design



Green corridor selection

🦋 **Q:** How to select the green corridor?

A: We may consider aspects as below:

1 : Meet users' multiple demands

A variety of demands

- Cycling/walking travelers
- Walkers/cyclists for commuting
- Walkers/cyclists for leisure and exercise

2 : Interact with urban development

3 : Connect multi-dimensional space

Connect multi-dimensional space



Green corridor selection

Multi-dimensional space — existing attractions



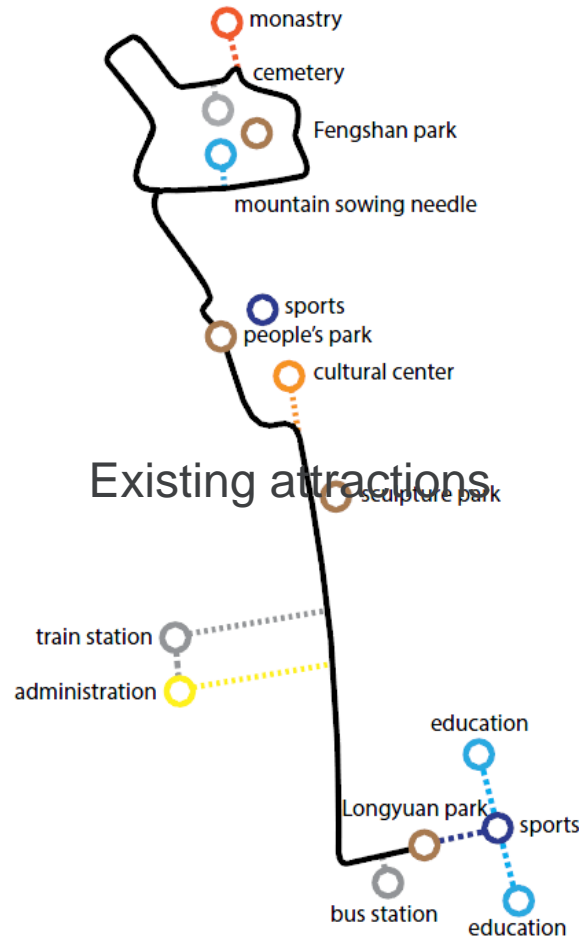
People's park



Studio city



Train station



Yuanrong temple



Fengshan park

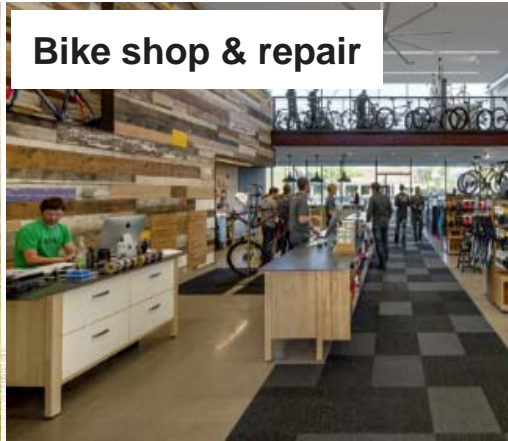


Longyuan park

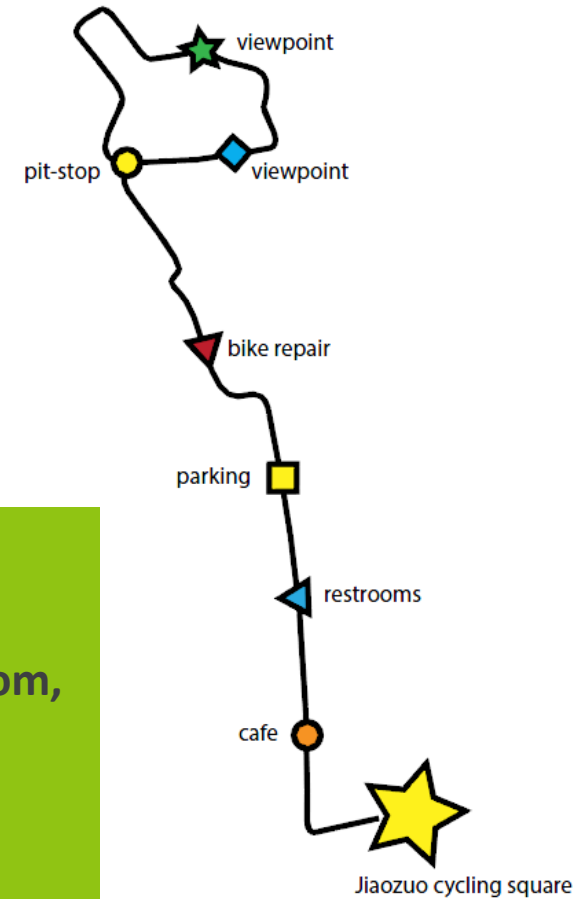


Green corridor selection

Multi-dimensional space — new attractions

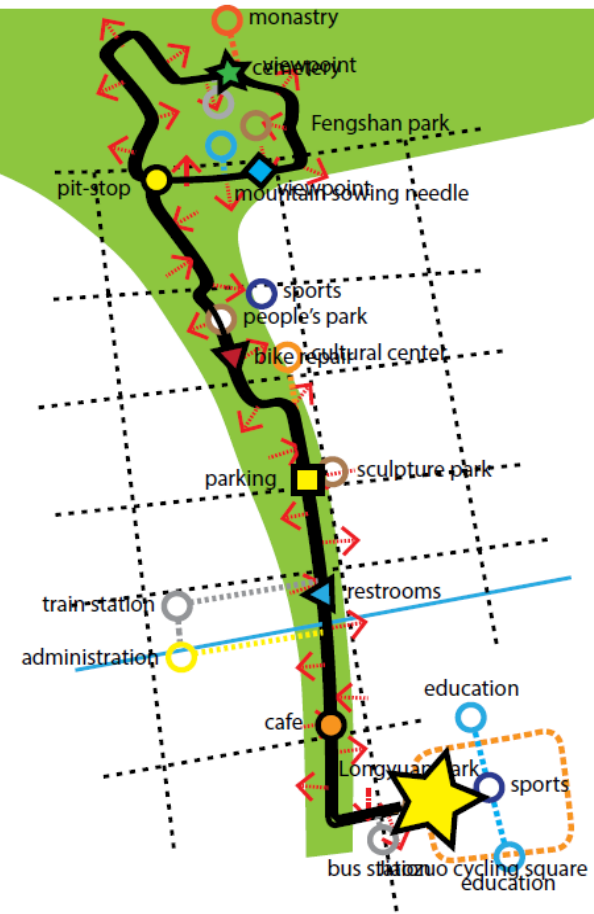
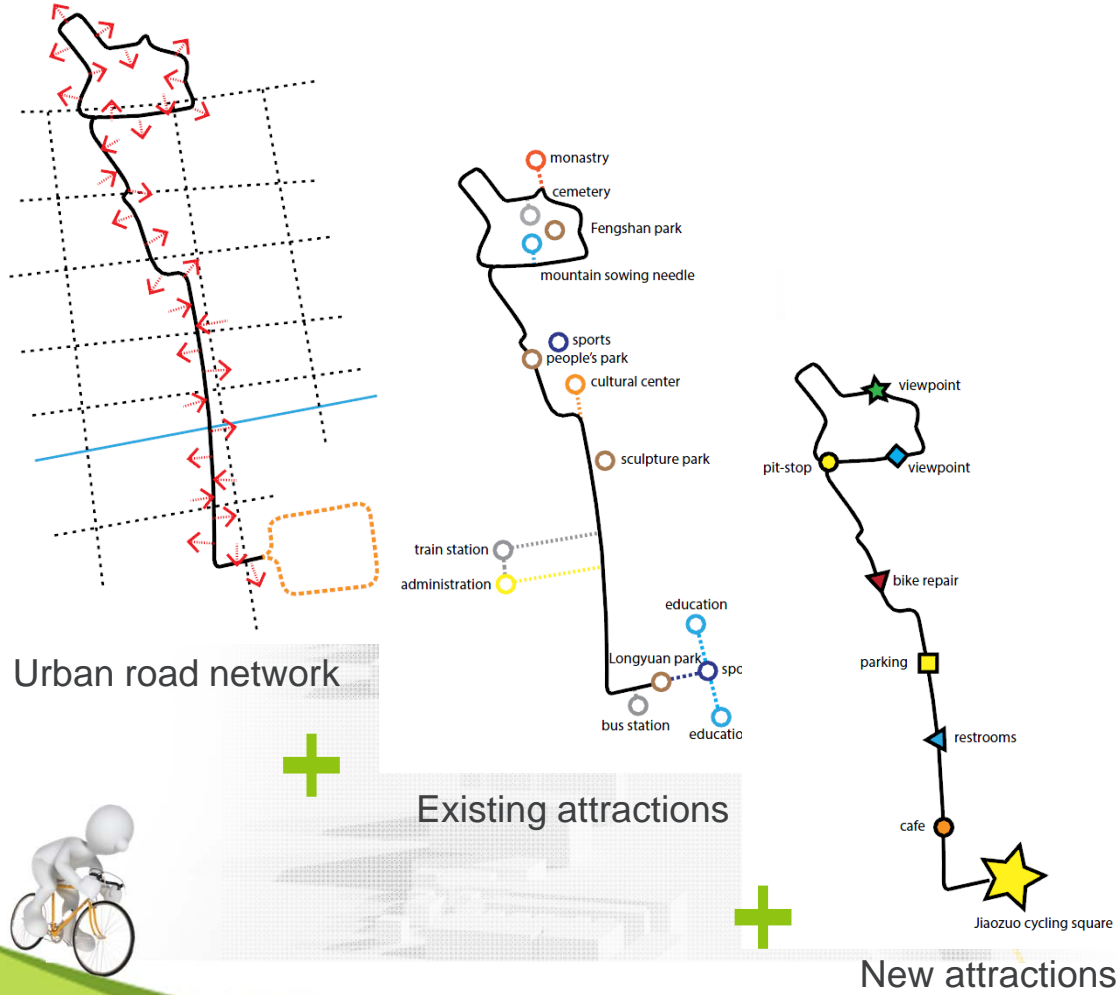


Equip with bike facilities, restroom, viewpoint and so on.



Green corridor selection

Connect multi-dimensional space



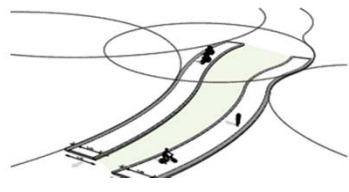


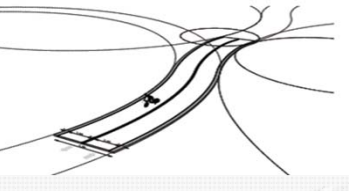


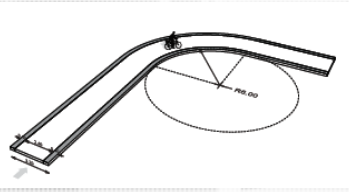


Integral public space

- Mainline-10.2km
- Origin: Longyuan Lake Park
- Destination: Mountain on the north of Yingshi Road

Alignment design


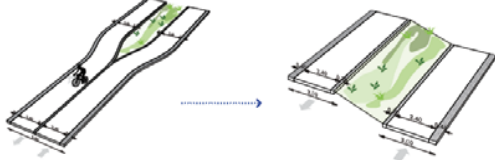
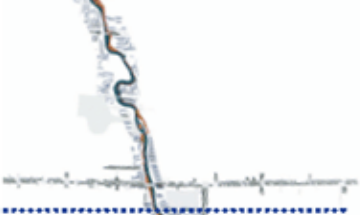
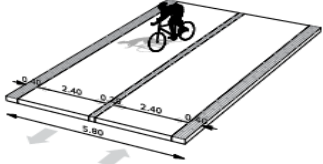
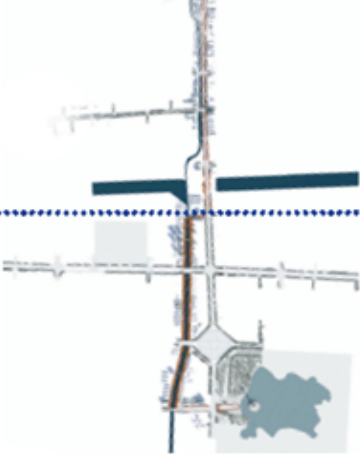
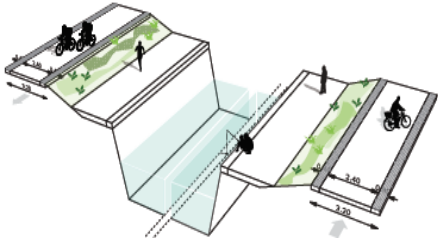


Alignment design

Corridor	Alignment	Reality	Design sketch	Concept
mountain				Using curved lines and the largest radius possibly
river				Like at the mountain area, create a very smooth and fluent alignment
City and canal				Using a combination of straight lines and 6 m. radius curves where required to turn a corner

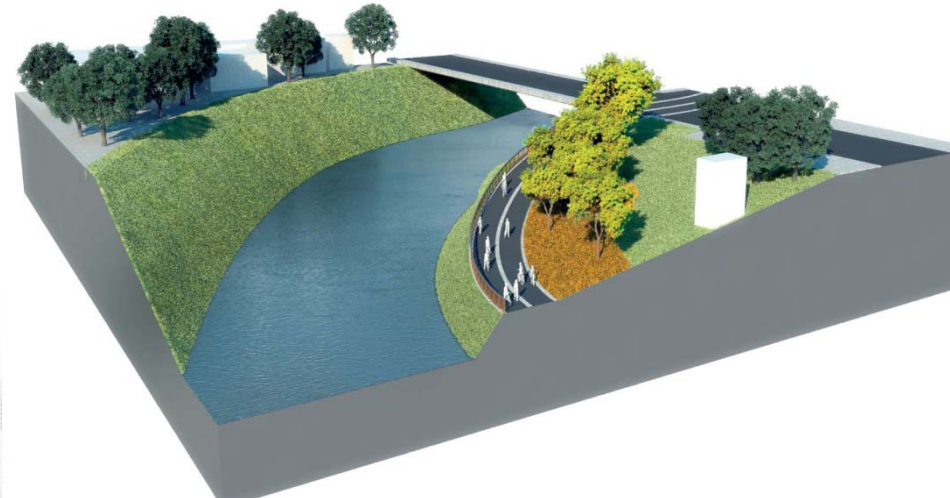
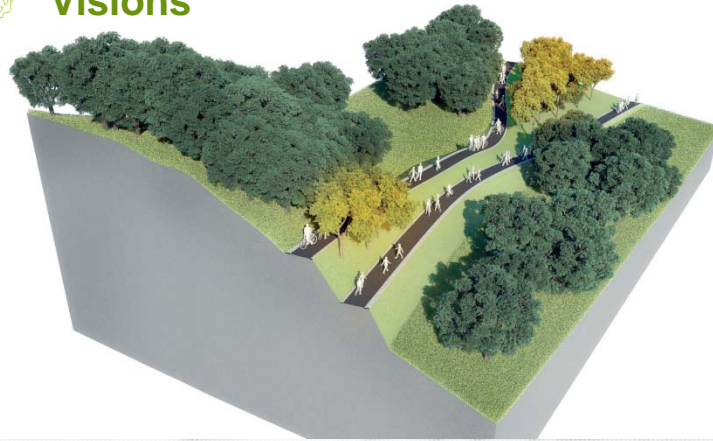


Profile design

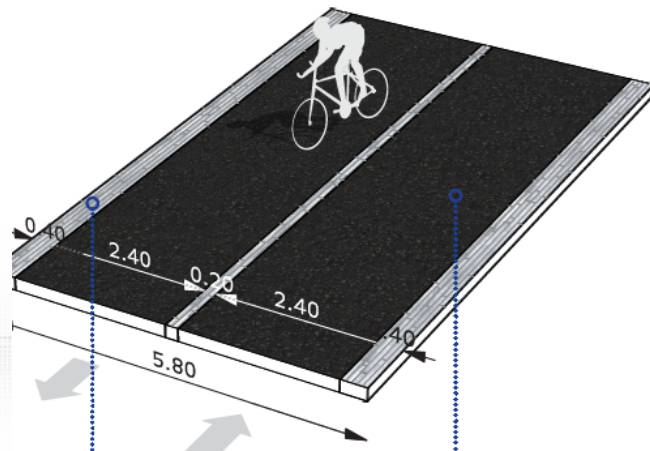
Corridor	Profile	Concept & Parameters
 <p>mountain</p>		<p>maximize the experience of being in nature, split into two, each one is 3 m. wide road creates a more enclosed feeling and a very different experience</p>
 <p>river</p>		<p>Stays on one side of the river and goes as close to the water as possible. One should feel to be embedded in the river valley and almost be able to touch the water.</p>
 <p>city</p> <p>canal</p>		<p>Split up in two directions on either side of the road, close to or directed at the shops, restaurants and other functions in the buildings lining the streets. Along the canal, split up in two directions on either side of the canal.</p>

Profile design

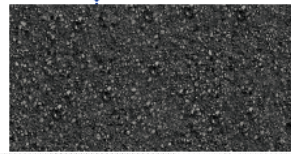
🦋 Visions



Material selection



Mount Taihang Schist
Use local materials



Black asphalt

Light schist and black asphalt
A specific design for Jiaozuo

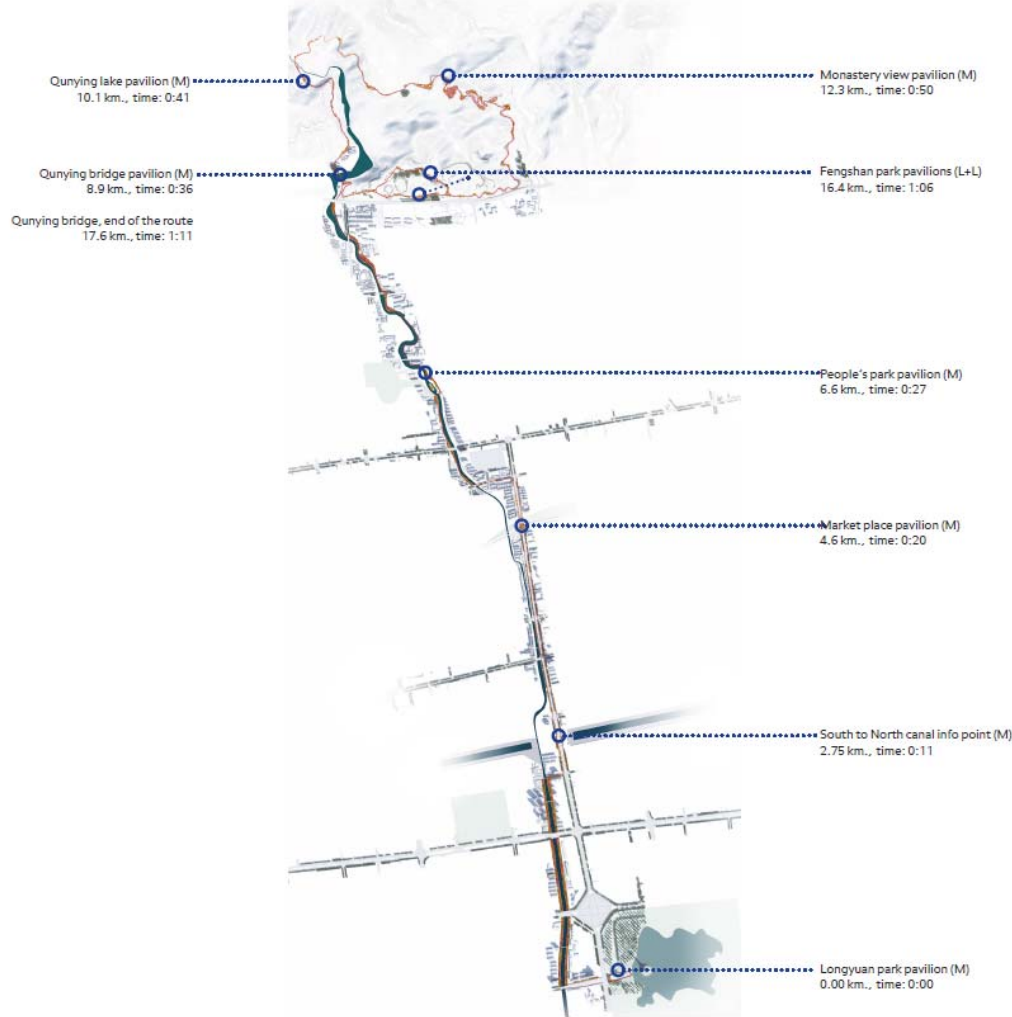
Perfectly contrast, unique beauty

Without chemically added colors

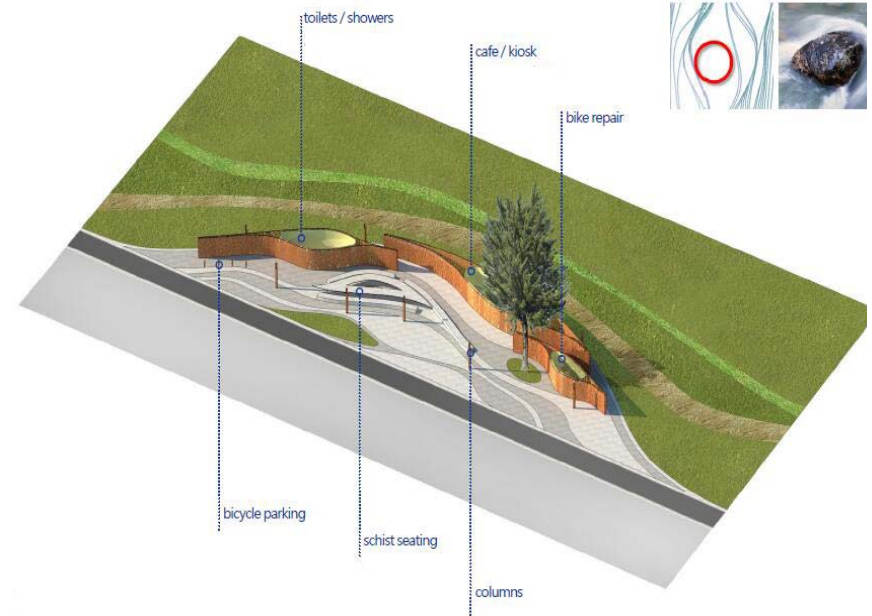
Minimal maintenance cost



Facilities and elements



widening the verge



beautiful

safe

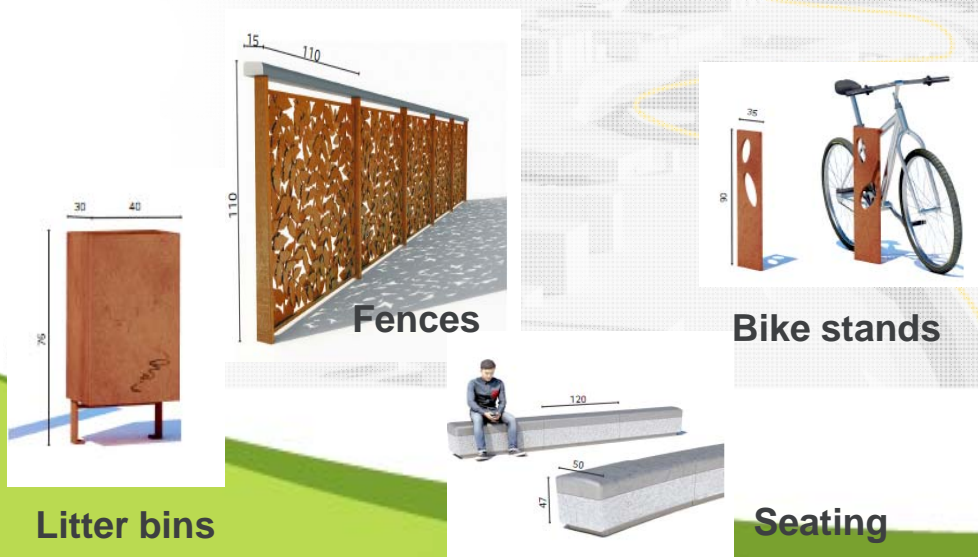
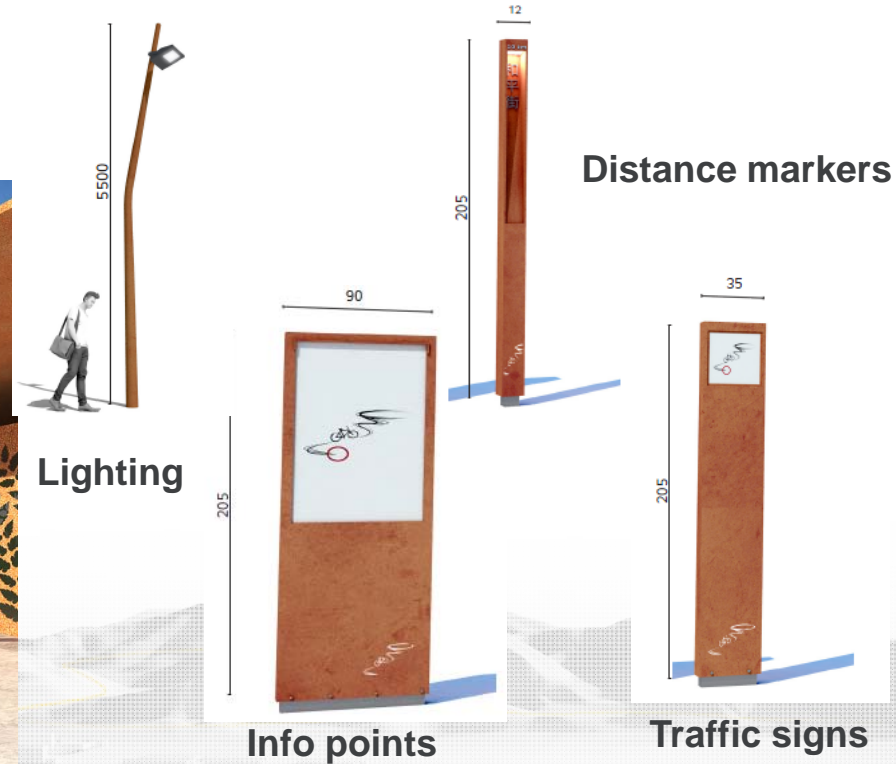
organized



Pavilions and resting places are like rocks in a stream. It should be equipped with seating, toilets, water access, emergency call, kiosks, bike repair & parking stations, and so on.

Facilities and elements

Vertical elements, using corten steel and stained steel, color and texture is earthy and natural.



Virescence

Flowering shrubs for ornamental value



Koelreuteria
(Golden rain tree)



Evergreen grasses as basic planting

Softscape

- Indigenous species
- A golden ribbon from mountain to city
- Rich in ornamental value through all seasons



Humanity



Culture attractions



Water landscape



Mountain landscape

Connectivity

Comfort

Experience



Benefit

The commuter



Driving



Cycling



Walking



- 01 Environment pollution
- 02 Traffic congestion
- 03 Traffic injury
- 04 Health problem



Through greenway

- 01 Social benefit
- 02 Economic benefit
- 03 Health benefit
- 04 Safety benefit
- 05 Mobility benefit
- 06 Environment benefit

Change to the system



Benefit

01

Social benefit

- ✎ Improve urban popularity
- ✎ Enhance urban happiness

02

Economic benefit

- ✎ Investment in walking and bicycling facilities can generate the bicycle-related tourism revenue.
- ✎ Residential property value increases.

03

Health benefit

- ✎ Walking and bicycling facilities promote an active, healthy lifestyle.

04

Safety benefit

- ✎ Infrastructure improvements and safety contribute to crash reduction.

05

Mobility benefit

- ✎ Walking and Bicycling facilities provide efficient commuting options.
- ✎ Walking and biking infrastructure is among **the most cost-effective** forms of transportation investment.

06

Environment benefit

- ✎ Sidewalks, bike lanes, paths, and greenway trails help to reduce vehicle emissions, fuel consumption, and congestion.

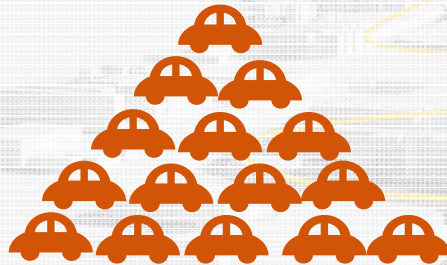


Benefit



Trip distance per day: 5 km.
Fuel consumption of 100-kilometer: 10L

Replace **5 km** of driving with walking or biking ×
365 days
492.75 kg of carbon dioxide prevented from
entering the atmosphere



Ten thousand cars



Replace **1 km** of driving with walking
or biking
2.7 ton of carbon dioxide prevented
from entering the atmosphere



Benefit



Mobility

Change to the system



Induce more people walking and biking for their daily needs.



Install sidewalk along roadway



Provide protected bicycle lanes



Install countdown signals



Install Speed limit facilities



Install refuge islands



Provide safer pedestrian and cyclist crossing facilities

Safety

Concluding Remarks

✿ The planning of Greenways

- An effective measure to promote the popularization of green and low carbon travel
- Seamless connection with the road network, residential quarter, attraction, etc.

✿ The design of Greenways

- Should comprehensive consider the humanity, landscape, and engineering
- Should make the Greenways is friendly to rider, runner, and walker

✿ The management and maintenance of Greenways

- Sustainable
- Managed flow
- On-call repairing





Questions?