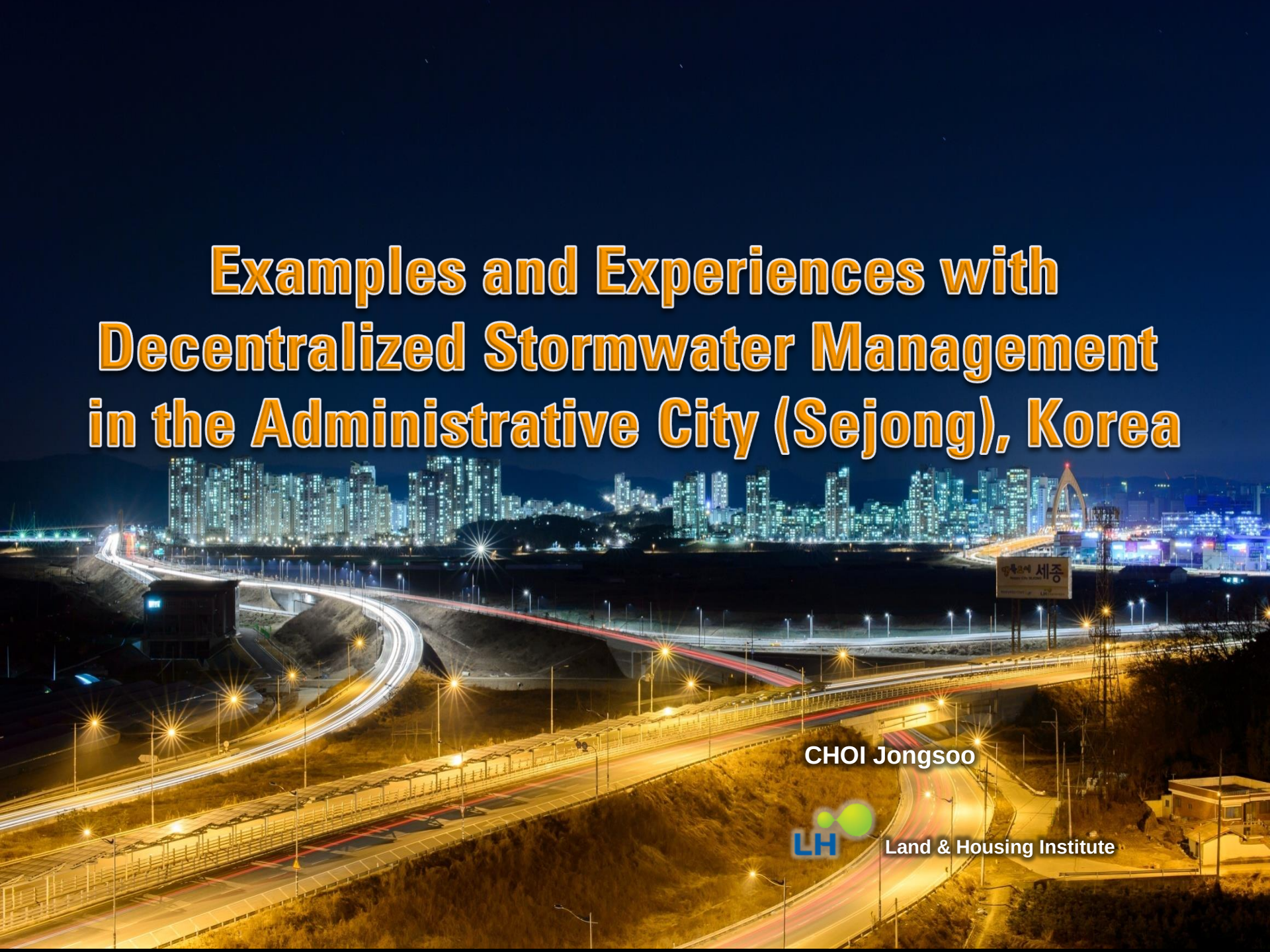
Examples and Experiences with Decentralized Stormwater Management in the Administrative City (Sejong), Korea



CHOI Jongsoo

LH Land & Housing Institute

CONTENTS

1. Outline of the Administrative City

Handuri Bridge

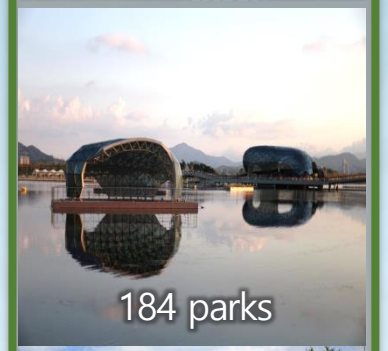

200km
120km
30km
70km
Seoul
PyeongChang
Daegu
Busan
Gwangju

- The Republic of Korea has been conducting a grand project of relocating its government offices for a well-balanced national development and decentralization.
  - Relocation of 40 Central government agencies (15,000 workers)
  - Relocation of 15 Research Institutes (3,600 workers)
- The Administrative City is currently under construction since 2007 and is expected to be completed in 2030.

- ✓ Area: 73km^2(7,300ha)
- ✓ Target population: 500,000

Green-Eco City

Walkable City

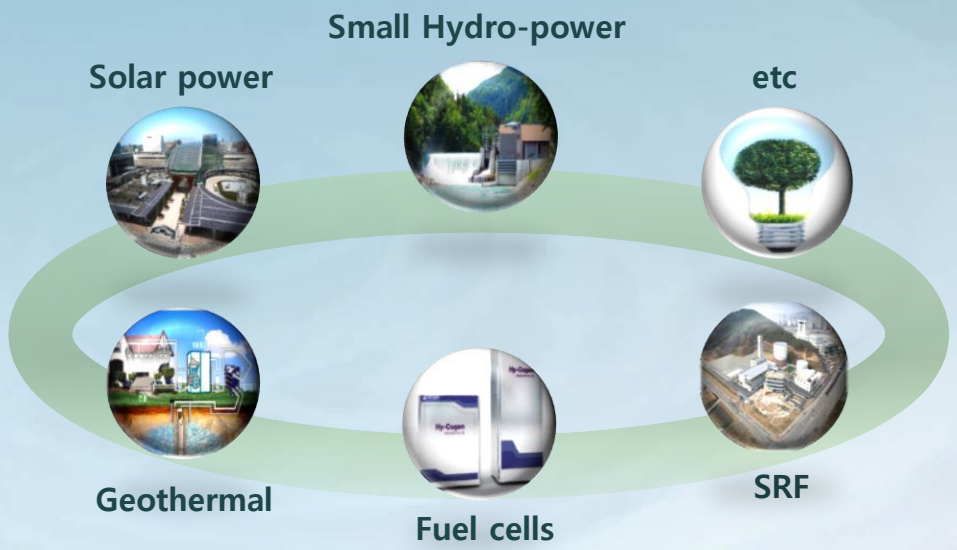


Bike-Friendly City

BMX, MTB trails

Low-Carbon City

World-Class New & Renewable Energy · Low-Carbon City → Environmental Capital



- **Percentage of New & Renewable Energy : up to 25%**
- **Reduction of Green house Gas: up to 77%**

기사인쇄하기

정책브리핑

행복도시, 친환경 분산식 빗물관리 시스템 도입

행복도시, 친환경 분산식 빗물관리 시스템 도입

▷ 행복도시 6생활권에 저영향개발기법을 도입하여 강우유출량 및 수질오염물질 저감, 지하수 함양 등 건강한 물순환체계 구축 기대
▷ 환경부·행복청간 업무협력을 통해 저영향개발기법의 모범사례 창출

환경부(장관 윤성규)와 행정중심복합도시건설청(청장 이충재)은 27일 정부세종청사에서 친환경 분산식 빗물관리 방안인 저영향개발(LID : Low Impact Development)기법의 적용과 확대를 위한 업무 협약식을 가진다.

※ 저영향개발(Low Impact Development) : 개발사업 등의 불투수면에서 발생하는 강우유출을 최소화하여 자연상태의 물순환 회복에 기여할 수 있는 친환경 분산식 빗물관리 기법(식생수로, 침투도랑, 투수성 포장 등)

이번 업무협약은 정연만 환경부 차관과 이충재 행복청장이 참석해 서명식을 하며, '행정중심복합도시 활권의 설계·시공에 친환경 분산식 빗물관리방법인 저영향개발기법을 전면 도입한다. 또한, 저영향개 대와 적용을 위한 행정적 지원 및 공동 지침 마련, 관련 법령 및 제도개선, 교육 훈련 등을 공동 추진할

행복도시 6생활권은 기존 월산산업단지가 입지했던 곳으로 세종시 연기면 일원에 약 689만 7,000㎡ 반 시설이 주로 입지할 예정이며 4개 기초생활권으로 구성됐다.

- **MAC, Introduction of Eco-friendly Rainwater Management System**

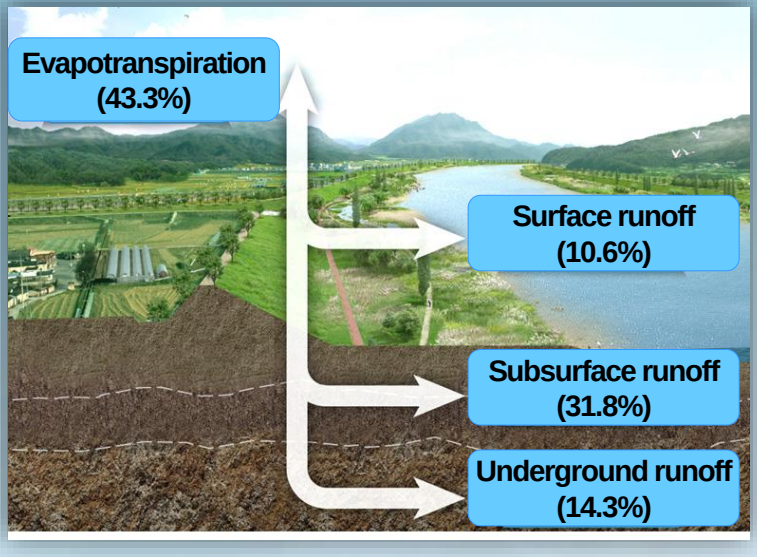
Decentralized Stormwater Management

or, Low Impact Development (LID)

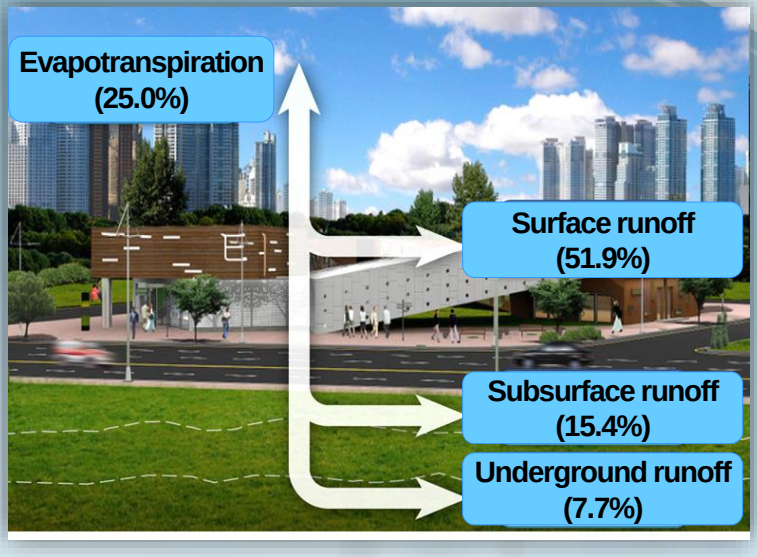
2. Paradigm Shift in Rainwater Management

Conventional Concepts

New Concepts



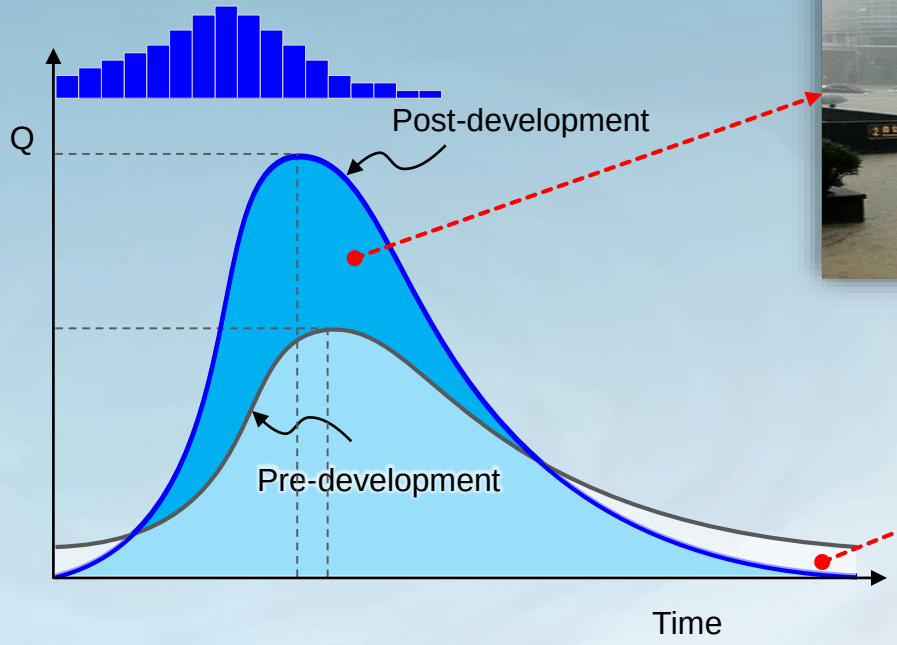
<1962>



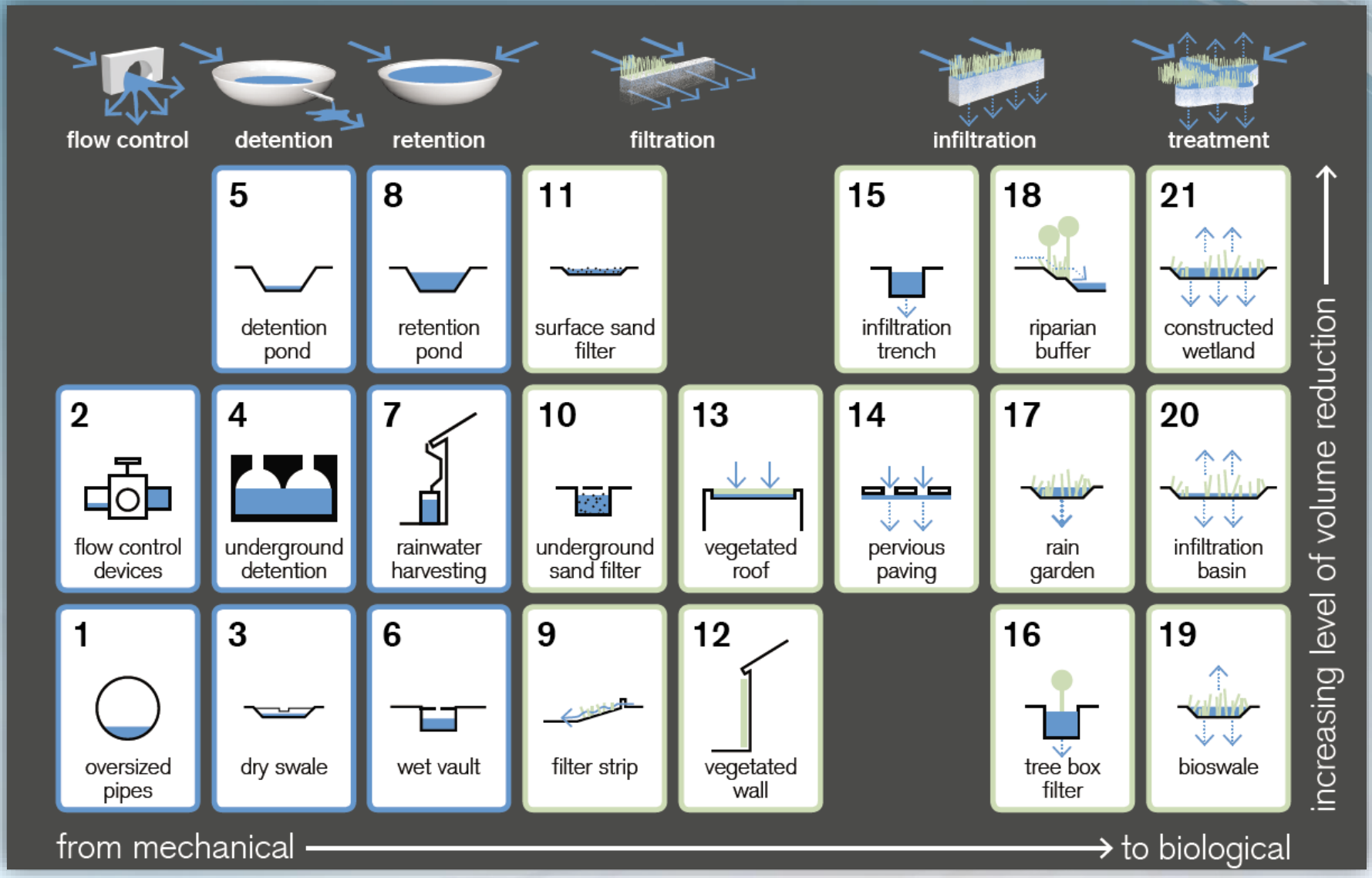
<2010>

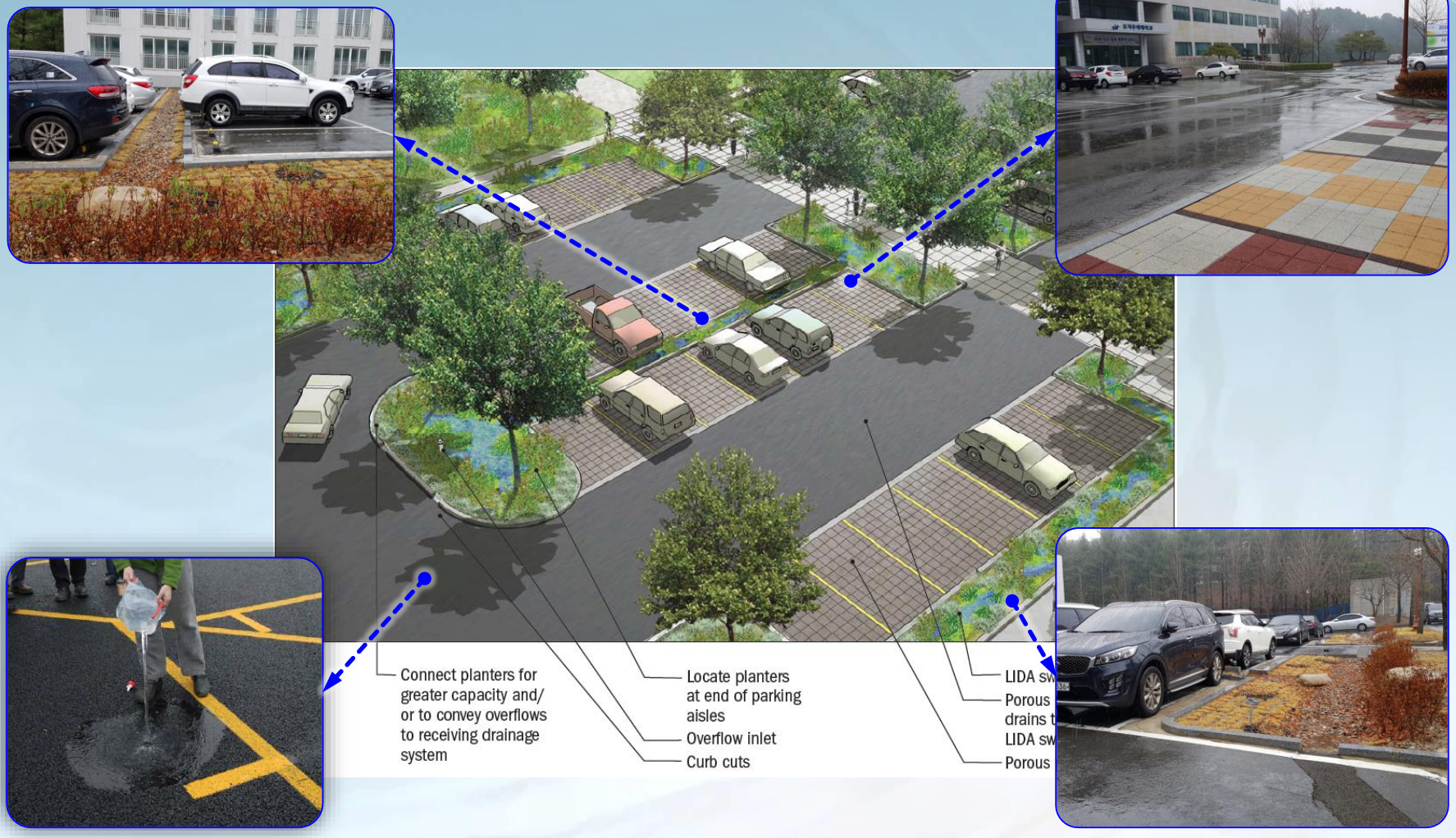
- Urban flooding
- Groundwater depletion
- Lack of channel-maintaining flows
- Heat island effect
- Heat wave

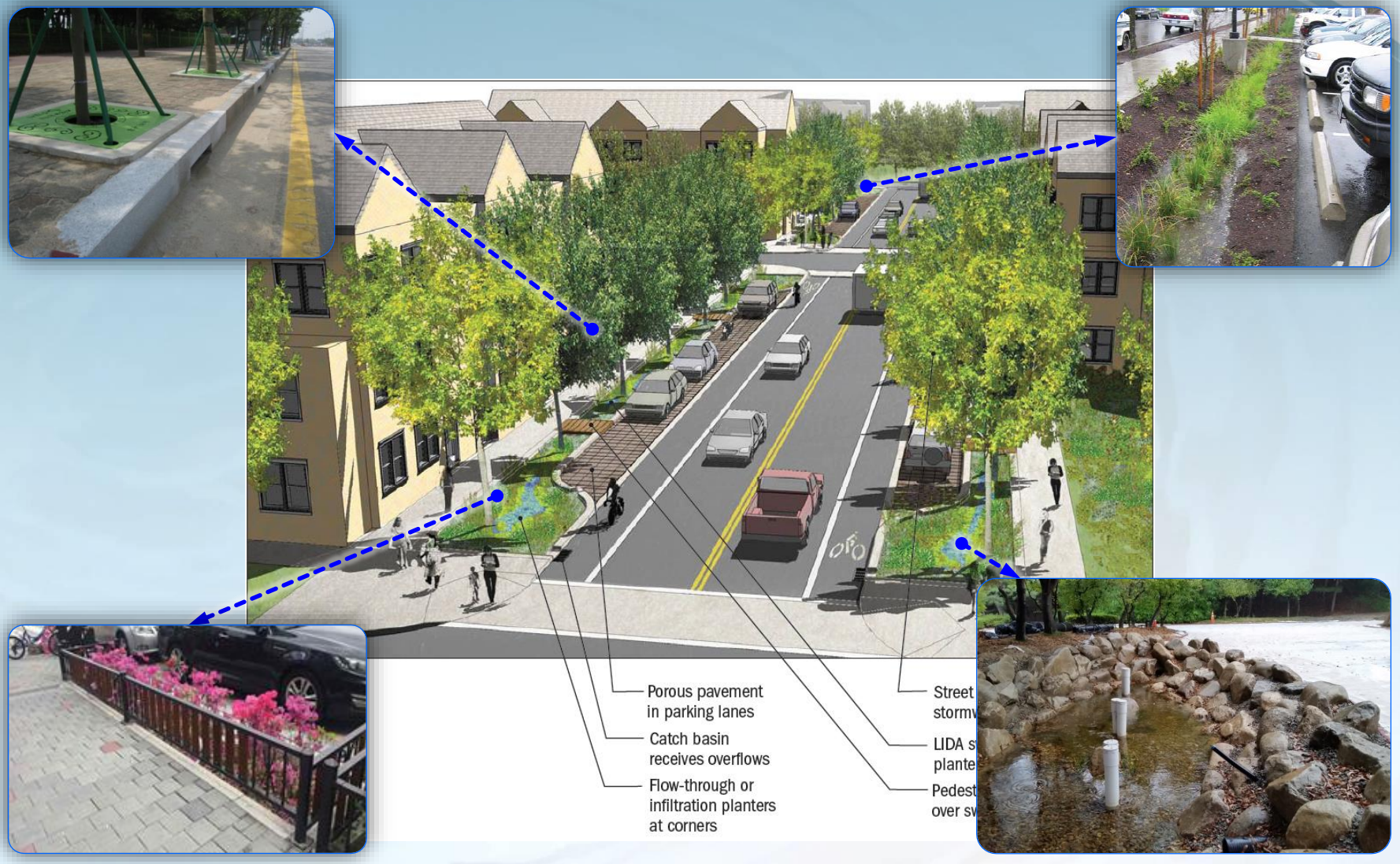
References : General plan of Seoul rainwater management(2013,06, Seoul)



Low Impact Development (LID) or, Sponge City is a land planning and engineering design approach which integrates the urban water cycle, including stormwater, groundwater and wastewater management and water supply, into urban design to minimize environmental degradation and improve aesthetic and recreational appeal.


flow control
detention
retention
filtration
infiltration
treatment
5
detention pond
8
retention pond
11
surface sand filter
15
infiltration trench
18
riparian buffer
21
constructed wetland
2
flow control devices
4
underground detention
7
rainwater harvesting
10
underground sand filter
13
vegetated roof
14
pervious paving
17
rain garden
20
infiltration basin
1
oversized pipes
3
dry swale
6
wet vault
9
filter strip
12
vegetated wall
16
tree box filter
19
bioswale
increasing level of volume reduction
from mechanical
to biological


Connect planters for greater capacity and/ or to convey overflows to receiving drainage system
Locate planters at end of parking aisles
Overflow inlet
Curb cuts
LIDA sw
Porous
drains t
LIDA sw
Porous

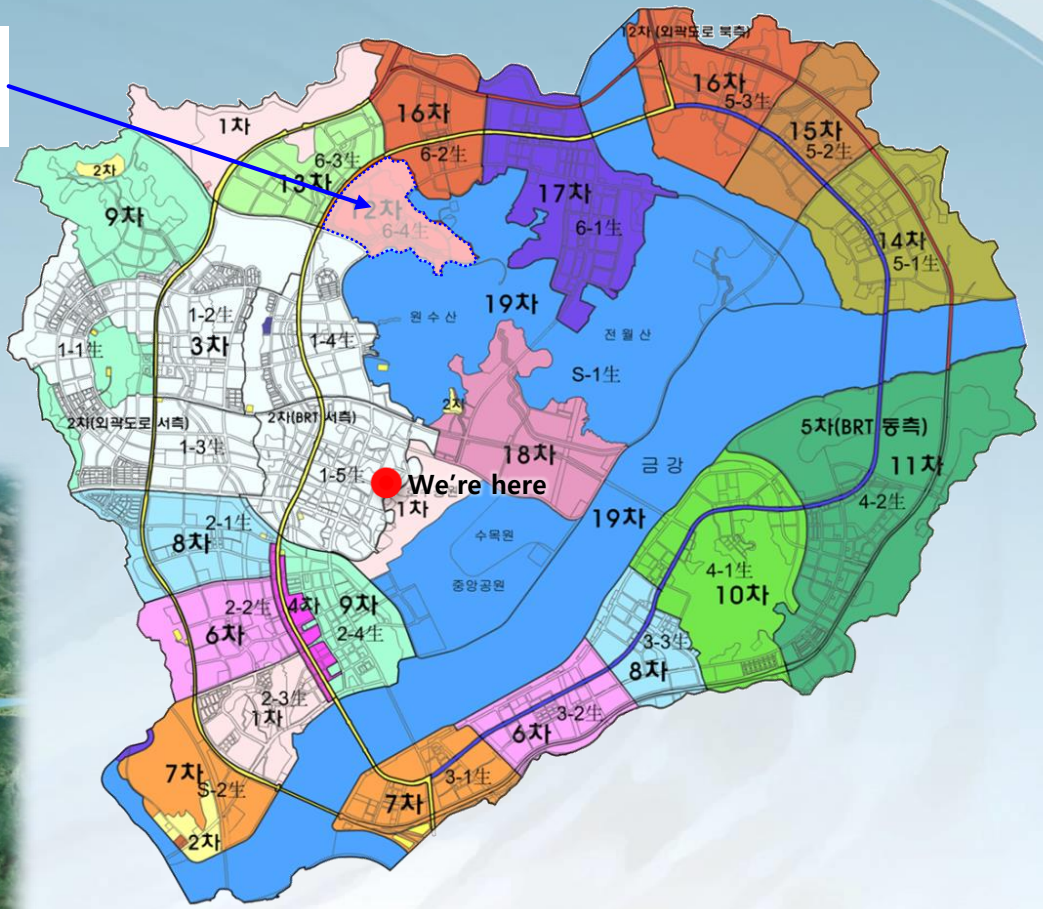

Porous pavement
in parking lanes
Catch basin
receives overflows
Flow-through or
infiltration planters
at corners


Flow-through planters (next to building) as needed for non-green roof areas
Infiltration planter (minimum 10' setback from building) or flow-through planter
Stormwater art (sculptural downspout)
Green roof
Disconnected downspout and splash basin
Infiltration or flow-through planters for street, parking areas or sidewalk runoff

3. Decentralized Stormwater Management in the Administrative City

Stage on the water(Sejong Lake Park)

[Zone 6-3]
1,020,175m²

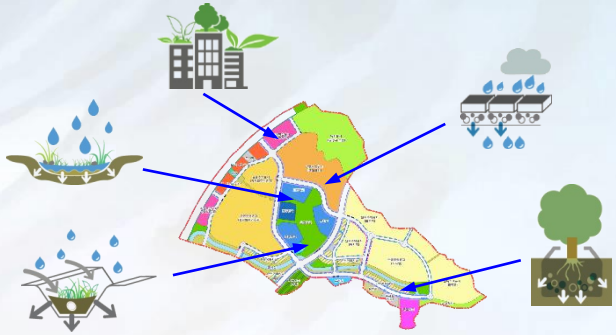


Process of LID Introduction

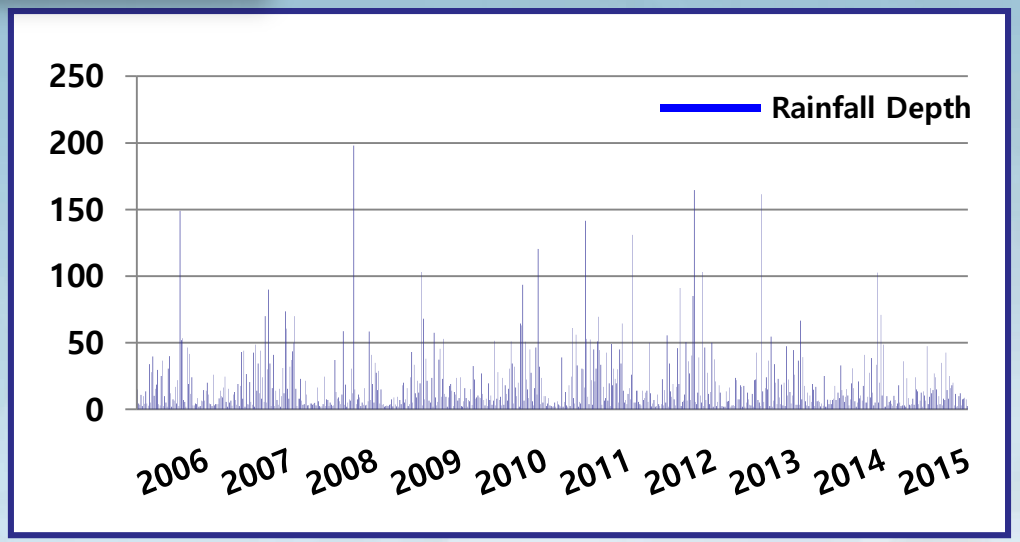
Estimation of Design Rainfall Depth (based on the analysis of runoff characteristics after development)

Assignment of Design Rainfall Depth to each Land Uses

Design of LID for Rainwater Management



Analysis of Rainfall Events



[Rainfall events over the last decade]

Items	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	Avg.
Annual Precipitation(mm)	1,053	1,499	896	996	1,385	1,771	1,342	1,209	878	705	1,174
Average Rainfall Depth(mm)	15.3	18.1	14.0	16.6	17.1	22.4	19.4	16.6	13.9	11.4	16.4
Events	69	83	64	60	81	79	69	73	63	62	70

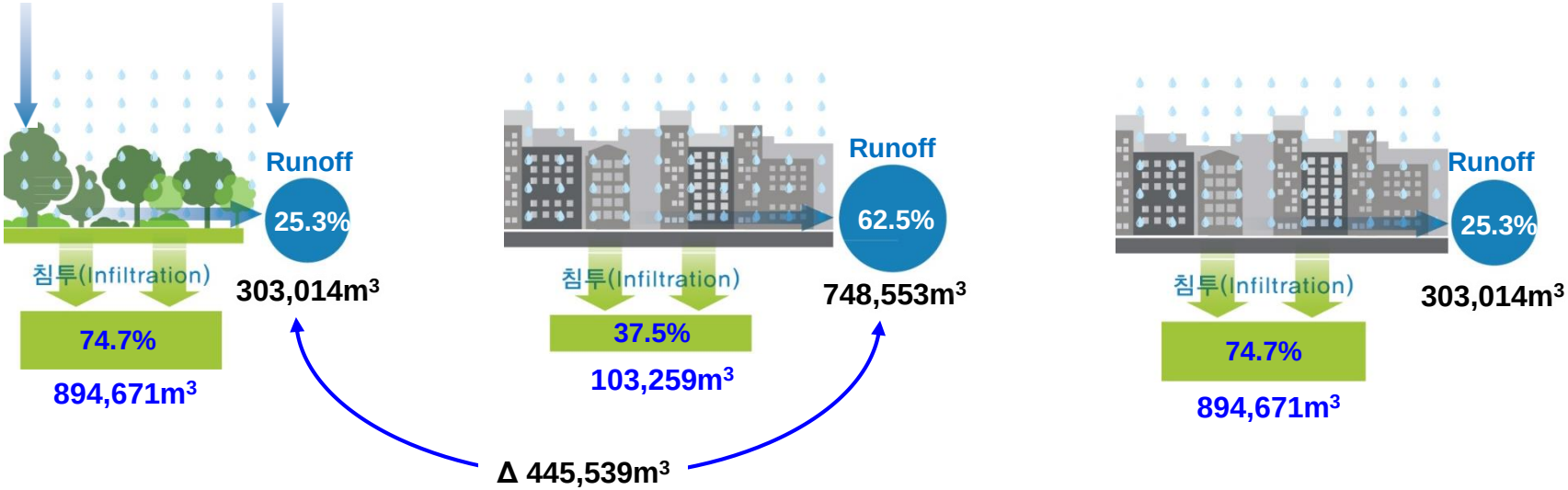
Analysis of Runoff Change after Development

[Before Development] [After Development(Traditional)] [After Development(LID)]

Annual Precipitation : 1,174mm

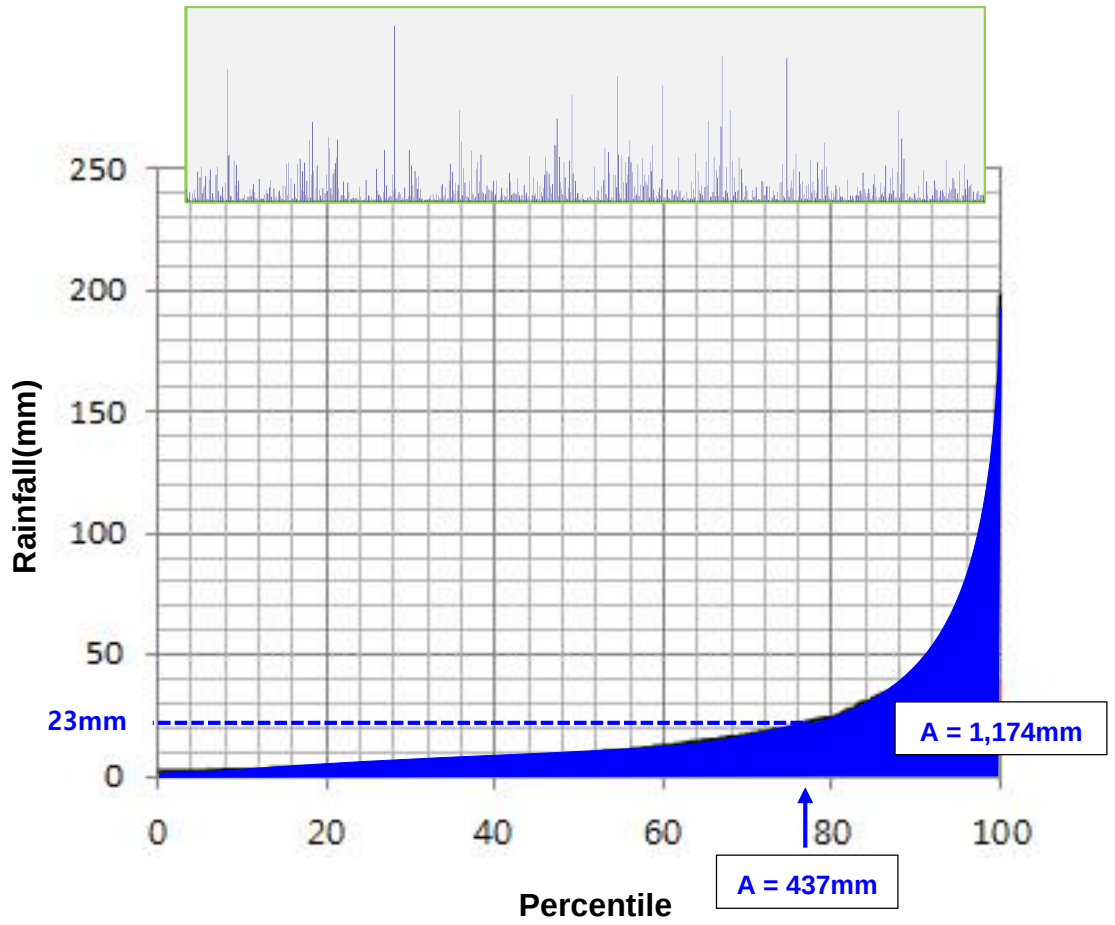
Catchment Area : 1,020,175m²

Rainwater Volume : 1,197,685m³



• **Increase runoff / Catchment area = 445,539m³ ÷ 1,020,175m² = 437mm**

Estimation of Design Rainfall Depth



Percentile	Rainfall Depth(mm)
70	17.0
75	20.0
80	24.0
85	32.0
90	41.0
95	52.5

Design Rainfall with Land Use

Land Use	Apartment	Detached House	Park	Road, Parking Lot	Commercial	School	Total
Area (m^2)	234,546	200,134	241,826	203,389	45,408	94,872	1,020,175
Ratio (%)	23.0	19.6	23.7	19.9	4.5	9.3	100
Target Rainfall(mm)	25.0	25.0	41.0	7.1	7.1	32.0	25.1

LID with Land Use

Apartments

Bioretention, Rain barrel, Porous pavement

Commercial

Green roof, Rain barrel, Porous pavement

Open Spaces

Bioswale, Rain garden, Porous pavement

Detached Houses

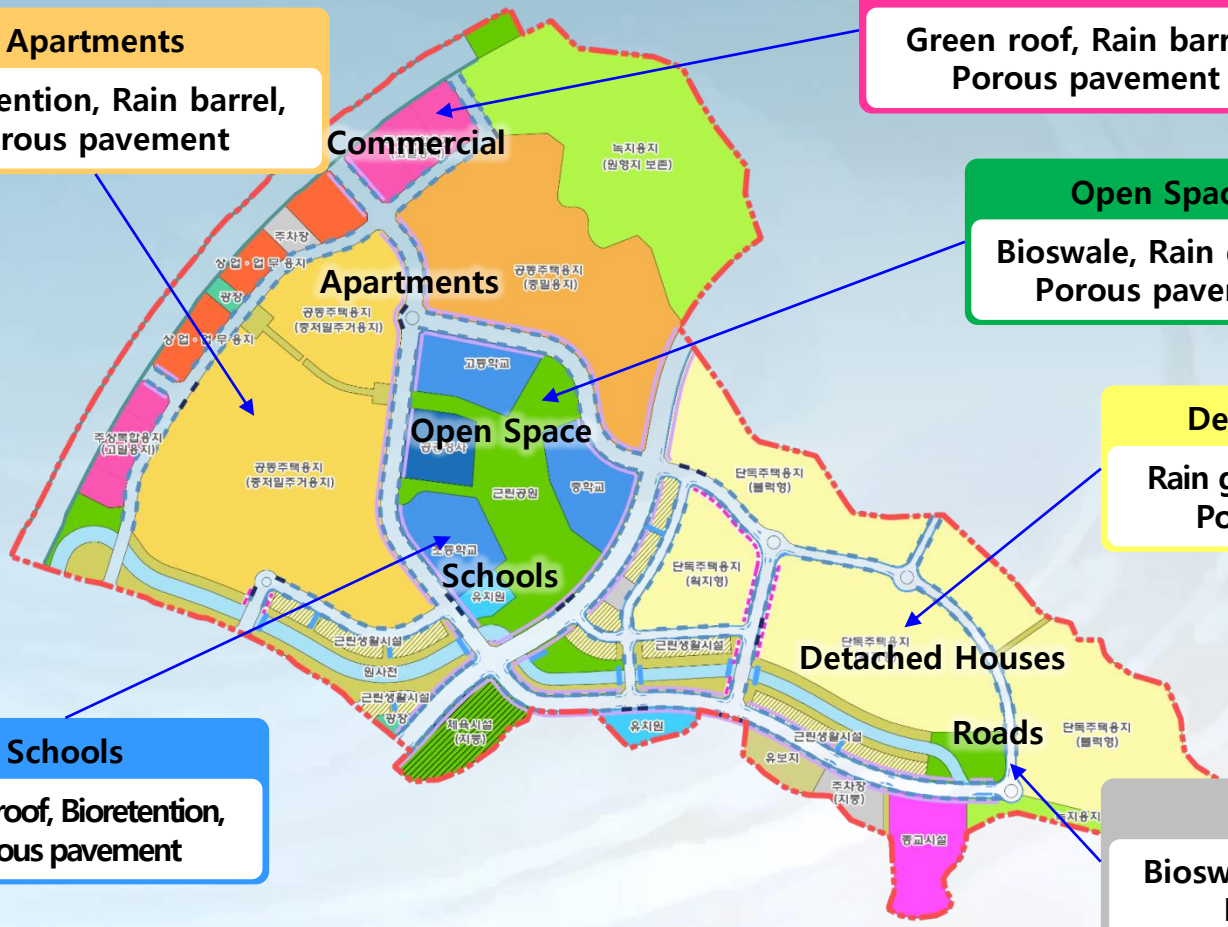
Rain garden, Rain barrel, Porous pavement

Roads

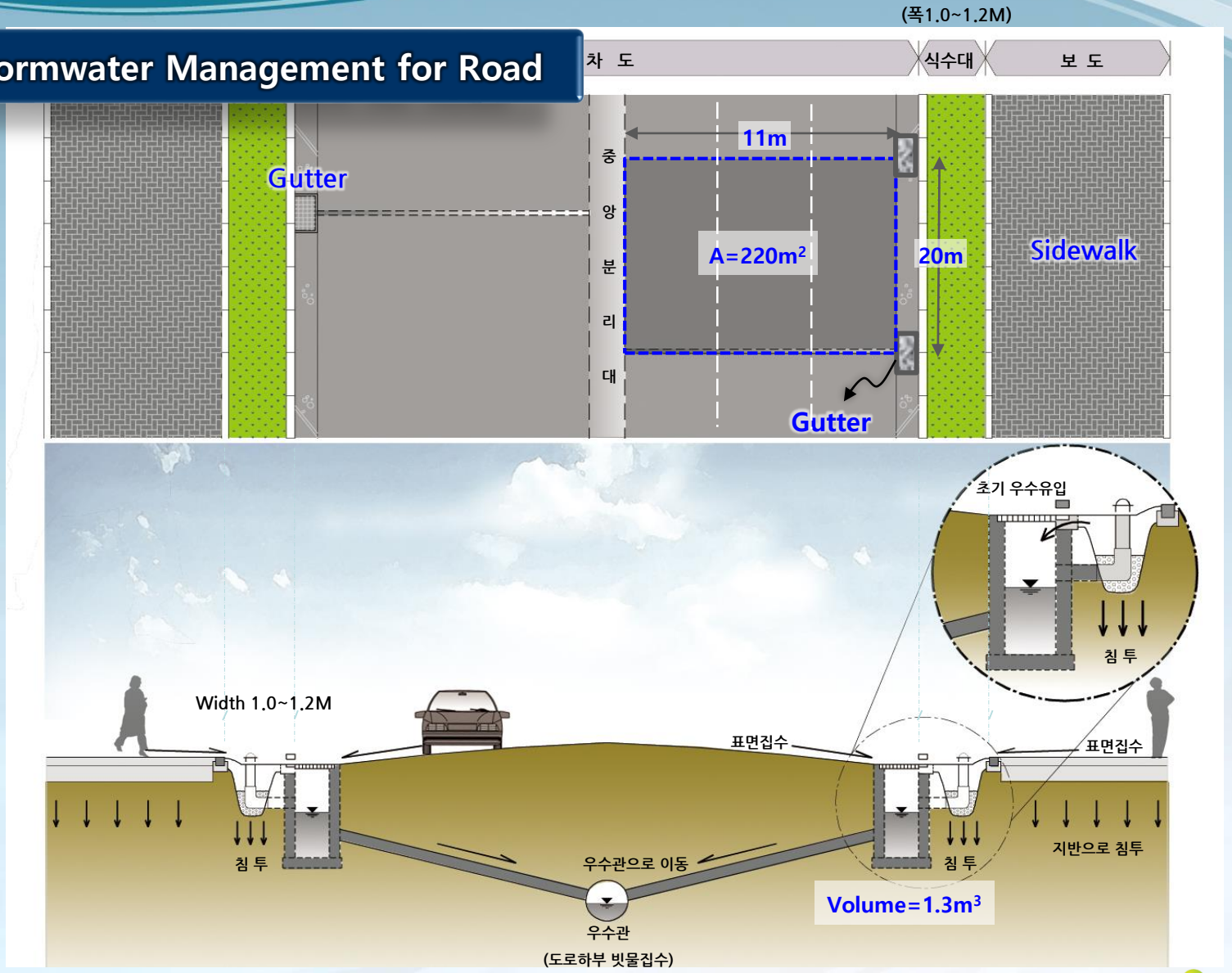
Bioswale, Infiltration trench, Porous pavement

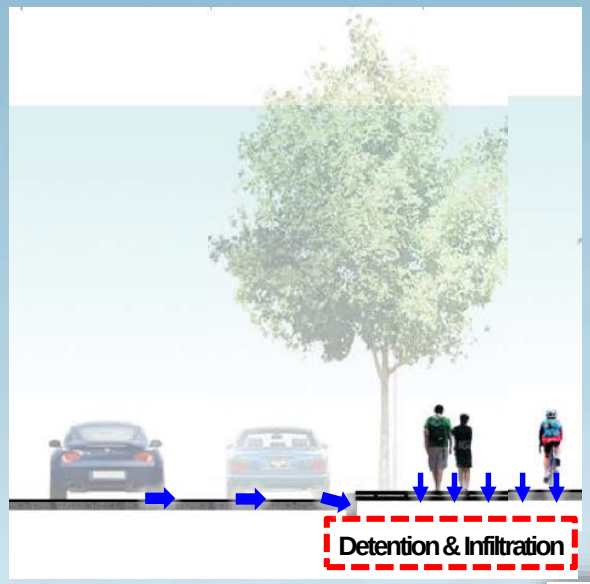
Schools

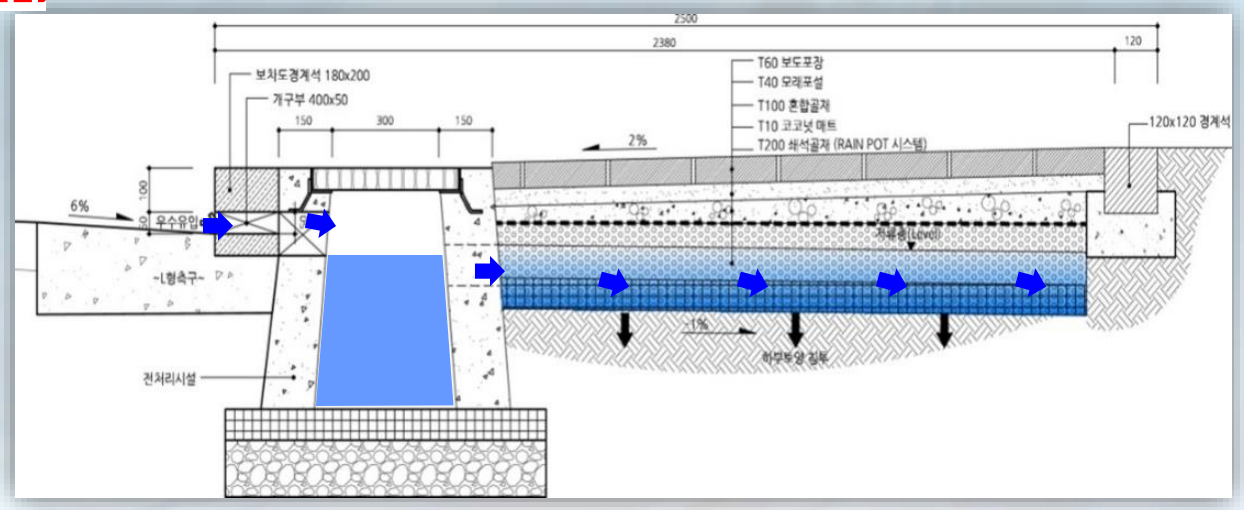
Green roof, Bioretention, Porous pavement



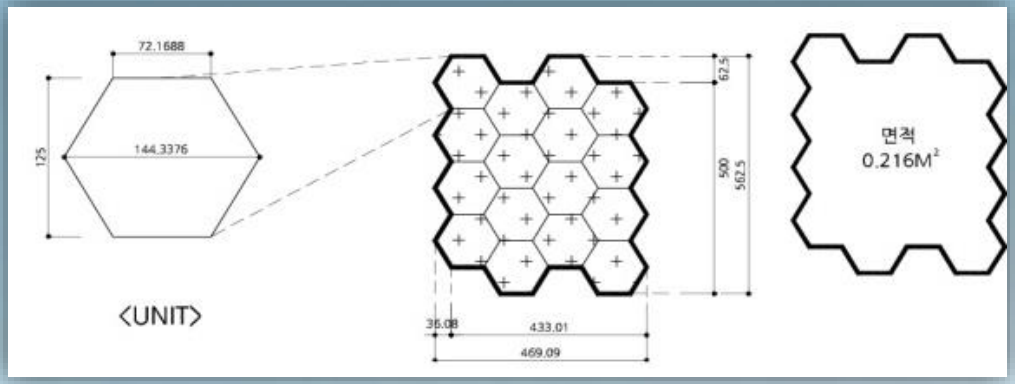
Stormwater Management for Road

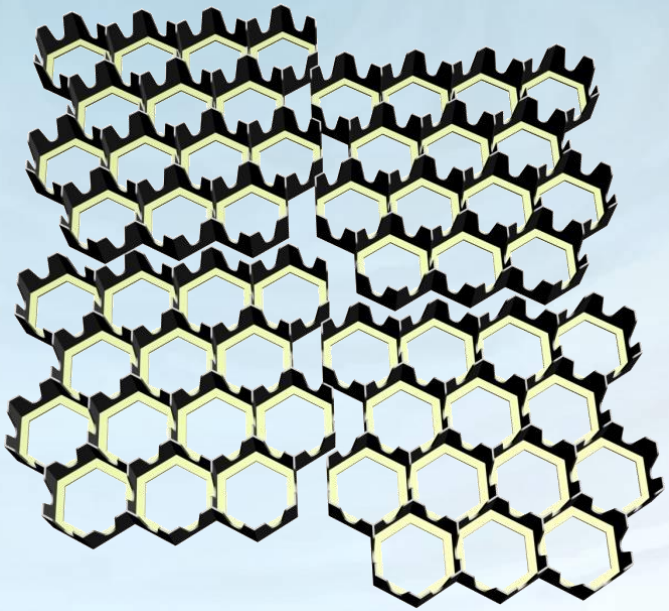


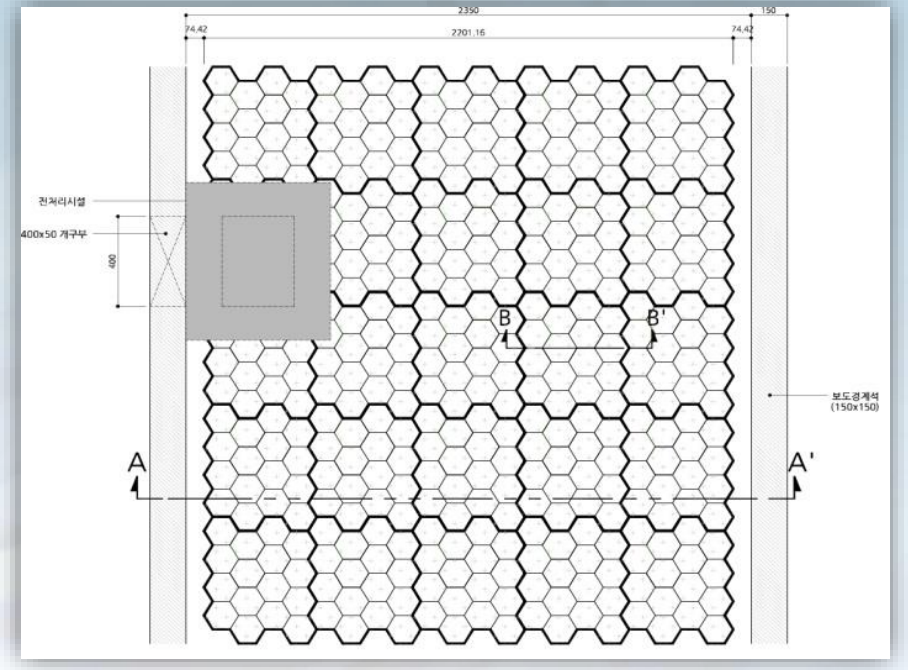

Detention & Infiltration


2500
2380
120
보차도경계석 180x200
T60 보도포장
T40 모래부설
T100 혼합골재
T10 코코넛 매트
T200 쇄석골재 (RAIN POT 시스템)
120x120 경계석
가구부 400x50
150
300
150
2%
6%
100
우수유입
~L형측구~
1%
전처리시설
하부투양 집투

Bottom Ash


72.1688
144.3376
125
62.5
500
562.5
면적
0.216M²
<UNIT>
35.08
433.01
469.09




2350
150
74.42
2201.16
74.42
전처리시설
400x50 개구부
400
B
B'
보도경계석
(150x150)
A
A'

Auger Boring

Settlement Gauge Installation

Flow Meter Installation

Rain Gauge Installation

Soil Moisture Installation

Data Logger

Mitigation of the urban heat island

Non-point source pollution prevention

Channel-maintaining flows

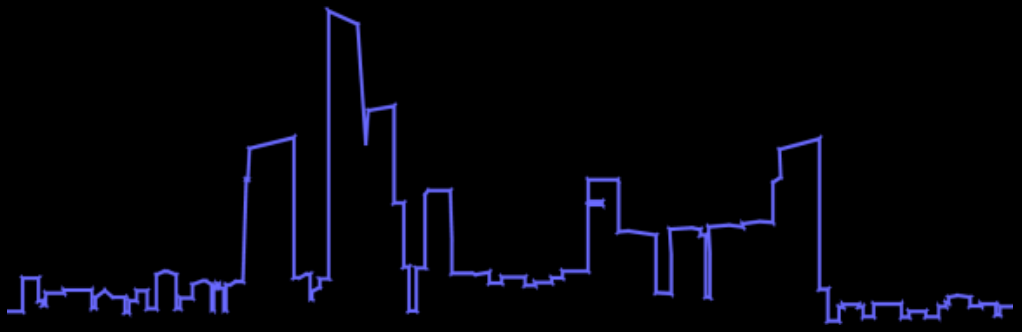
Providing waterfront space

Reducing urban flooding

Ecological improvement

Groundwater recharge

Alternative water sources



Thank you

Jongsoo CHOI

jongsoo@lh.or.kr