

Urban green infrastructure

- a case study in regenerative design -



Franco Montalto, PhD



What is a Lot?

- A piece of land
- History book
- Watershed
- Consumer
- Producer
- Neighbor
- Habitat
- Home



There are lots of lots!



One City

=

Many Lots



One Lot

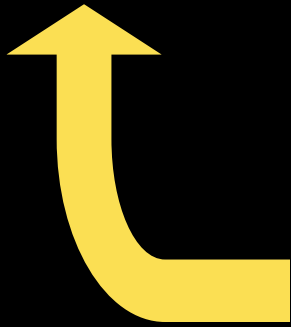
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Many Functions



- Ecological
- Infrastructural
- Social
- Economic
- Recreational
- Health-related
- Micro-climatological
- Educational
- Safety-related
- Inspirational

Multifunctional lots → Regenerative cities



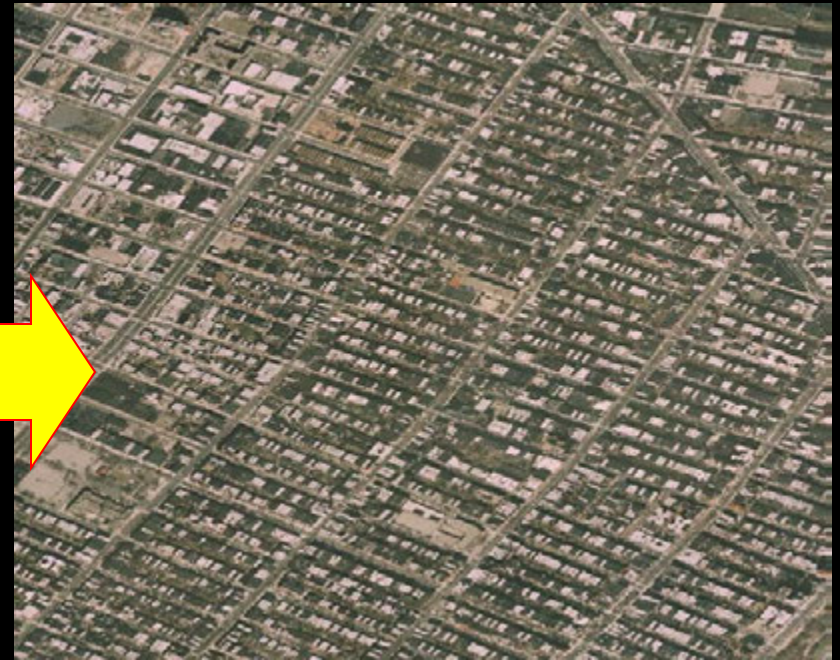
Green Infrastructure Goals

- Integrate multifunctionality into the design and redesign of urban lots
- Water-related and non water-related goals
- Address lots as components of a larger urban “system”

Land use change

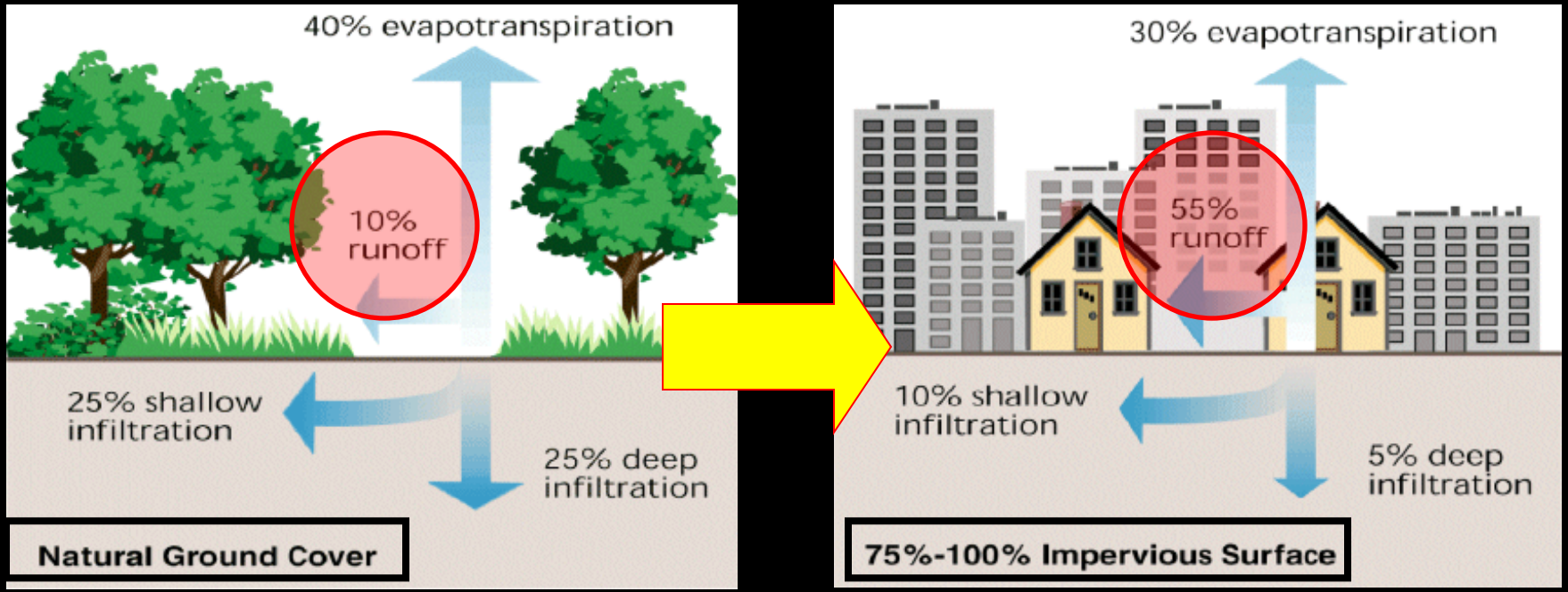


Undeveloped



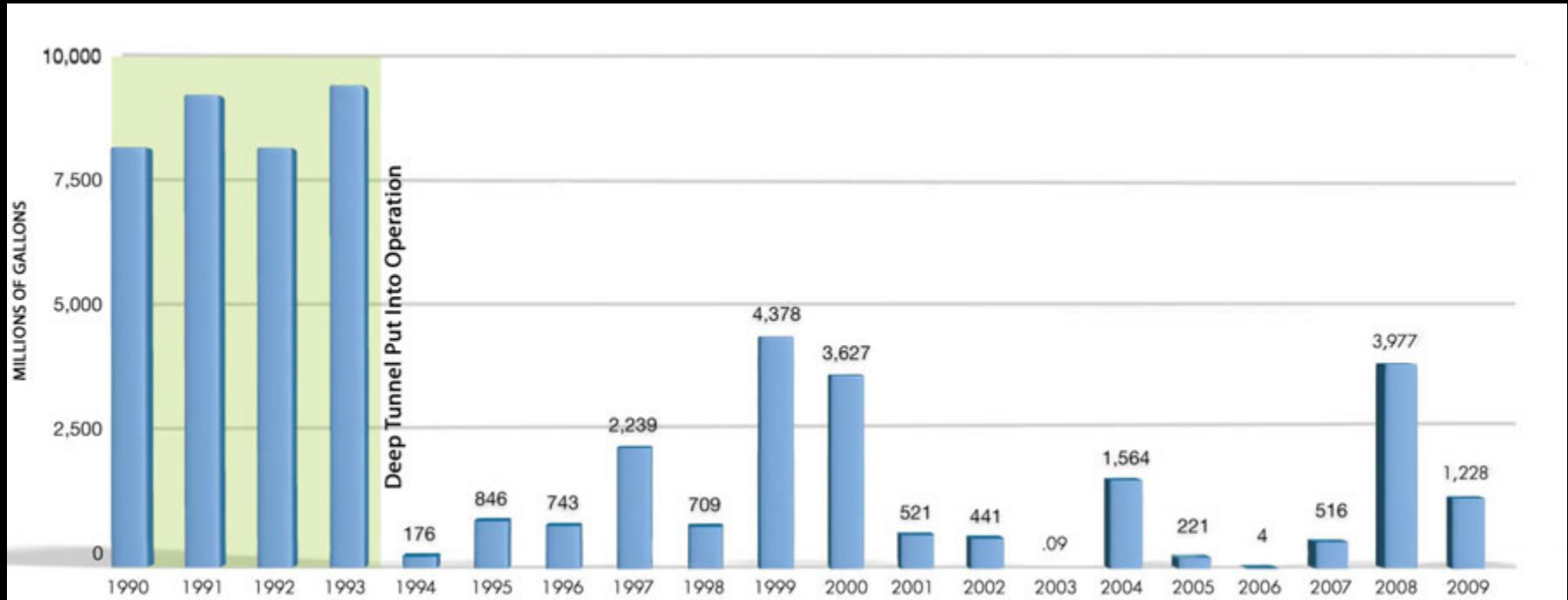
Developed

(Eco)hydrologic change



Images adapted from USEPA graphics

After spending \$4 billion....



Is this regenerative design???

Management change

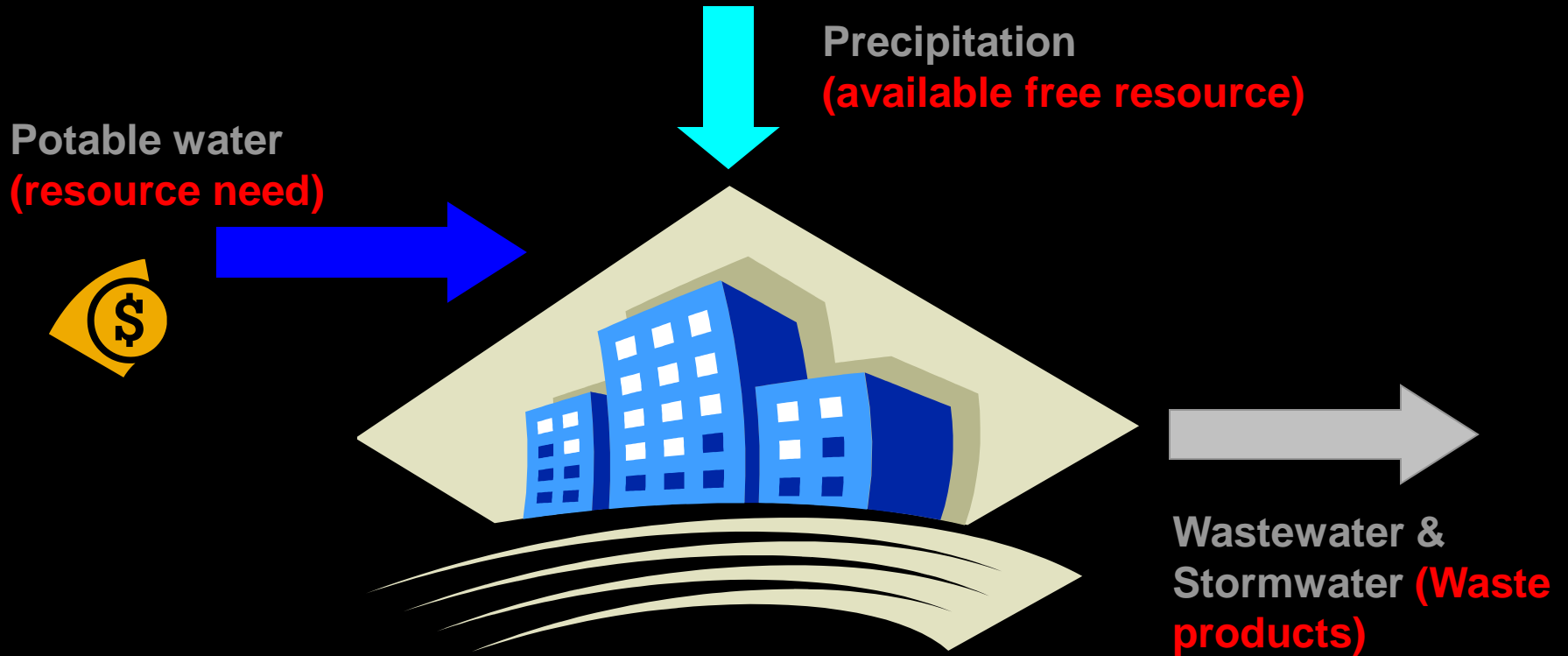


Grey, Centralized, Monofunctional



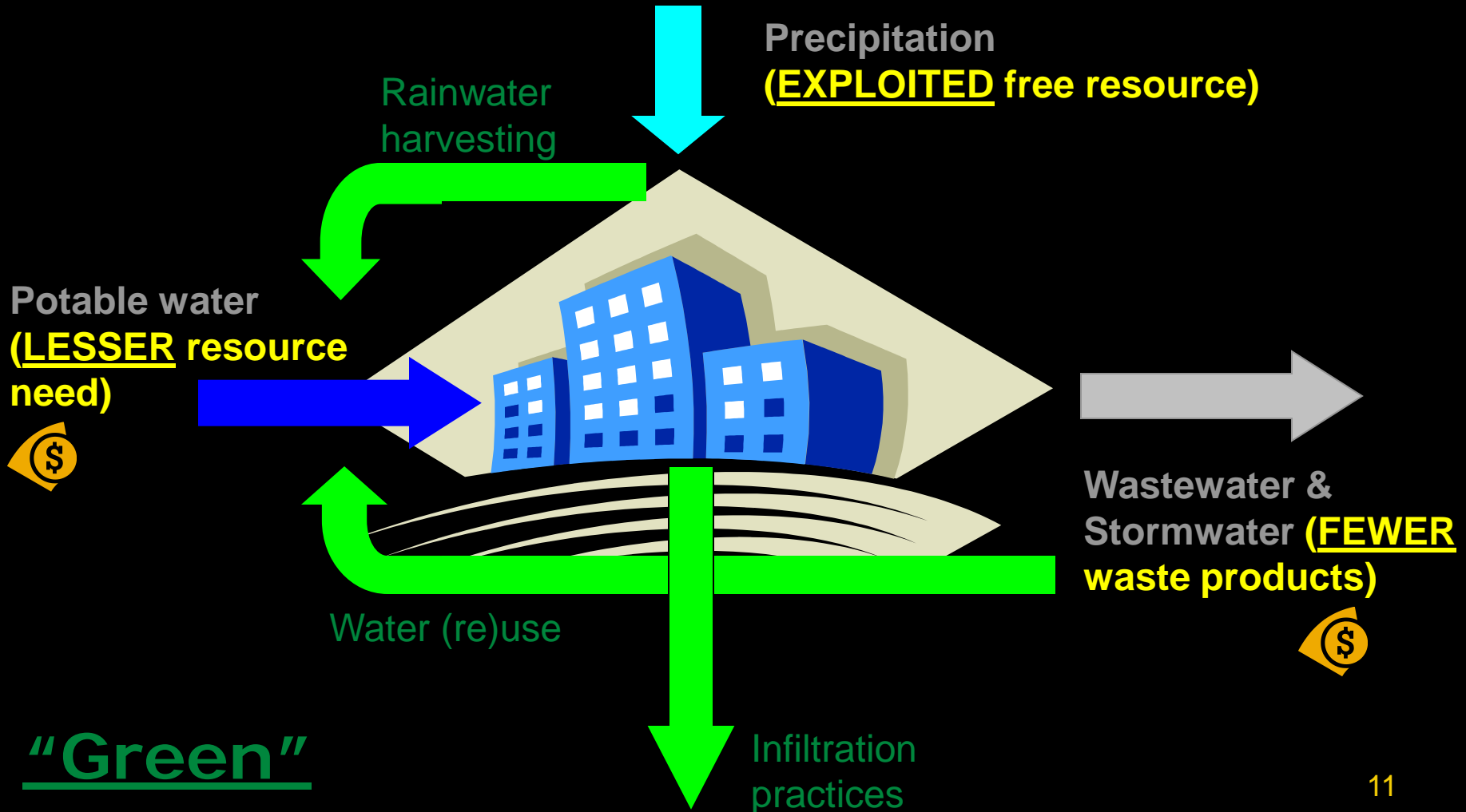
Green, Decentralized, Multifunctional

(Re)engineering the urban water cycle



"Conventional"

(Re)engineering the urban water cycle



Multiple Benefits

- Fewer water imports:
 - Less required hard infrastructure
 - Greater regional resilience to drought
 - Fewer diversions of water from ecosystems
- Less “waste” water:
 - Reduced treatment costs
 - Reduced impacts to surface water bodies
- Restored/enhanced urban ecosystems

New habitats (human and other)



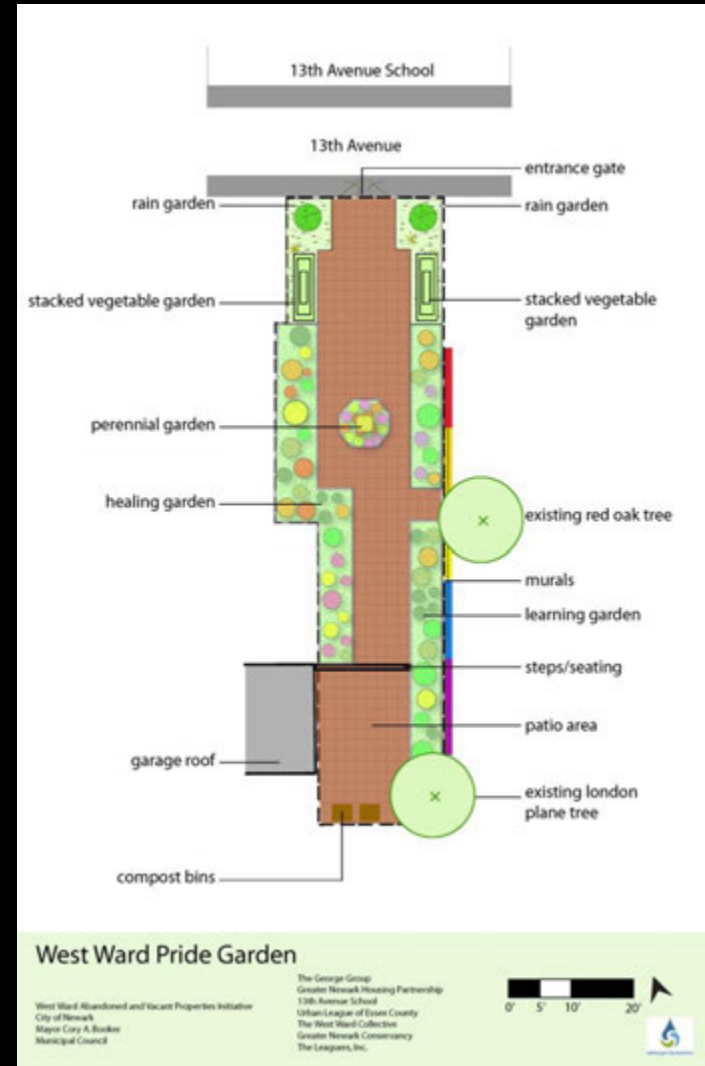
Brooklyn Bridge Park,

In collaboration with Prof. Steve
Hoffman, Parsons School of Design

Irrigation, exercise, recreation



West Ward Pride Garden,
Newark, NJ



Potable water substitution



Chiller and
ice maker



Habana Outpost, Brooklyn, NY

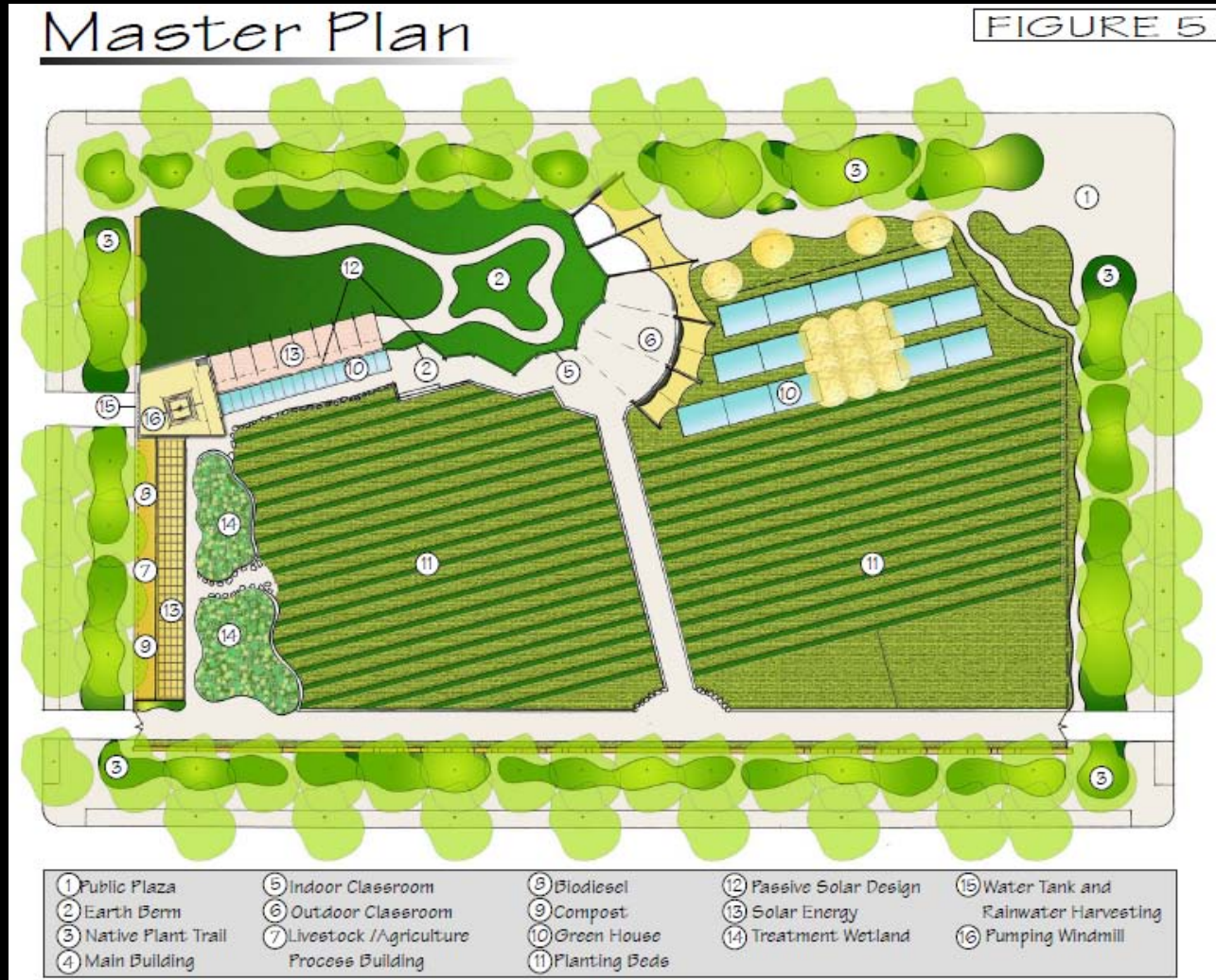
Rainwater for toilet flushing



Habana Outpost, Brooklyn, NY



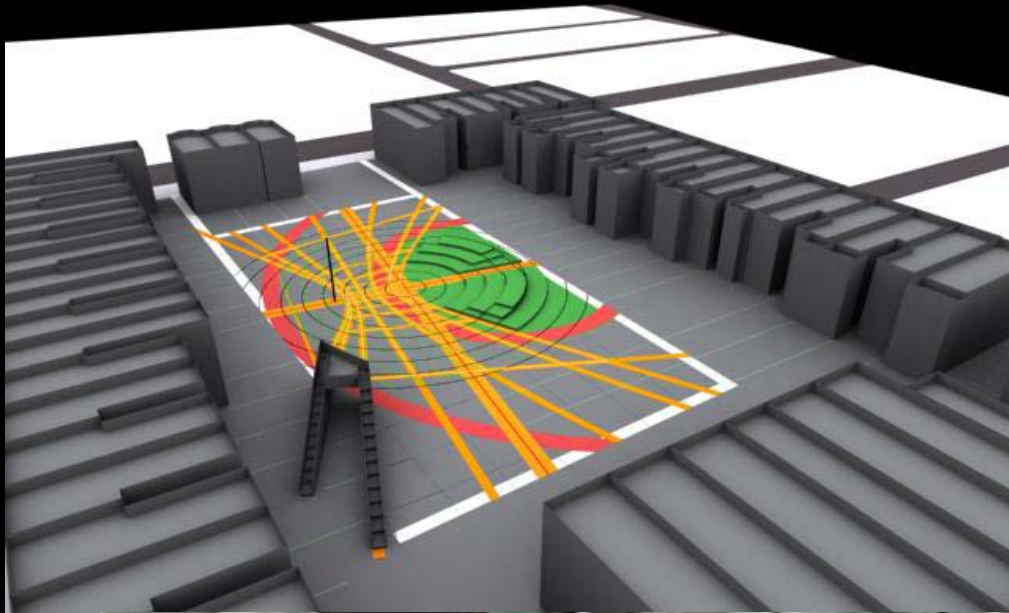
Beneficial reuse of underutilized spaces



Added Value, Brooklyn, NY

Added Value – Master Plan highlights

- 65,000 sf of planting beds
- 56% reduction in runoff
- 1,000 sf classroom and educational space
- 39,000 sf publically accessible park
- Beneficial reuse of 1400 lbs of local organic waste per week
- Using 60% less water and 70% less energy compared to “conventional” design



Benefits of Multifunctional Engineering of the “Poliselli Site”

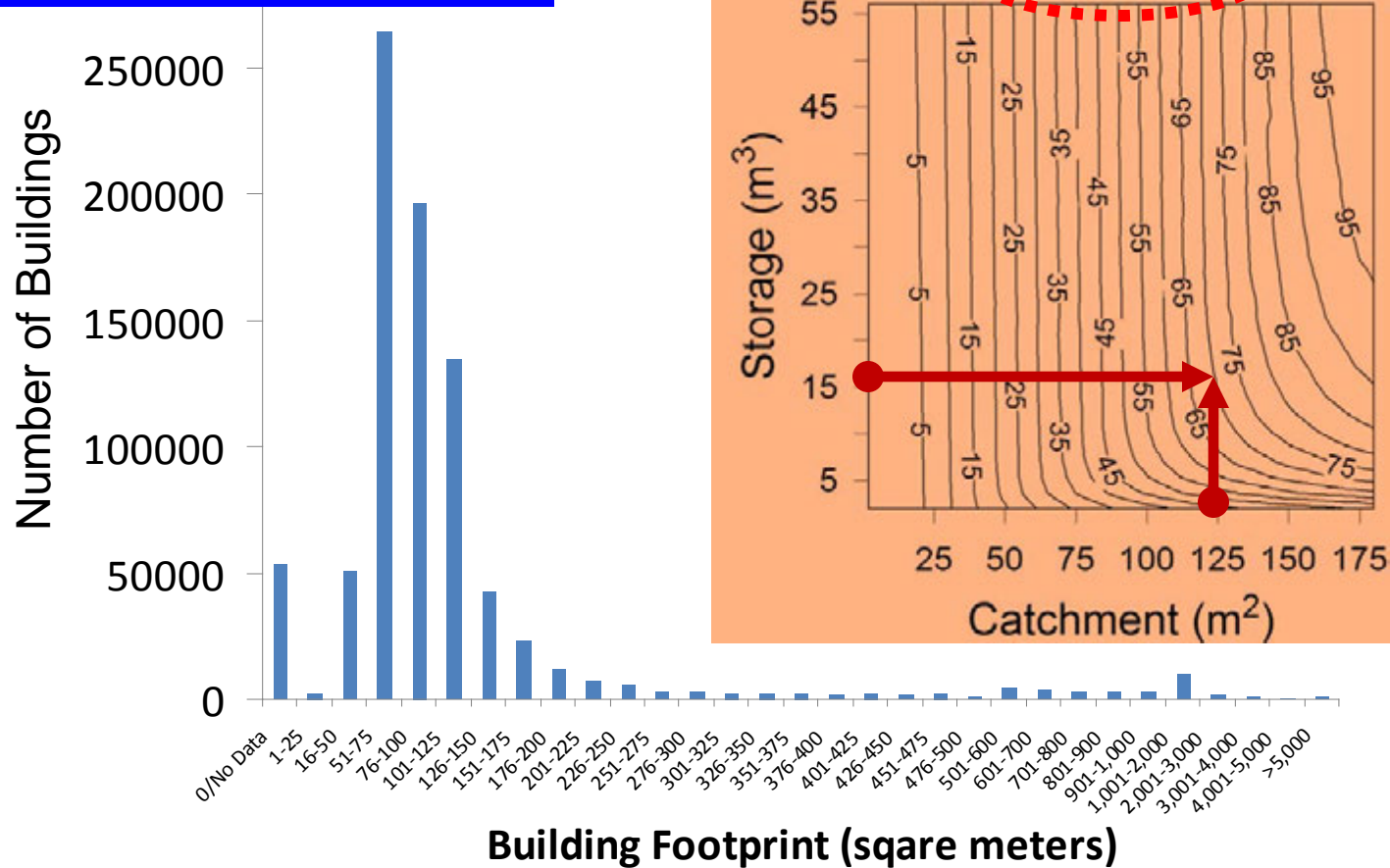
- Permanent capping of a 2/3 acre brownfield
- Creation of ~15,000 sf of raised agricultural beds
- Production of 3 seasons of crops valued at ~ \$30,000/yr
- Servicing of > 100 families with organic fruits and vegetables
- Beneficial use of approximately ~300,000 gallons/yr of stormwater runoff generated on adjacent rooftops for irrigation
- Permanent reduction in loading of the combined sewer system
- Beneficial use of > 60,000 lbs/yr of organic food and garden wastes as compost, a permanent diversion from landfills



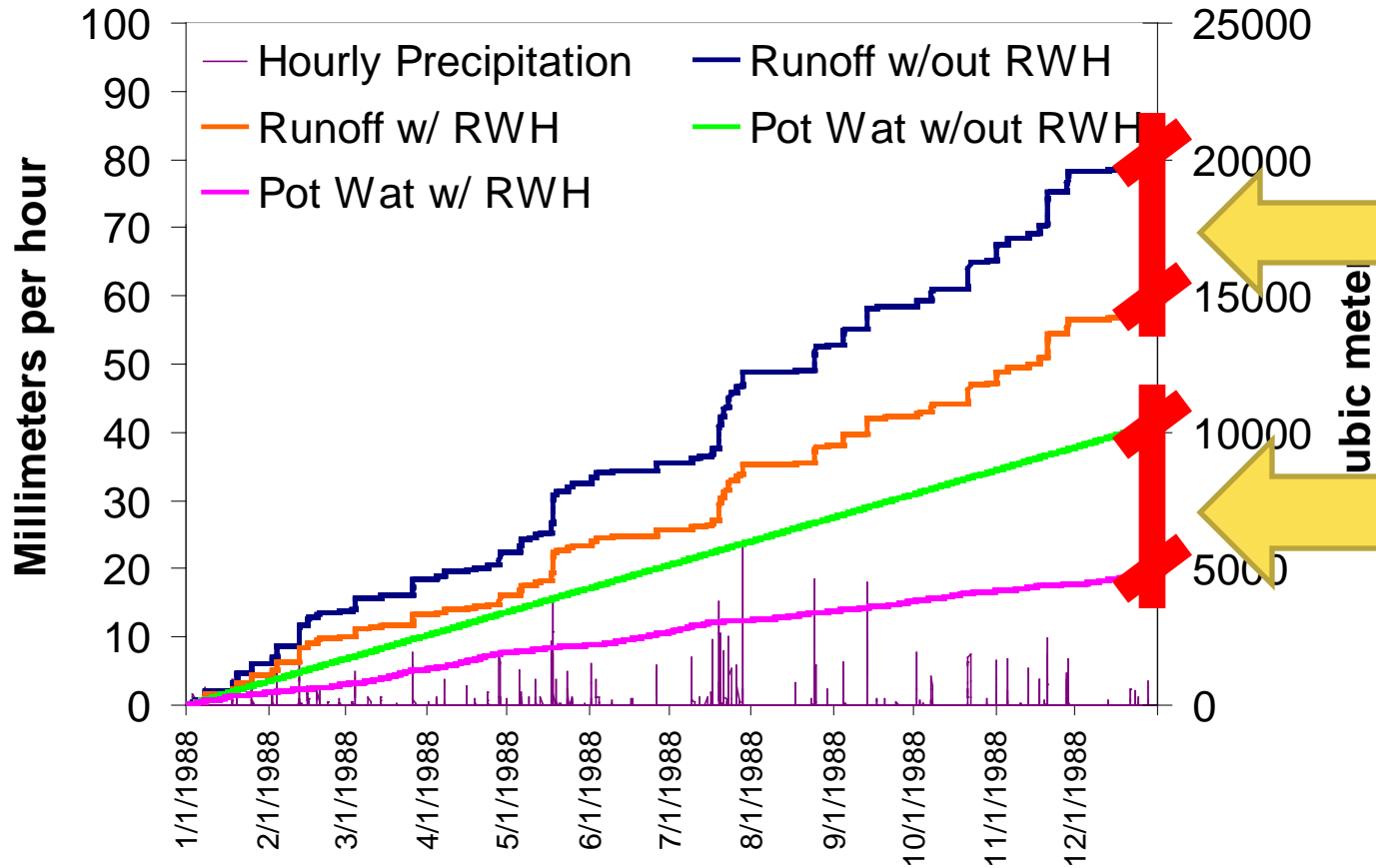
Rendering: Angelo Zaharatos

Building-scale supply reliability

SARET: the Storage and Reliability Estimation Tool



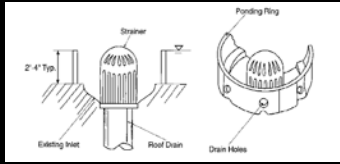
Block-scale impacts



28% reduction in annual runoff

53% reduction in potable water demand

Blue roofs



LIDRA: the Low Impact Development Rapid Assessment Model

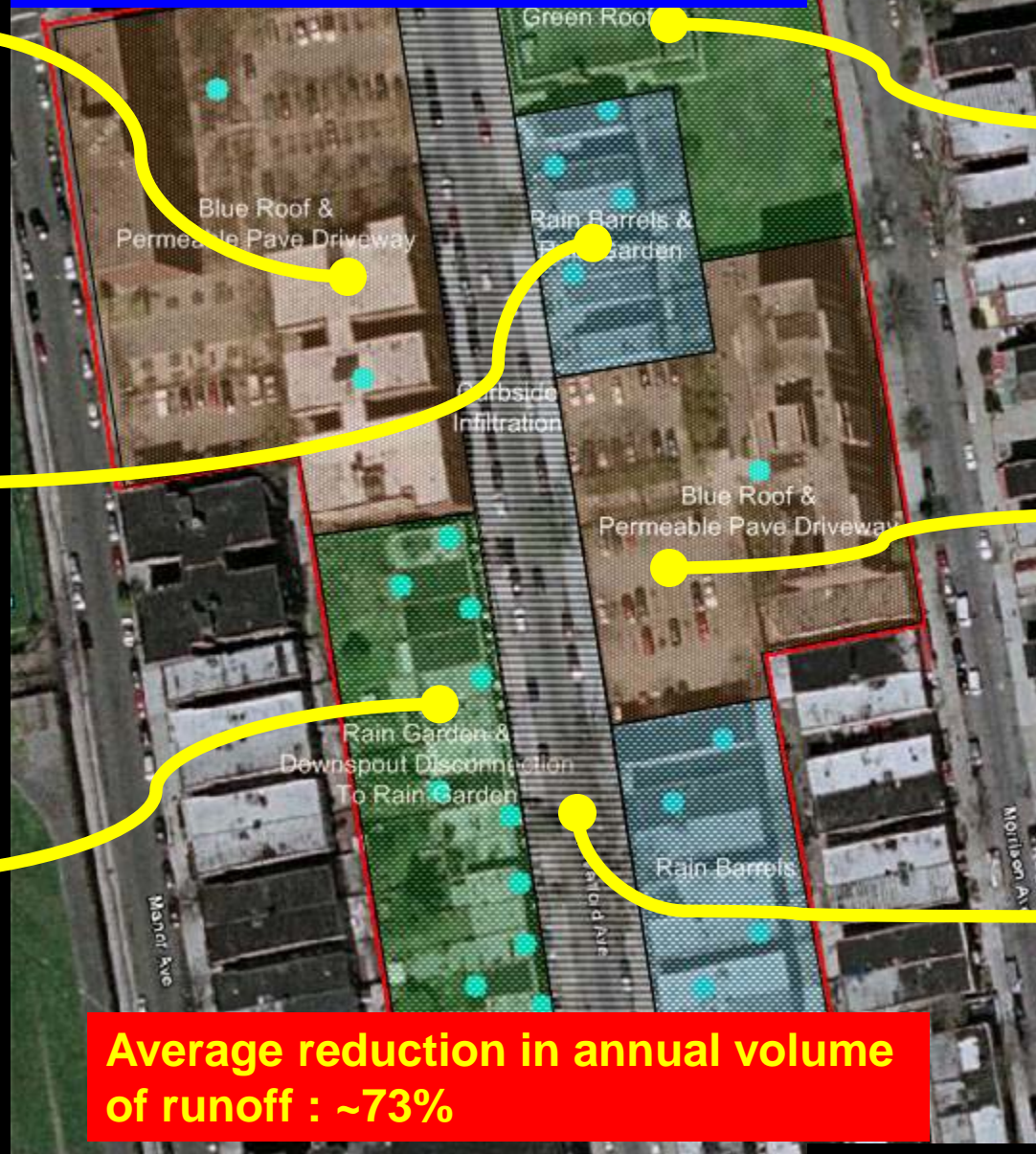
Green roofs



Rain gardens



Rain barrels



Porous pavement



Curbside infiltration



Average reduction in annual volume of runoff : ~73%

Concluding remarks

- Multifunctionality is a key component of regenerative design and planning
- Multi-scale benefits achieved through incorporation of multiple sets of criteria in the design process
- Requires creativity throughout project planning, design, and implementation