Stormwater...

Low Impact Development - A Natural Solution

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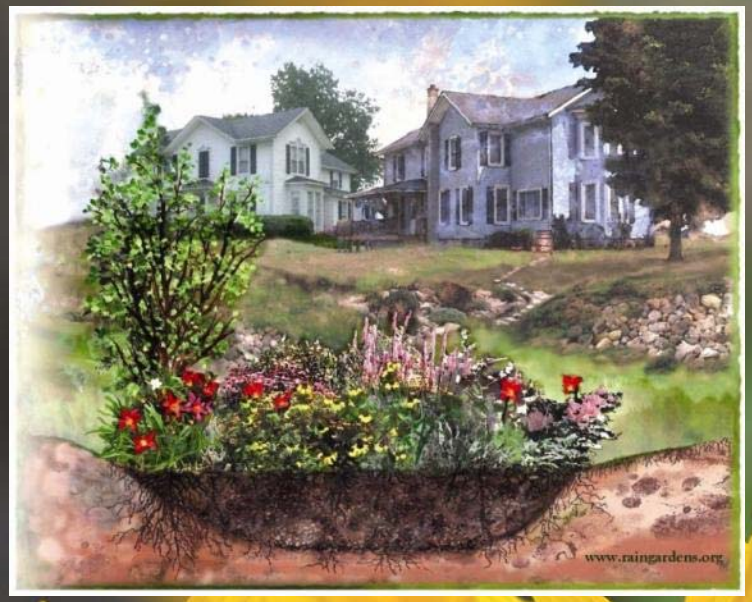
The Watershed Center
GRAND TRAVERSE BAY

Our Mission:

The Watershed Center advocates for clean water in Grand Traverse Bay and acts to protect and preserve the Bay's watershed

What is Low Impact Development (LID)?

- Small-scale stormwater management practices utilized onsite
- Work with nature to reduce runoff and pollutants from a site
- Manage water at source
- Emphasize using vegetation and infiltrating water into ground



Provides ecosystem services and associated economic benefits that conventional stormwater controls do not

LID Benefits

Why LID? First, a look at priority pollutants.

6 out of the 8 identified watershed pollutants in GTBay Watershed Plan are directly affected by stormwater runoff

Stormwater runoff results when drops of rain fall to the ground, or snow melts, and the resulting water that does not infiltrate into the ground flows over the surface of the land.

	Pollutant
*	Sediment
*	Nutrients
*	Changes to Hydrologic Flow
	Loss of Habitat
*	Toxins (Pesticides/Herbicides, Oils, Gas, Grease, Salt/Chlorides)
	Invasive Species
*	Pathogens (*E. Coli* and Fecal Coliform indicators)
*	Thermal Pollution

Why LID? Benefits for Water Quality

- Watershed pollutants: excessive nutrients, sediments, toxins (oil, gas, salt)
- Carried to waterbodies by stormwater
- LID practices reduce the amount of stormwater leaving a site, hence **reduces pollutants**
- **Reduce flooding** and extreme flows – less erosion and scour

Benefits for Developers

$$ **SAVE and MAKE MORE MONEY** $$

- Less land needed for stormwater infrastructure
  - More land for additional lots → Develop more units per site
- Faster sales as a result of perceived value of additional landscaping
- Increased property values based on proximity to and desirability of open space
  - Potential buyers will pay more to be located near amenities such as open space, water features, and gardens.

EPA – Green Infrastructure: Cost-Benefit Resources
http://water.epa.gov/infrastructure/greeninfrastructure/gi_costbenefits.cfm

Benefits for Property Owners, Communities and Watershed Ecosystems

- Increase property values, higher tax revenue
- Reduced flooding and property damage downstream
- Reduced spending on stormwater infrastructure

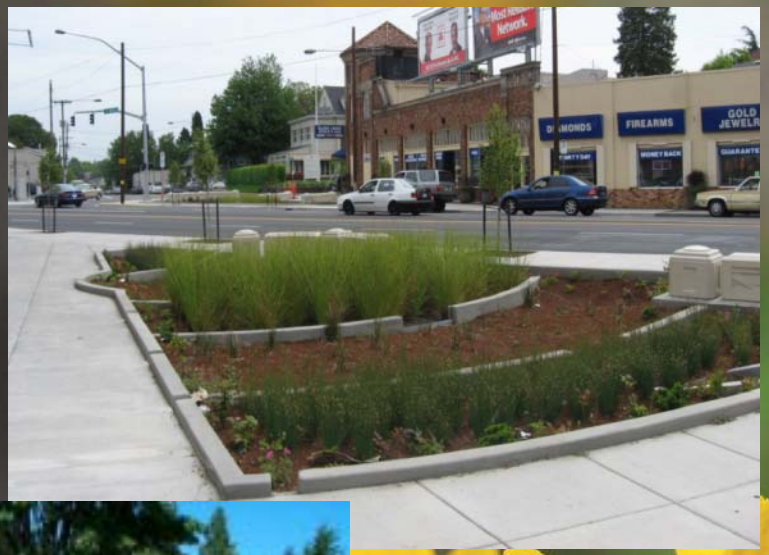
Benefits for Property Owners, Communities and Watershed Ecosystems cont'd

- Increased groundwater recharge
- Enhance aesthetics, improved habitat
- Expanded public spaces, and recreational opportunities

- Sense of public participation, increased awareness of local water quality issues
- Higher overall quality of life

Barriers for Implementation

- Public perception and acceptance
- Zoning codes
- Stormwater code – some codes only cover volume of stormwater, not quality
- Experience in installation



Weeds? Or beautiful, water filtering plants?


Using LID in Site
Planning and Design

LID in Site Planning and Design

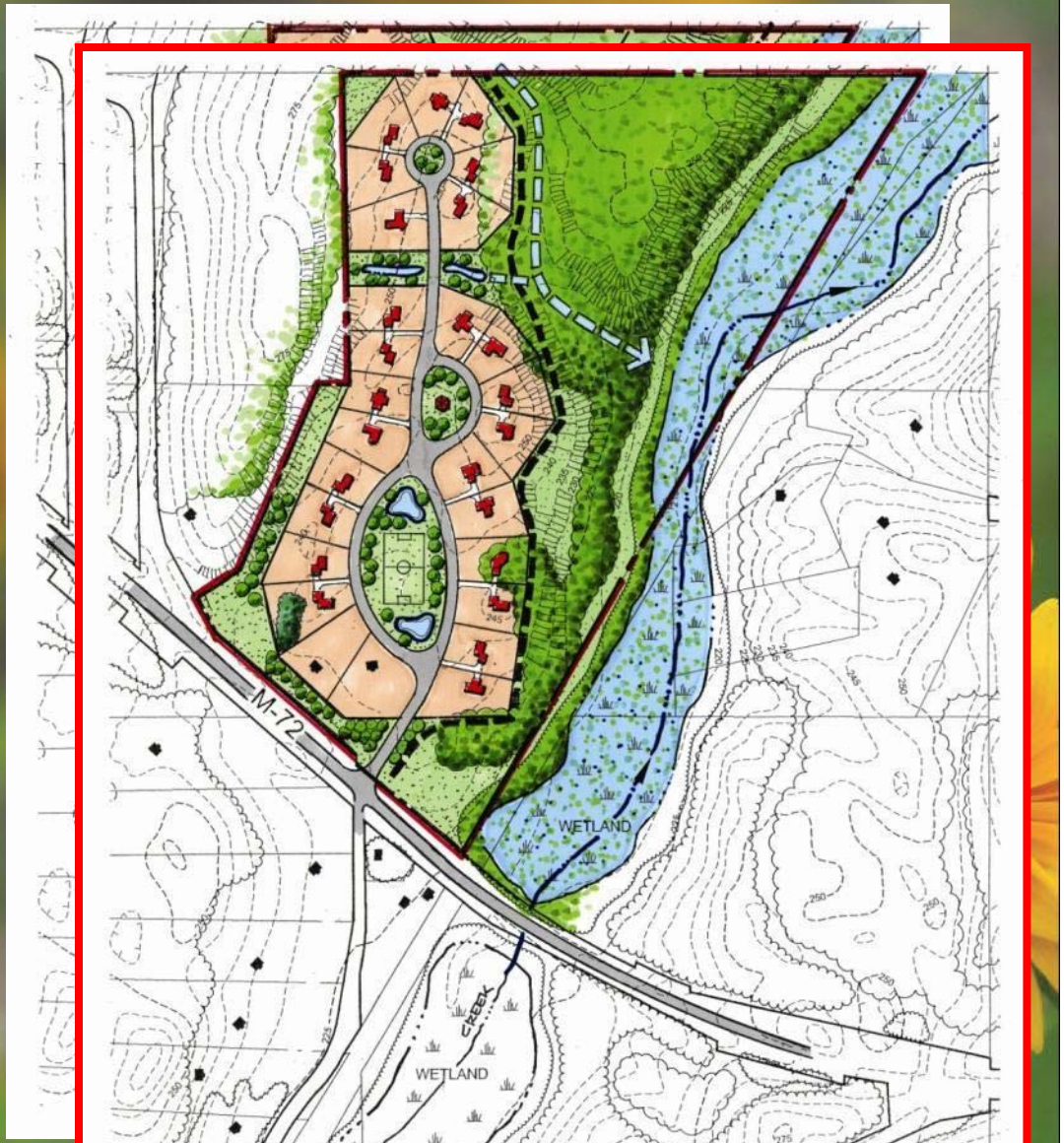
Case Example: 120 acre parcel

Typical Site Plan

- 12 home sites on 10acres

Conservation Site Plan

- 27 home sites on 50 acres
- 70 acres for: infiltration basins, bioretention swales, wetlands, other LID practices
- Preserve woodlands, wetlands, sloping terrain
- Added features enhance value of properties; build more homes – increase profit



LID in Site Planning and Design

Conservation site plan

Land set aside provides stormwater mitigation and desirable feature

Cluster development to protect features

Preserves open space and natural features, minimizes developed areas

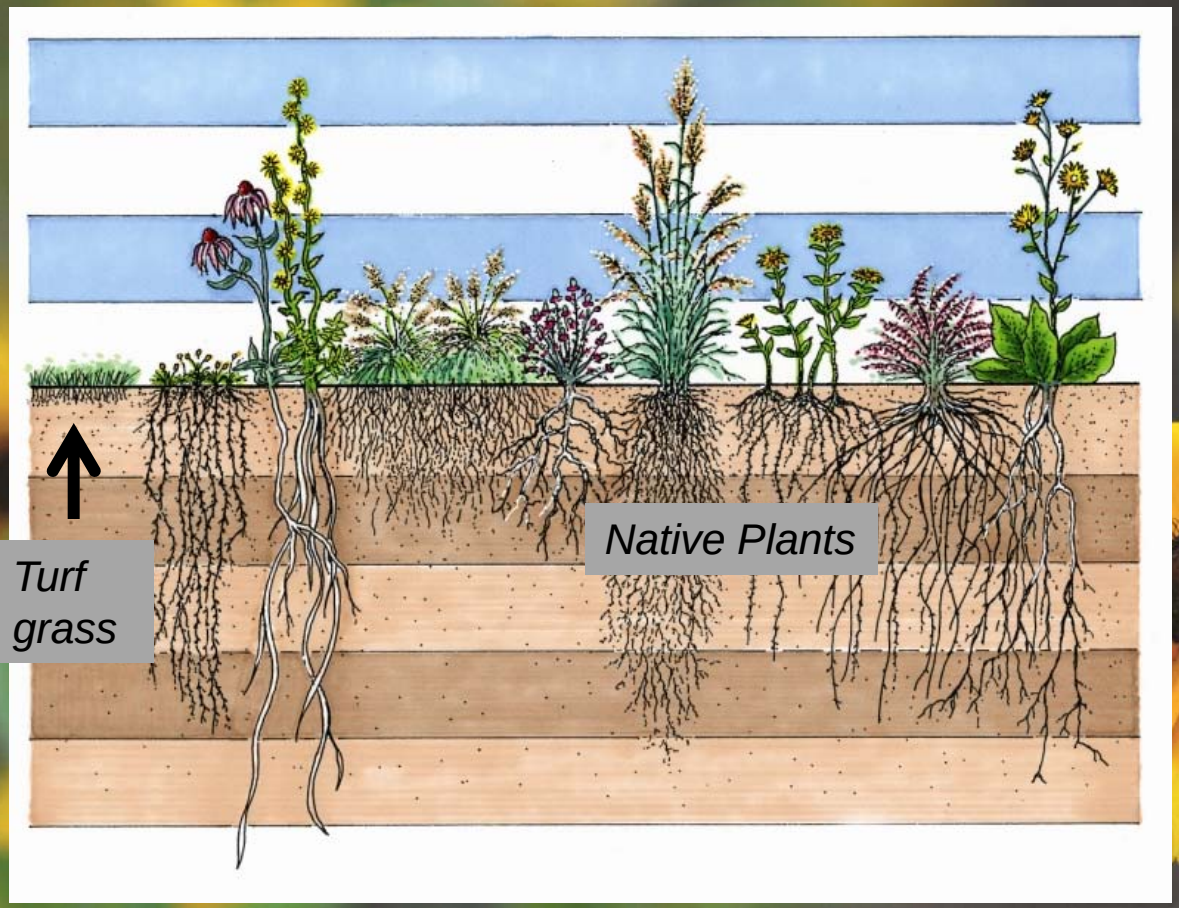
LID in Site Planning and Design cont'd…

LID is flexible and includes a variety of solutions

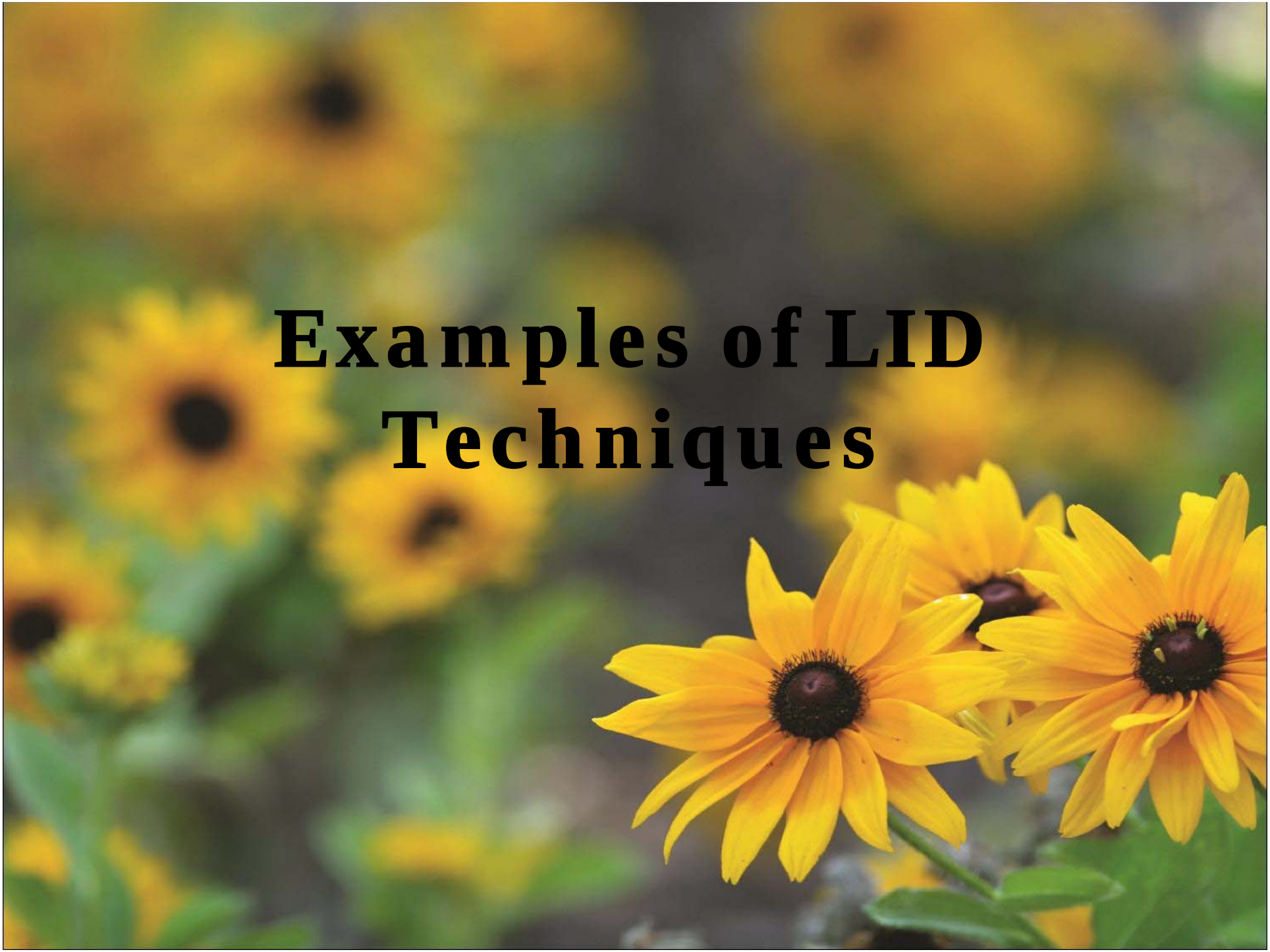
- Preserve Existing Drainage Paths and Streams
- Minimize Impervious Surfaces
  - Narrower roads, land-bank parking, porous pavement
- Preserve Natural Vegetation
- Use Low Impact Landscaping

LID in Site Planning and Design cont'd…

- Utilize native species and prepared soils - reduce watering, fertilizer, and maintenance needs



Root systems of turf grass vs. native species


Examples of LID
Techniques

LID Techniques

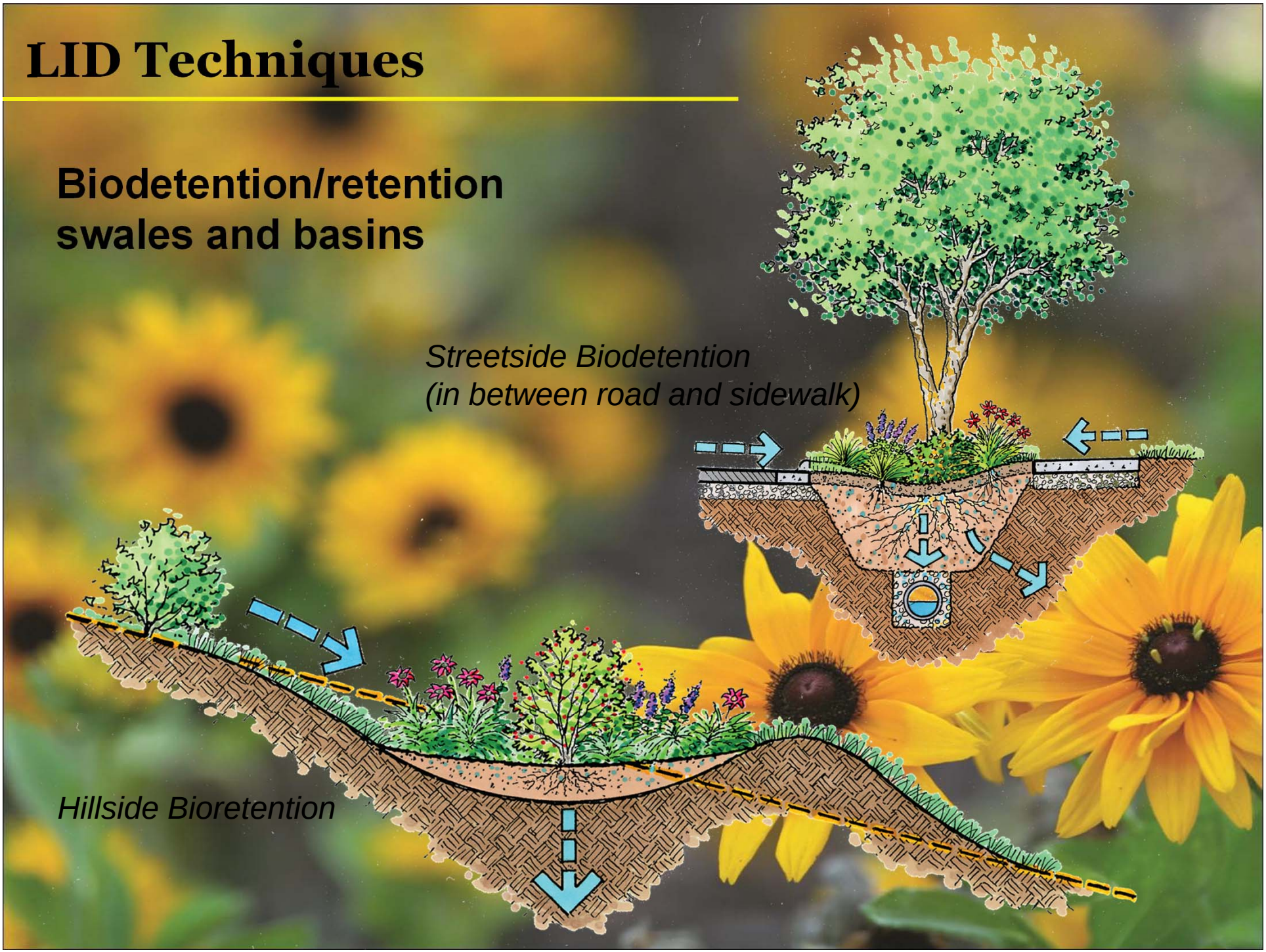
Biodetention/retention swales and basins

Bioretention Basin

Biodetention Basin
(note outlet underground to optimize water flowing through basin)

LID Techniques

Biodetention/retention swales and basins



LID Techniques cont'd…

Biodetention basins – Traverse City West Middle School

LID Techniques cont'd...

Biodetention basins – Small-scale residential applications

LID Techniques cont'd...

Rain Gardens

Rain gardens installed The Watershed Center's office (left) and Suttons Bay (below)

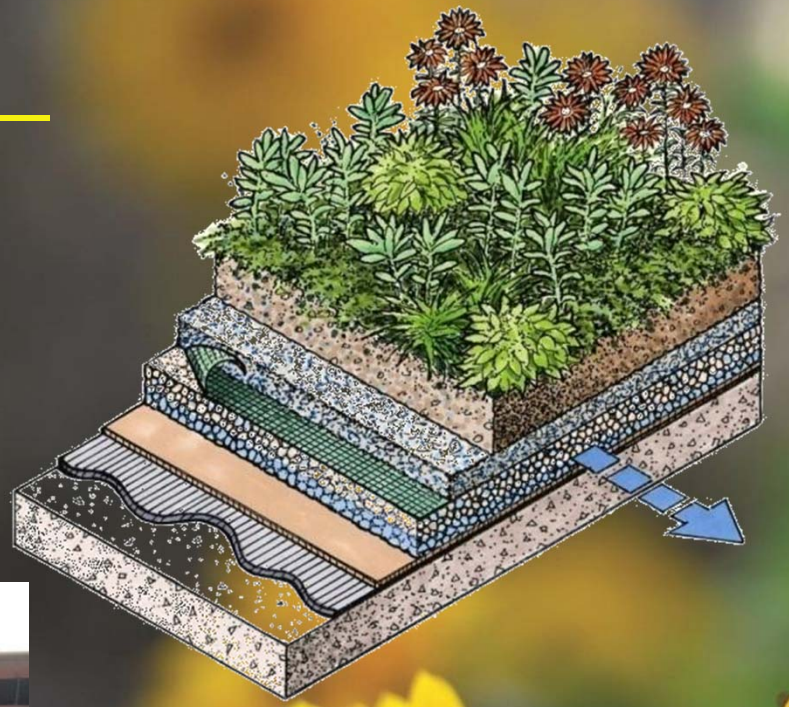
LID Techniques cont'd...

Infiltration Parking Island

Greilickville Harbor Park

LID Techniques cont'd...

Green Roof



Green roof at Cherry Capital Foods

Photo credit: Nathan Griswold, Inhabitect

LID Techniques cont'd...

Rain Barrel

Rain barrels installed at
Oryana Food Co-op

LID Techniques cont'd...

Flow Through Planters

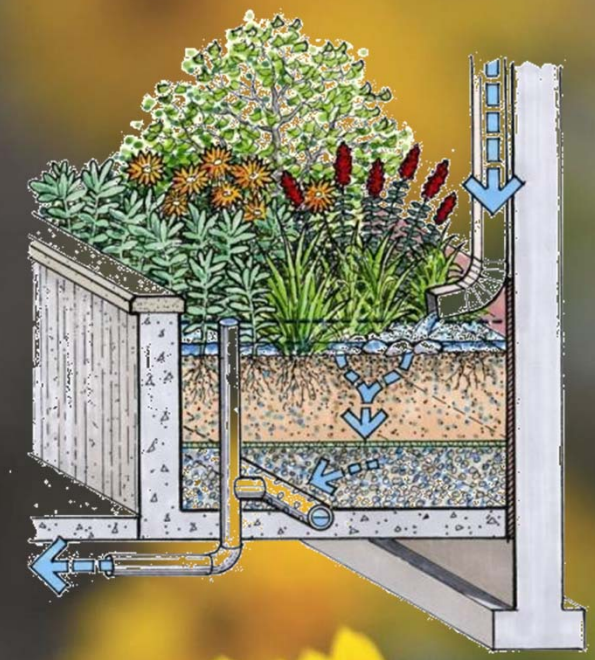
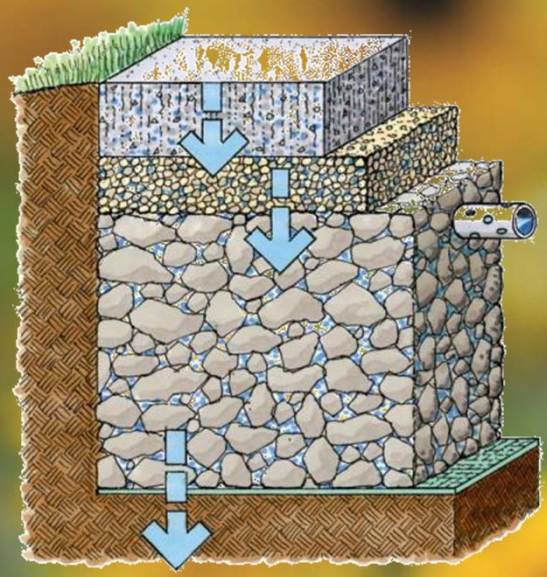


Photo credits:
http://www.phillywatersheds.org

LID Techniques cont'd...



Porous Pavement

LID Techniques cont'd…

Pervious pavers at end of Elmwood Ave (TC)

Pervious concrete at Mary's Kitchen Port (TC)

LID Techniques cont'd...

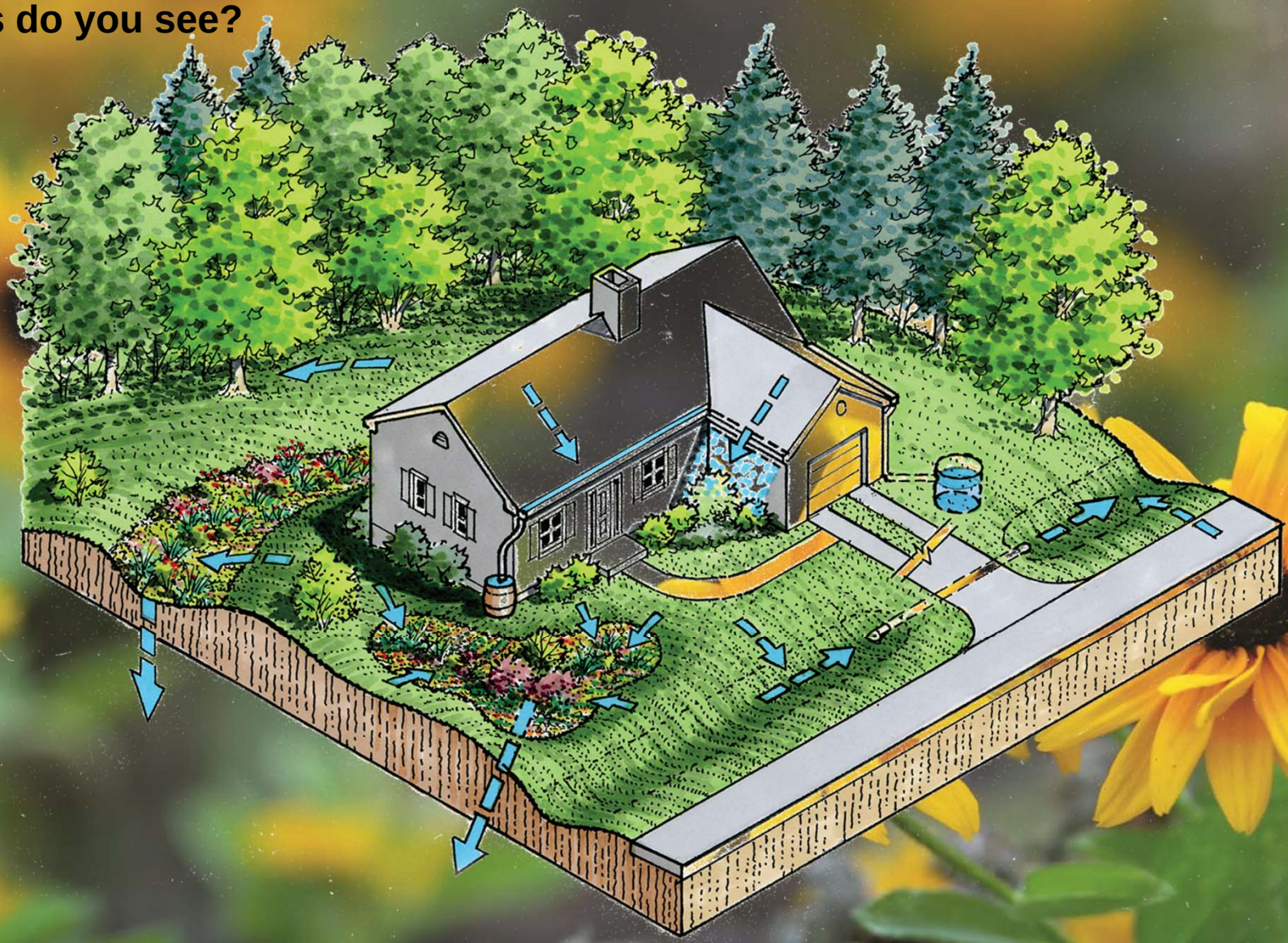
Underground Storage

Above: Bryant Park
Right: MMC Cancer Center


Case Studies

Case Study – Residential Home

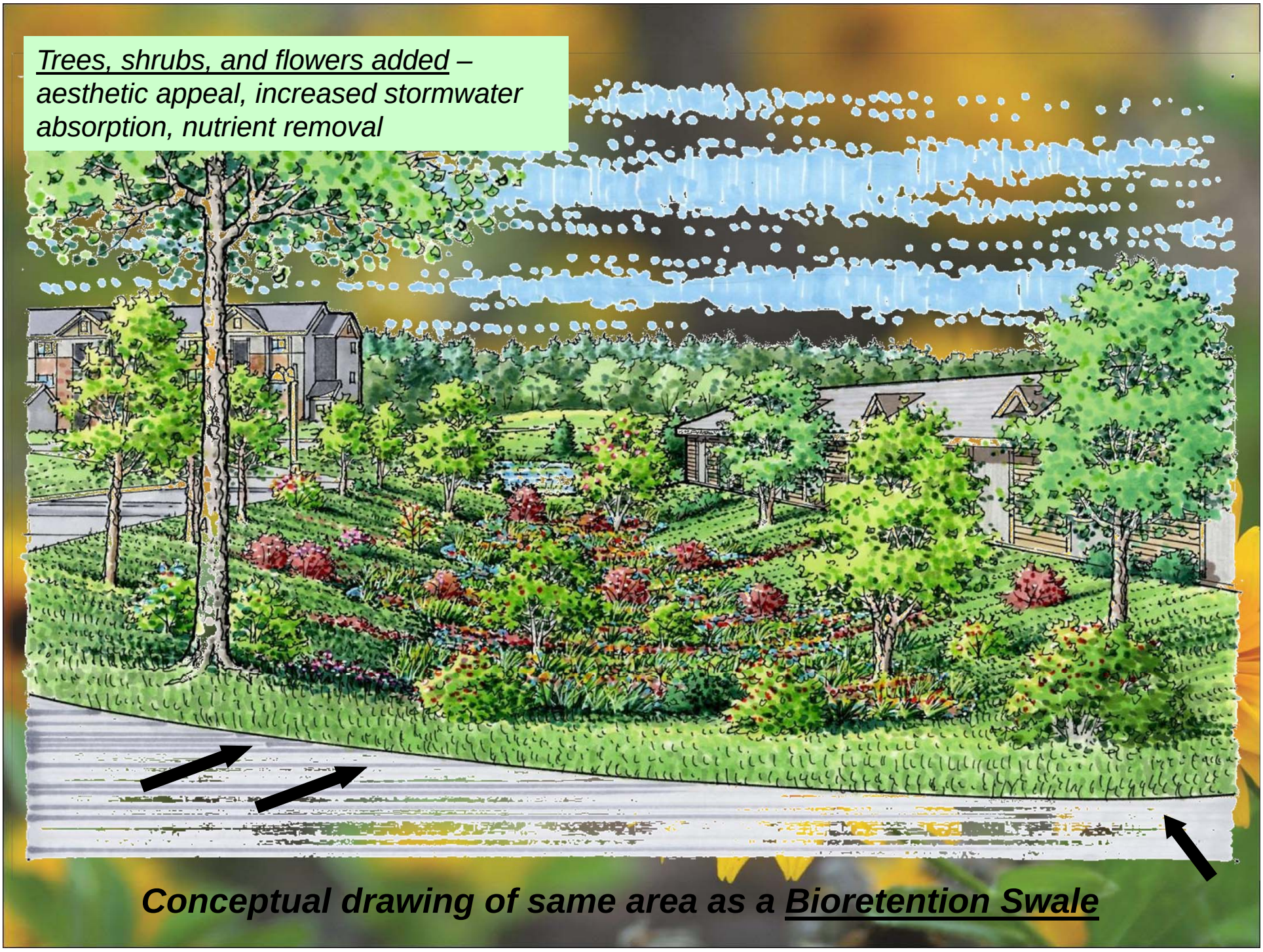
What types of LID practices do you see?



Case Study – The Arbors apartment complex

Traditional detention pond

<u>Trees, shrubs, and flowers added</u> – aesthetic appeal, increased stormwater absorption, nutrient removal



Conceptual drawing of same area as a <u>Bioretention Swale</u>

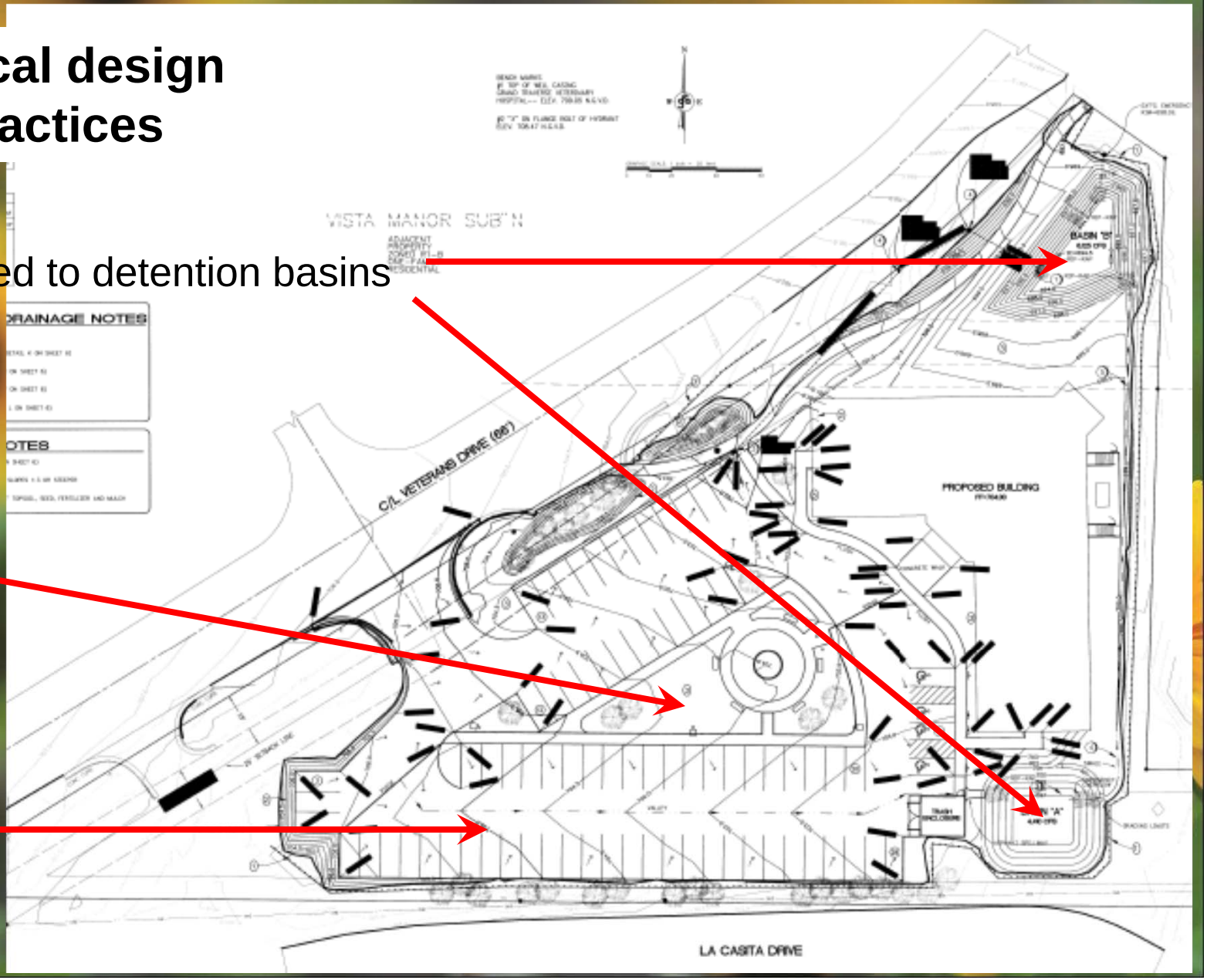
Case Study – Garfield Township Office

Typical design practices

Runoff directed to detention basins

Curbed area around vegetation

Little used paved areas

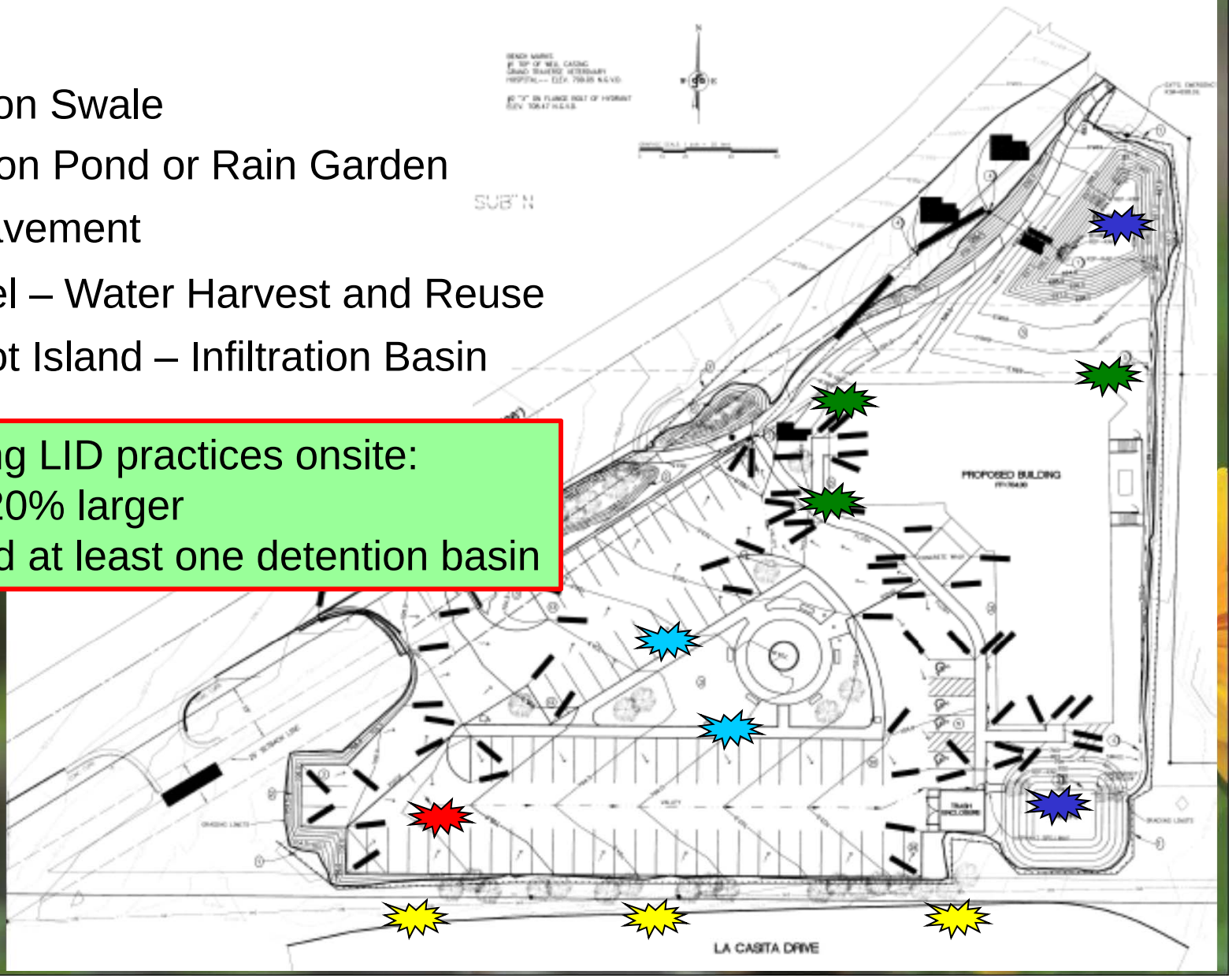


Case Study – Garfield Township Office

- Biodetention Swale
- Biodetention Pond or Rain Garden
- Porous Pavement
- Rain Barrel – Water Harvest and Reuse
- Parking Lot Island – Infiltration Basin

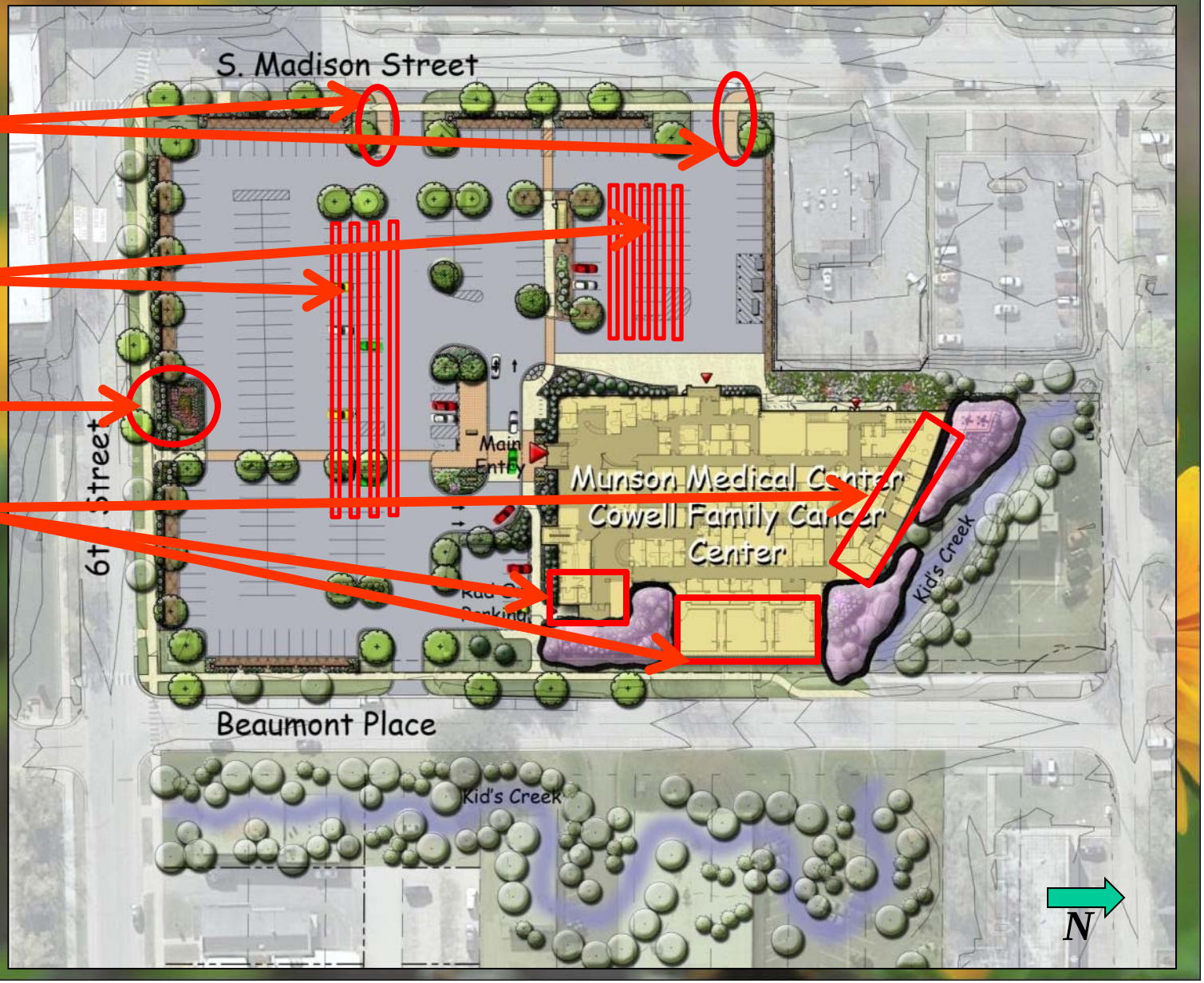
Incorporating LID practices onsite:

- Building 20% larger
- Eliminated at least one detention basin



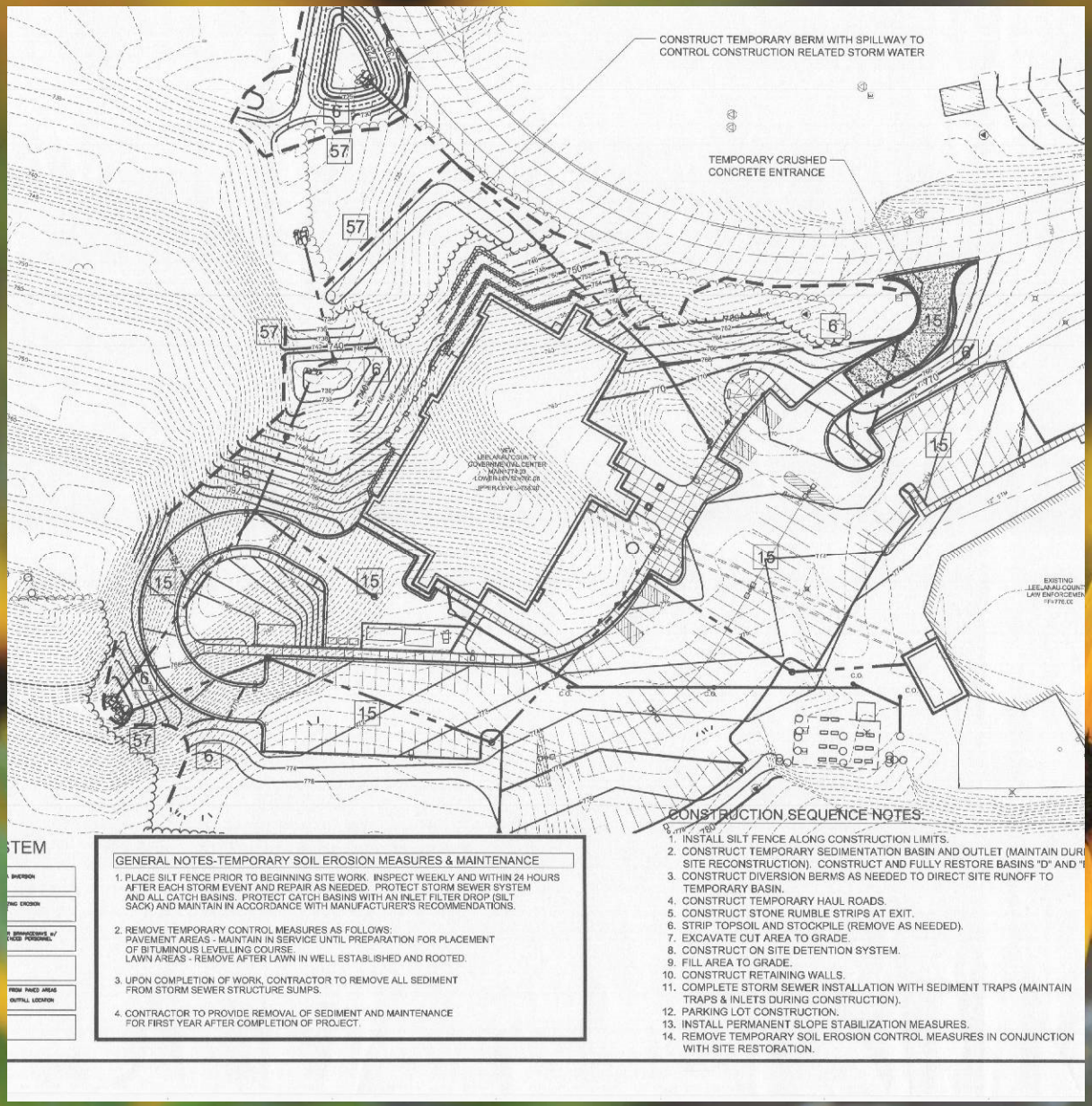
Case Study – Cowell Family Cancer Center

- Pervious pavement
- Underground infiltration trenches
- Rain garden
- Green roofs



URS

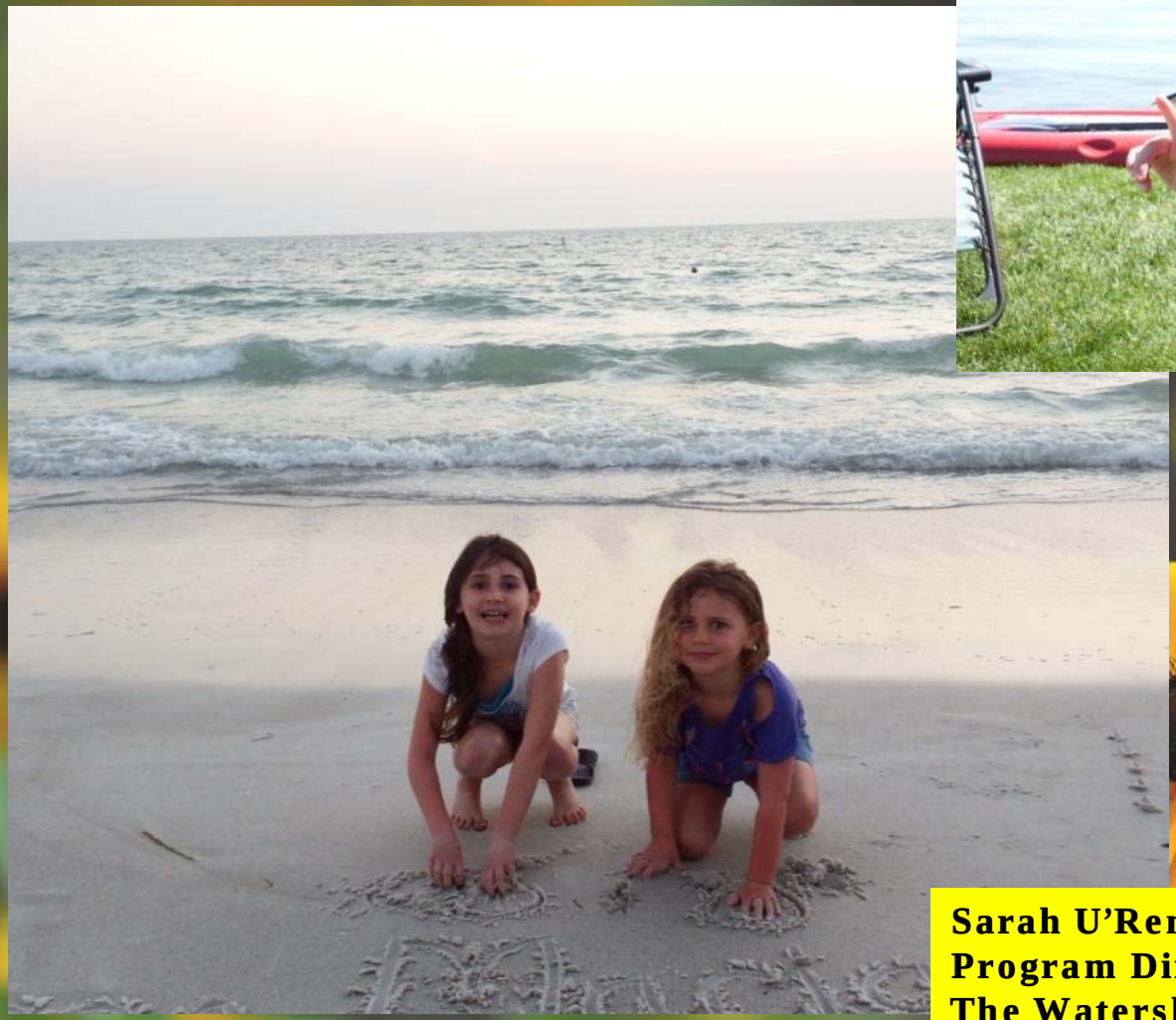
Case Study – Leelanau Co. Government Bldg



Group Work

What are some types of LID practices that could have been installed?

Questions?



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