



# **Cheong Gye Cheon Restoration Project** *- a revolution in Seoul -*

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**Formerly Cheong Gye Cheon Project**

**Seoul Metropolitan Government**

# Before



# After





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- ❑ Cheong Gye Cheon 2005
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- Introduction
  - *Seoul and Cheong Gye Cheon*



# Seoul at a glance

- Capital city of Korea for over 600 years
- Area : 605.6 km<sup>2</sup>
- Population : 10.3 M



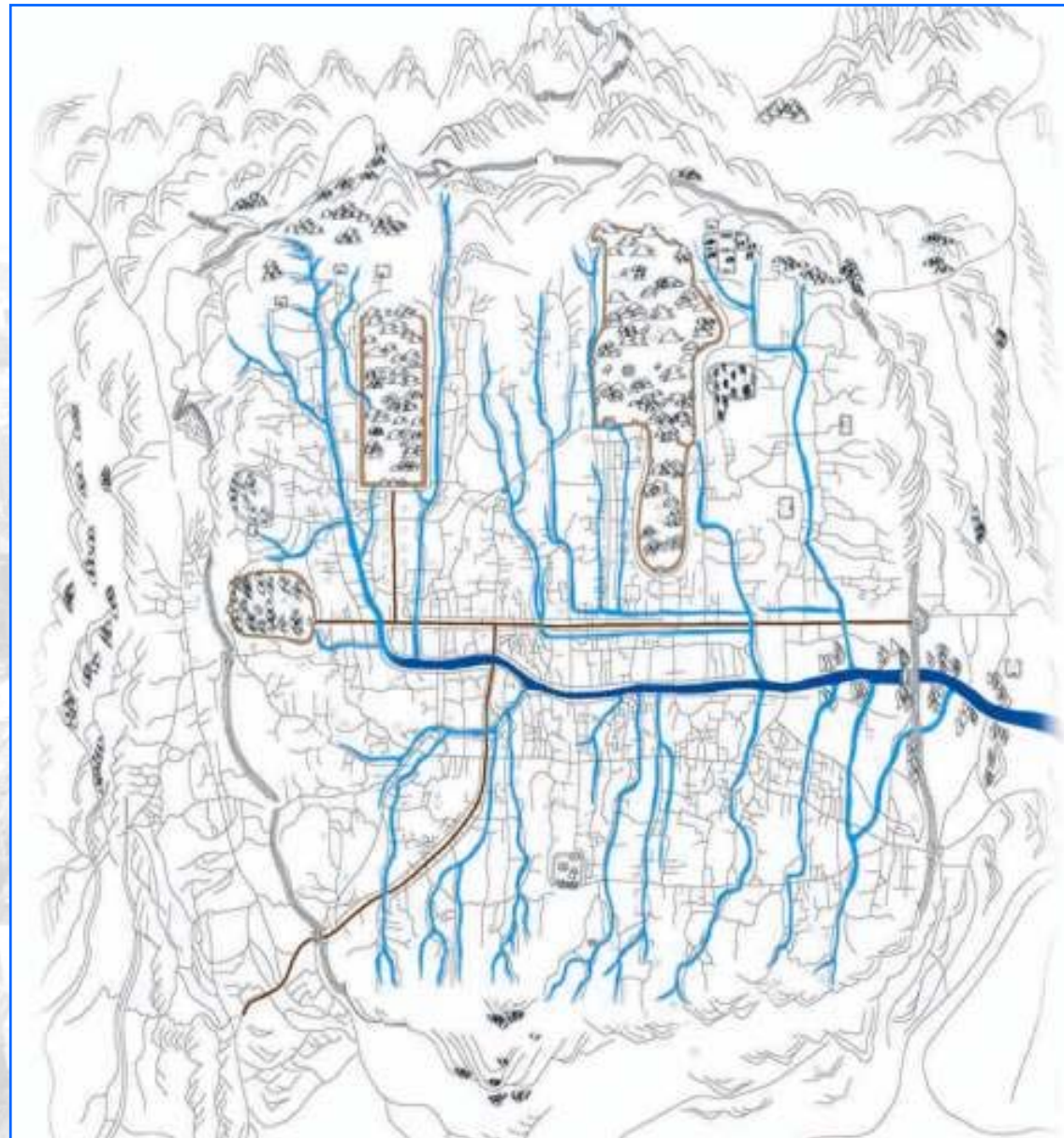


# Cheong Gye Cheon



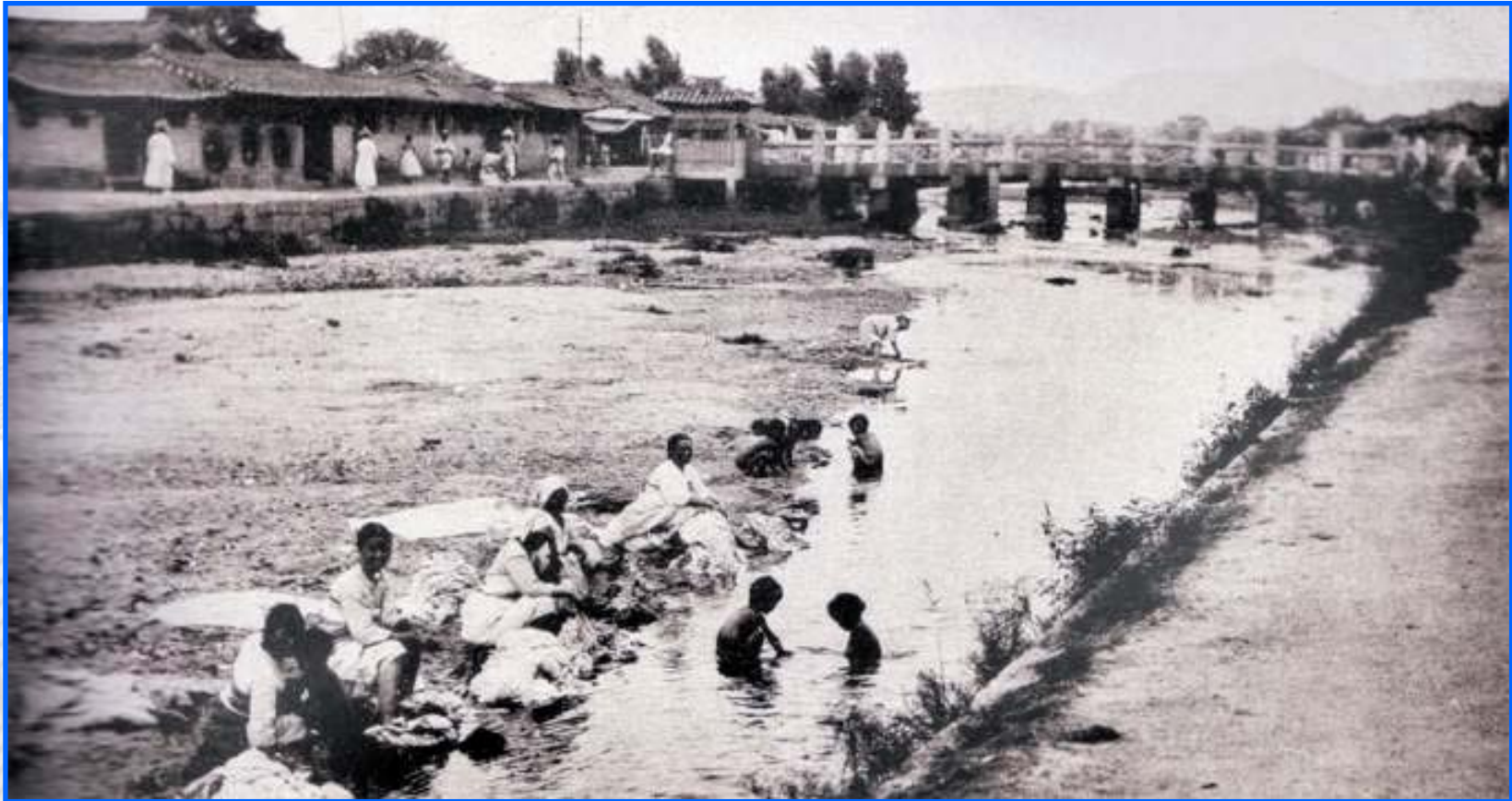
- Catchment area: 61 km<sup>2</sup>
- Length: 13.7 km
- Width: 20~85 m

# Old map of Seoul



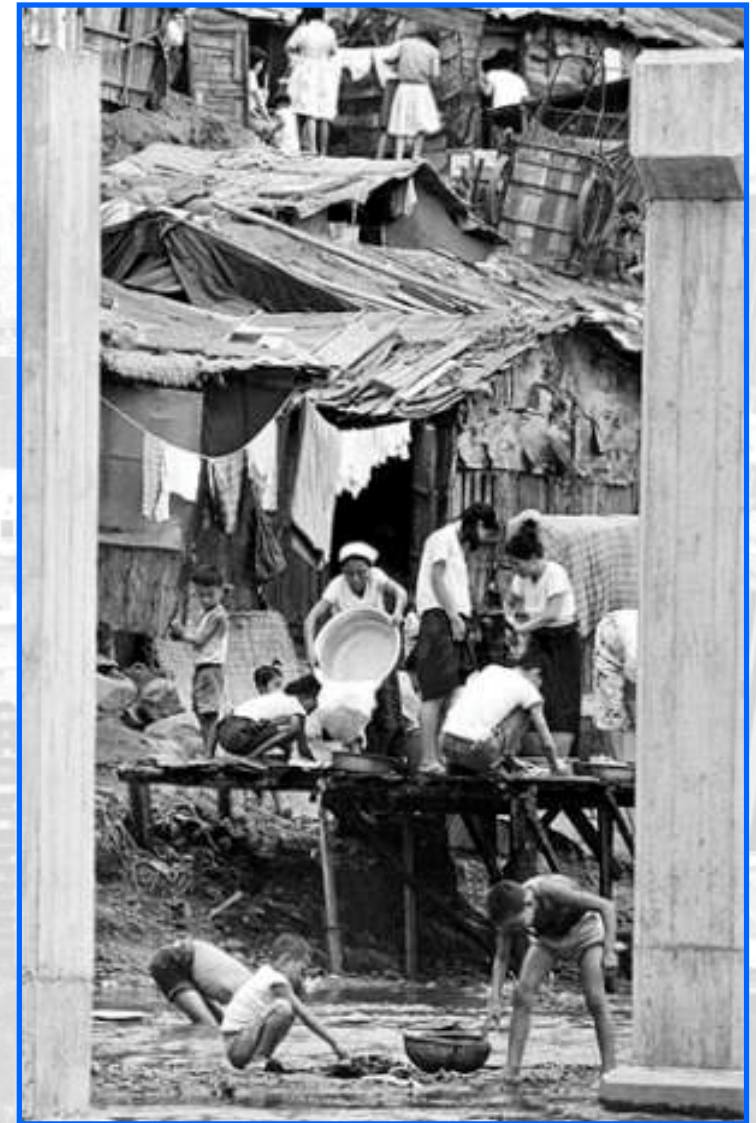


# Early 20C





# Problem: sanitation



# Solution: covering





# Covering work (1958~1977)



# Cheonggye Highway (1967~1971)





# Highway in 1990s





- **Cheong Gye Cheon 2002**



# Cheong Gye Cheon Area

Cheong Gye Cheon 2002



- **Building: over 6,000**
- **over 100,000 small shops**
- **Nation's biggest commercial area**



# Cheong Gye Cheon Area

Cheong Gye Cheon 2002



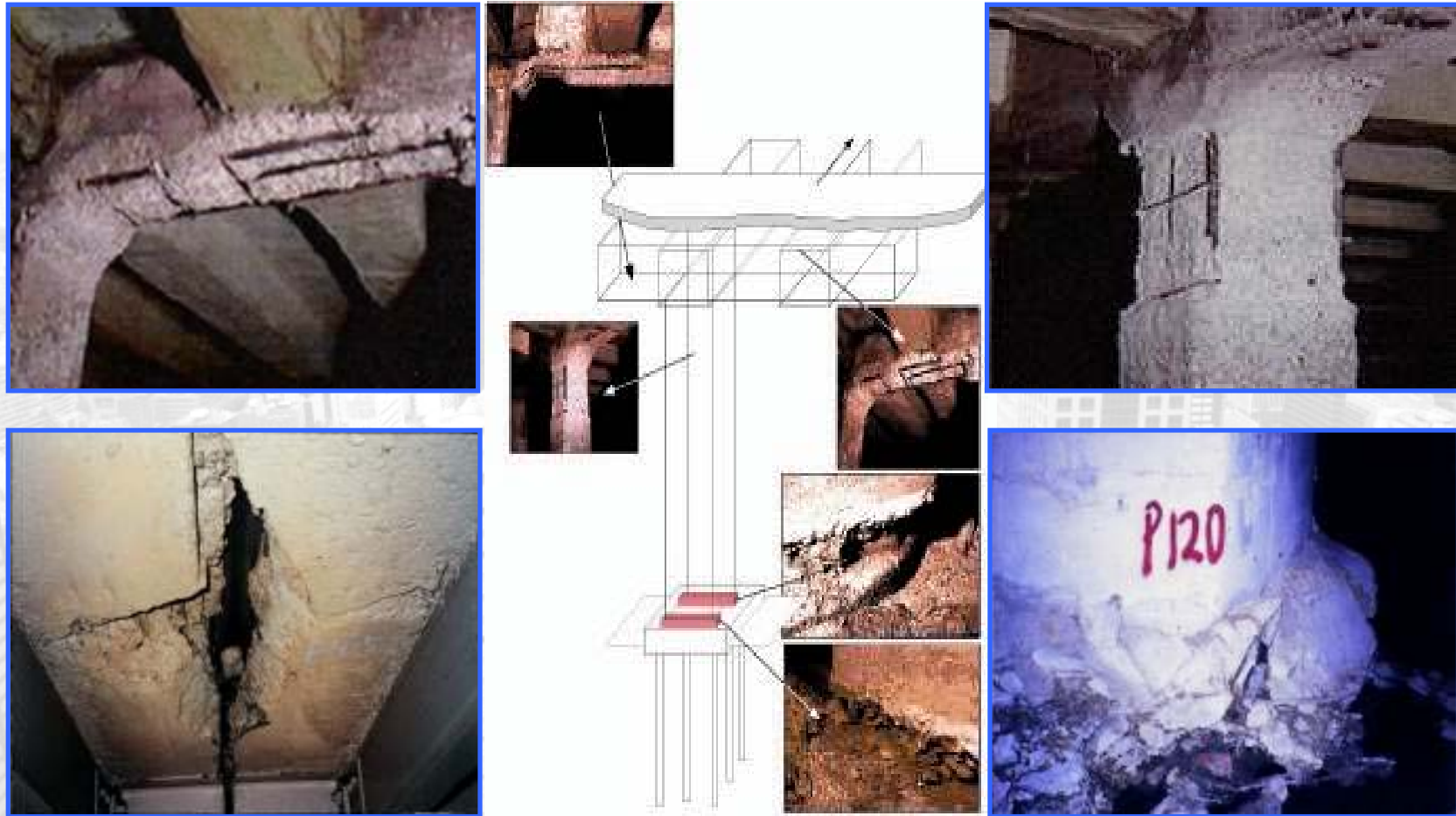


# Declining old CBD

- ❑ CBD redevelopment stopped where the Cheonggye Expressway started
- ❑ Population and employment reduced
  - Population: 40,000
  - Employment: 80,000 in 10 years
- ❑ Business headquarters moved to Gangnam (new sub-center)
- ❑ Industries in CBD lost competitiveness

# Safety problem

Cheong Gye Cheon 2002



✓ Over all 'C'; partially 'D' or 'E'



# Safety problem

Cheong Gye Cheon 2002



- Only small cars were allowed from 1997
- Maintenance cost soared: US\$50M (94~99)

- 
- **The Restoration Project**
    - **Background**
    - **Outline**
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# Decision to restore: July 2002



# Why restore?

- ❑ **Paradigm shift of urban management**
  - **Development → High quality of life**
  - **Environment-friendly city**
- ❑ **Fundamental solution to safety problem**
- ❑ **Recovery of history and culture**
- ❑ **Revitalisation of downtown area**
  - **Balanced regional development**





- **The Restoration Project**

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# Site location

□ Total length: 5.84 km

Section 1 (L=2.04km)

Section 2 (L=2.1km)

Section 3 (L=1.7km)





# Demolition

- ❑ Covered structure and highway: 5.4 km
  - Waste (concrete+asphalt): 872,400ton (96% recycled)

■ Step 1 ■ ■ ■ ■ Step 2 ■ ■ ■ ■ Step 3 ■ ■ ■ ■ ■

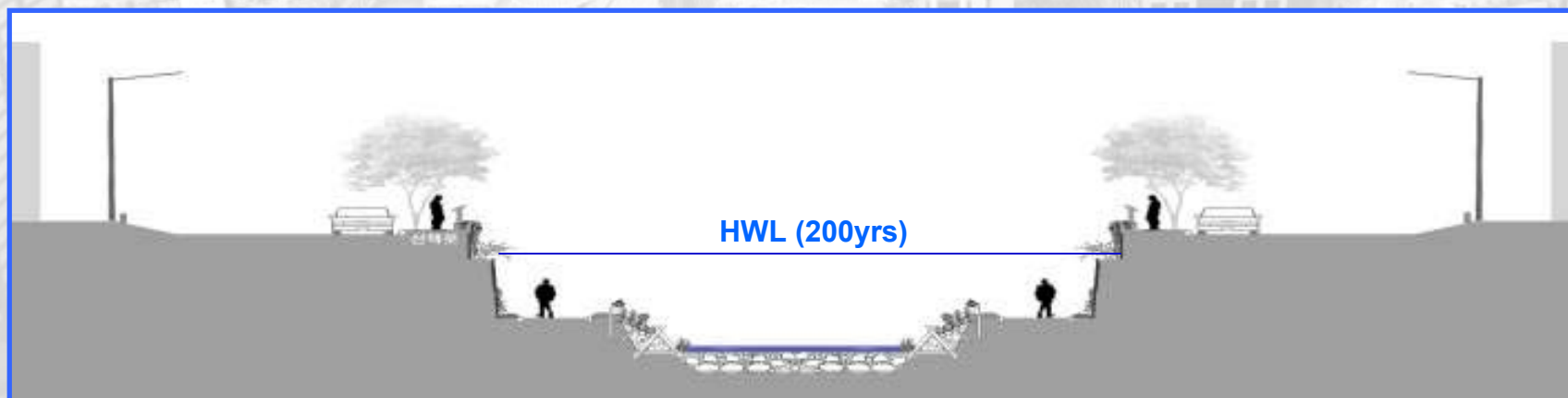


# River design

## □ Design Criteria

- Satisfy with the 2<sup>nd</sup> grade local river standard
- Secure the stream capacity for 200 years frequency rainfall (118mm/hr)

## □ Flood Level: estimated by numerical model and corrected using hydraulic model test





# Water supply

## □ Waterway plan

- Width: more than 20% of main waterway width
- Depth: more than 40 cm
- Flow velocity: 0.24 m/sec
- Measures to prevent water loss

## □ Water supply plan

- Water from the Han river: 120,000 ton/day
- Underground water from subway stations: 22,000 ton/day

## □ Water quality: better than the 2<sup>nd</sup> grade

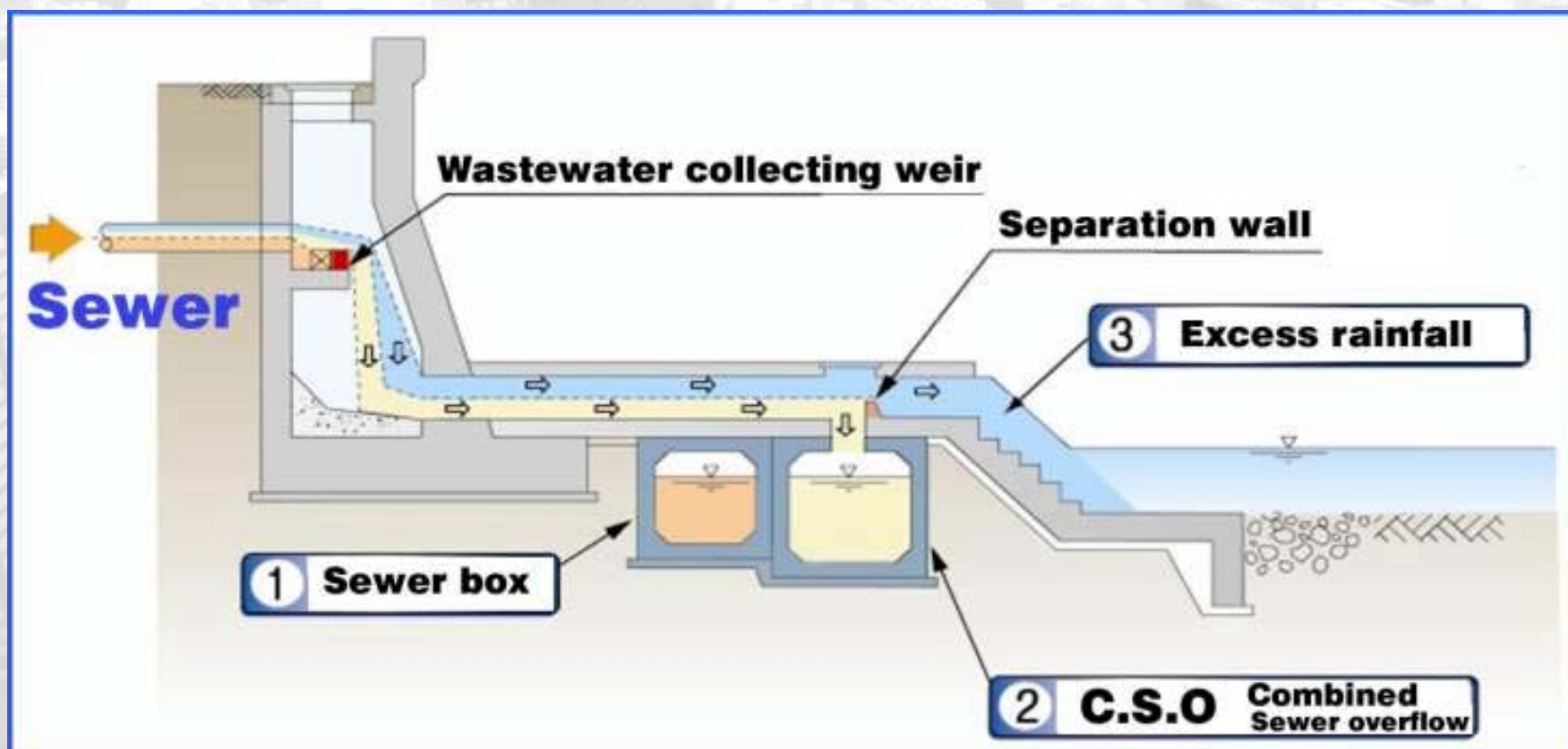
- BOD: 3mg/l or less
- SS: 25 mg/l or less
- DO: 5 mg/l or less
- Total N: 10 mg/l or less
- Total P: 1 mg/l or less

# Sewer system

## □ Design Criteria

- Combined sewer system for rainfall and wastewater
- Capacity : 3 times of estimated wastewater

## □ Combined Sewer System





# Bridge design

## ❑ Design Criteria

- Minimize flow resistance
- Create as cultural places
  - artistic landmark

## ❑ Number of bridges: 22

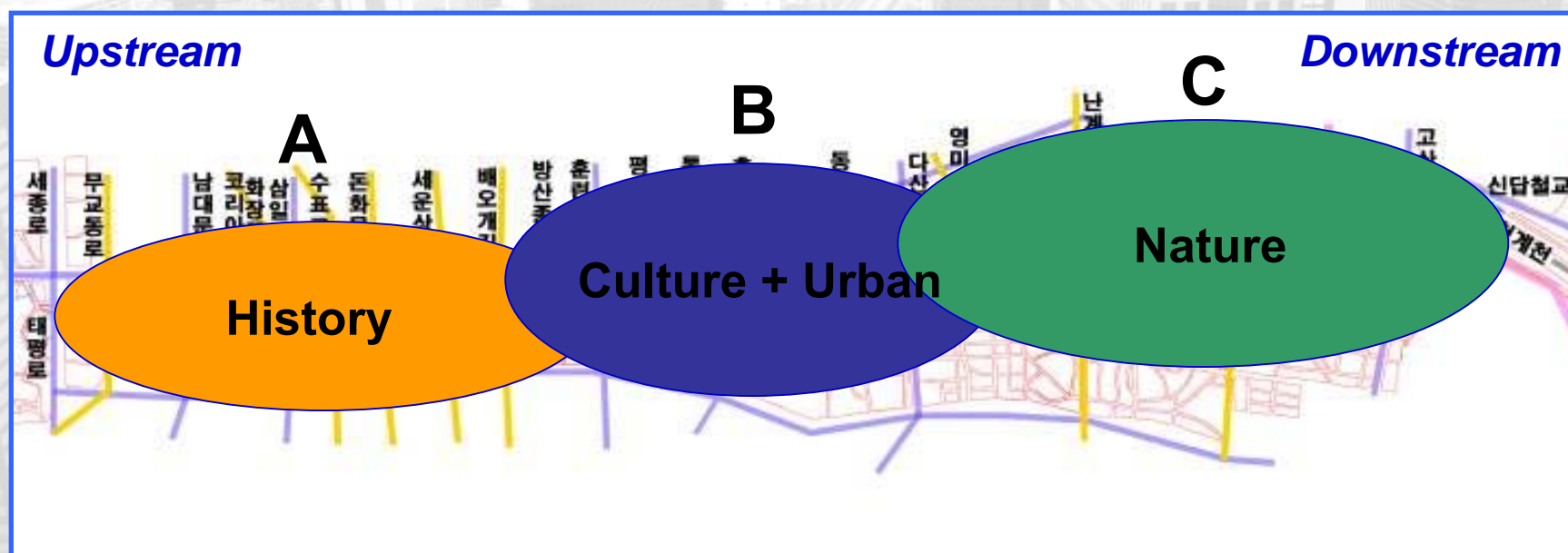
## ❑ International concept design competition



# Landscape design

## □ Concepts

- New green belt with waterfront: West to East
- Gradual transformation from urban landscape to natural environment
- Create ecological biotope and environment
- Thematic places: waterfall and fountains





# Historic relics restoration

## □ Basis

- Preserve or restore historic relics
- Consider current situation: flood, traffic, merchants
- Involve specialists

## □ Site survey: Feb 2003 to June 2004

- Restore 600 year old bridge: Gwangtong gyo
- 150 m upstream from the original site
- Restore Supyo gyo and Ogansu gyo: future plan



- **The Restoration Project**

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# Challenge 1: Transport



- ❑ **Cheonggye road & hwy**
  - Urban backbone corridor
  - 170,000 vehicles/day
- ❑ **Traffic disaster warned**
  - Media, interest group
  - Traffic simulation
  - Project delay

# Solutions to transport

- ❑ **Discourage driving cars in the city centre**
- ❑ **Improve traffic system**
  - Cheong Gye Cheon area
  - Metropolitan area
- ❑ **Improve public transport system**
  - subway system
  - bus only lane



# Challenge 2: Neighboring merchants

- Traffic congestion : access difficulty
  - Noise & dust due to construction
- ⇒ Business decline



# Solutions to merchants

## □ Detailed survey on the markets and continuous interviews

- consultation offices at the markets
- regular meeting on the project



## □ Minimize inconvenience for business activity

- state-of-the-art technology
- provide parking space nearby



# Solutions to merchants

- ❑ **Stimulate business activity**
  - Reduce parking fee
  - Improve parking system for loading & unloading
  - Promote Cheong Gye Cheon stores
- ❑ **Financial support and subsidies**
  - Low-interest loans
  - Grants for the market remodeling
- ❑ **Special arrangement for street vendors**
- ❑ **Special business centre in a outer area**



- **The Restoration Project**

- *Background*

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# Project delivery

- ❑ **Targets**
  - Keeping the schedule
  - Best value for money
- ❑ **Details of contract: Design-build contract**
  - invitation for bid: Feb 2003
  - bidding: June 2003
  - starting work: 1 July 2003
  - ✳ three construction sections
- ❑ **Original project budget (03): US\$357M**
  - Final adjusted amount (05): US\$386M (+8%)
- ❑ **Original project period:**
  - 1 July 03 ~ 30 Sep 05 (27 months)

# Construction progress

Started on 1 July 2003





# Construction progress

## Stage 1: Scaffolding (July 2003)



# Construction progress

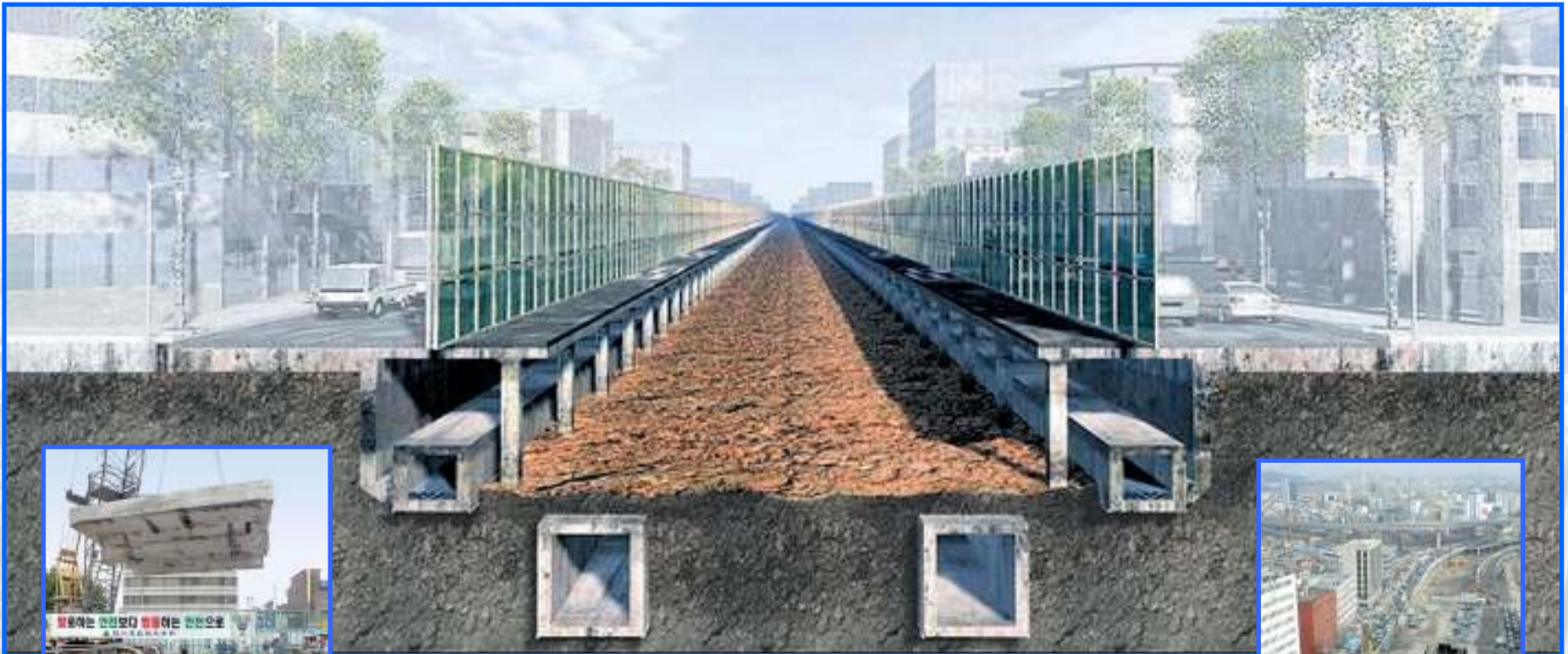
## Stage 2: Highway demolition (Aug 2003)





# Construction progress

## Stage 3: Covered road demolition (Jan 2004)





# Construction progress

## Stage 4: Sewer, road & bridge construction (Sep 2004)





# Construction progress

## Stage 5: Landscaping for the recovered area (May 2005)



# First water supply

1 June 2005





# Test running & Final touch

June ~ September 2005



# Grand opening

Progress

1 October 2005







- **Cheong Gye Cheon 2005**

## ☐ Monitor the changes due to the project

- from Jan 2003~Mar 2006
- before, during and after the project

## ☐ Monitoring areas

- Land use
- CBD Industry
- Environment
- Ecology
- Traffic
- Real estate



## □ Speed in CBD

- Morning peak: 17~18 km/hr
- Evening peak: 12 km/hr
- not very much worsened

## □ Car in/out flow

- 1.56M  $\Rightarrow$  1.27M (-18.6%)

## □ Subway ridership

- Central area: +13.7%

## Air

- $\text{No}_2$ : 69.7  $\Rightarrow$  46.0 ppb (-34%)
- PM10: 74.0  $\Rightarrow$  60.0  $\mu\text{g}/\text{m}^3$  (-19%)

## Water quality

- BOD: 100~250  $\Rightarrow$  1~2 ppm

## Noise level reduced

## Heat island effect relieved

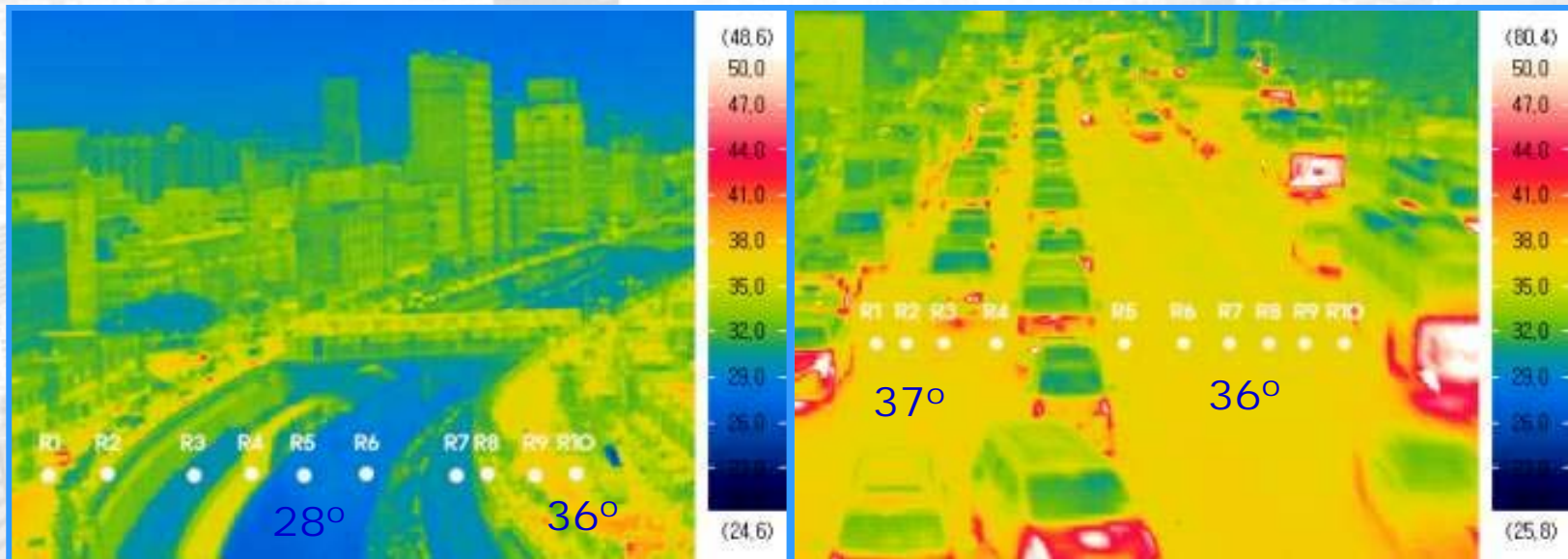
## Wind corridor created



# Cooling effect

Changes

## Thermal image 27 July 2005



**Average 32.7°C**  
**Cheong Gye Cheon**

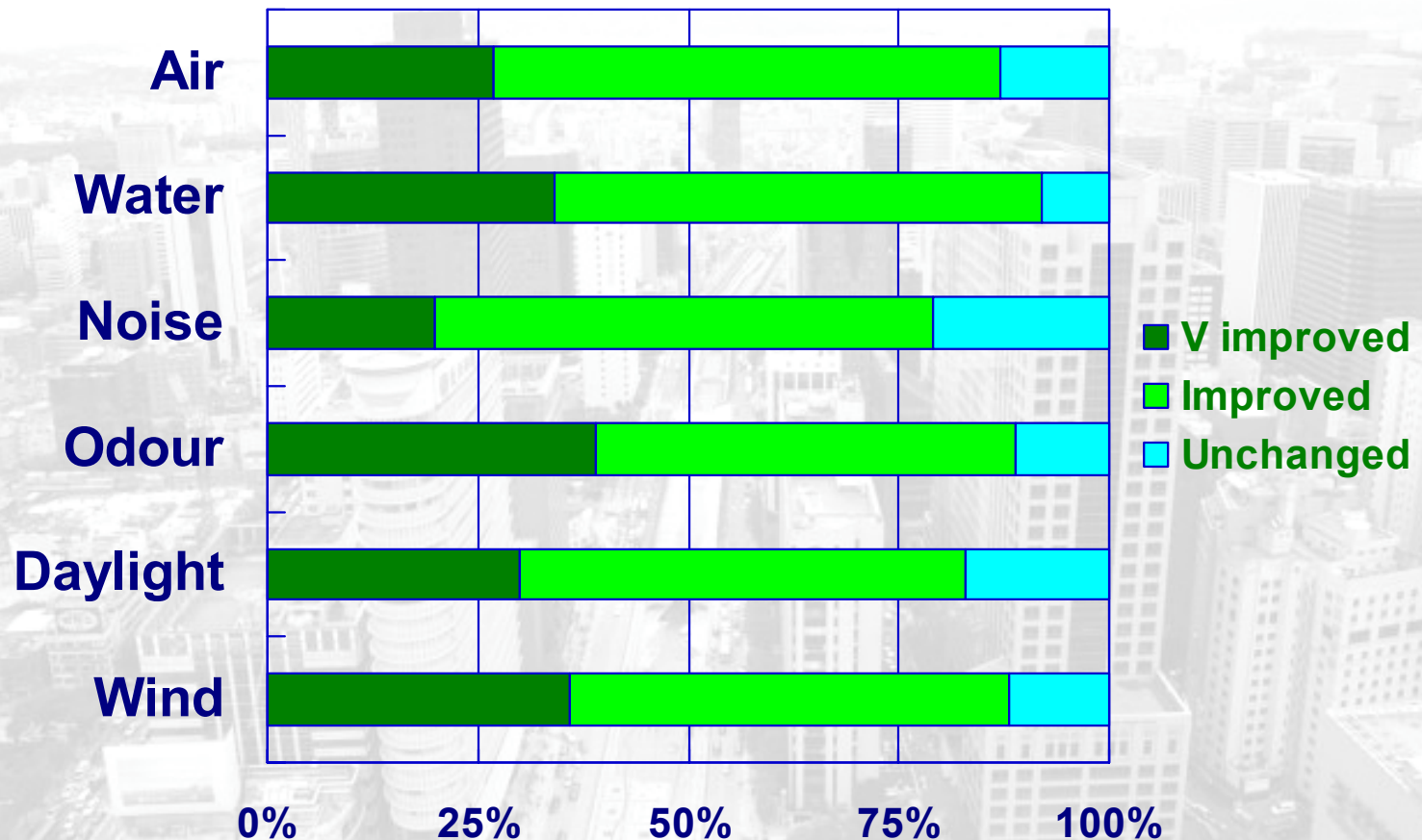
**-3.6°C**

**Average 36.3°C**  
**Nearby street**

# Environmental improvement

Changes

## Public survey (Nov 2005)





# Ecology: Fishes

Changes



□ 3 ⇒ 14 species



# Ecology: Birds

Changes



□ 18 species





# Ecology: Insects

Changes



□ 7 ⇒ 41 species





- **Final Remarks**



# Most preferred destination



# Future of Cheong Gye Cheon



- Identity as the 600 yr old Capital**
  - Harmony between preservation & development
- Economic vitality**
- Pedestrian oriented street system**
- International standard business district**



# Effects of the Project

- ❑ **Changes in the urban management paradigm**
- ❑ **Historic restoration**
- ❑ **Nature & ecological restoration**
- ❑ **CBD regeneration**
- ❑ **Good example of**
  - **solving conflicts over a public project**
  - **successful project management**

# Virtual Tour







## Further information

<http://english.seoul.go.kr/cheonggye/>  
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***Thank you for your attention!***