Green Infrastructure Successes In US Benefit China

Presented by:
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Director of Sustainability
Regional Experts at Your Doorstep

- 50+ years in business: we’ve practically seen it all and can handle all projects/issues effectively
- Large, Regional-based staff: access to in-person services quickly
- Consistently top-ranked in industry: longevity and success in business attributed to our focus on client and community needs without exception

Committed to sustainability
Our Sustainable Commitment

LEED GOLD

20+ LEED AP Professionals
60+ LEED Certified Projects

green infrastructure

environmental services
architectural services
construction services
transportation services

ENVISION
INSTITUTE FOR SUSTAINABLE INFRASTRUCTURE CHARTER MEMBER

10 Envision Sustainability Professionals (ENV SP)

GREEN GLOBES

5+ Green Globes Professionals
Shenzhen, China
Pingshan New District Shenzhen China
Natural Water Cycle: Pre-Development
Natural Water Cycle: Post-Development

- Increased imperviousness increases flows
- Puts structures and people in harm’s way
Distributed Stormwater Controls Close to Runoff Sources

Traditional Regional Technique

Distributed Stormwater Features

Integrated Stormwater Controls
How is Green Infrastructure & Flooding Connected?

Seeing the Significance of the Hydrologic Impacts of Urbanization Over Time
Green Infrastructure Technology Types
Rain Gardens and Bio-infiltration

Retrofit between existing curb & sidewalk
Slow the Water Down & Innovative Plant Media
Curb Extensions

With below-grade storage
Consideration: Evaluate the Existing Conditions of the Area
Consideration: Small spaces can equal great impact
Small footprint GI Practices work if you have good infiltration
Consideration: Interconnection of Systems
Rain Garden, Gravel Parking, Bioswales, & Below Grade Storage
Consideration: Pilot Tested Design Details

Inlets, Fore-bays, Edging and Filter Strips
Consideration: Inlet and Outlet Designs

Inlet designs for debris management are key
Consideration: Trash will find its way into the GI Practice
Whether at the Inlet or Outlet or Outright in your Practice
Consideration: Location & Maintenance
Leaves & debris kill grass if not cleaned
Consideration: Long-term Maintenance

Sediment affects performance
Consideration: Winter Infiltration

Estimate 30% performance as compared to summer infiltration
Bio- Infiltration Maintenance Considerations

- Salt kills plants
- Fall Leaf Collection
- Consider all LFs
- Inspection of GI/Monitoring
- Pick Plants based on existing use
- Cold Weather Climate Functionality

- **Routine Maintenance**
  - visual inspections
  - litter and debris removal
  - vegetative management/weeding

- **Non-routine Maintenance**
  - plant/turf strip replacement
  - structural repairs
  - sig. sediment cleanup
  - partial rehab

- **Major**
  - rehab
  - rebuild

- **Preventative**

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Bio-infiltration

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Permeable Pavements – “3 P’s”
Pervious, Porous and Permeable

Retrofit between existing curb & sidewalk
Articulated Concrete Block Mat

Within the ROW
Porous Asphalt
Lower Cost-Needs More Research
Pervious Concrete
Retrofit between existing curb & sidewalk
Pervious Concrete Lessons Learned

- Works well when turf grass is used in conjunction with practice
- Collector of sediment and fines
- Tends to clog and get permanently clogged in areas of high sediment and fines
- Aesthetic concerns by residents
- Can be costly
- Long term maintenance research has not be addressed
Pavement Innovations

- Cost curve coming down
- Technology Advancements are catching up
- Resiliency is the key
- Life Cycle Costs are there
- Cold Weather Climate Functionality
Pervious Pavements Maintenance Considerations

- Salt can break down pavement
- Fall Collection
- Inspection of GI/Monitoring
- Average Time Maintaining
- Typical Maintenance Required
- Cold Weather Climate Functionality
Tree Boxes
Below-grade storage, multiple applications
Tree Box - Design

Replace existing sidewalk removed during excavation with new concrete sidewalk over aggregate base compacted to not less than 95% maximum dry density (ASTM D527) per LMPW STD. DWG 701. Meet flush with top of tree box (all sides), then finish to match existing sidewalk to remain.

Provide ½” expansion joint where new concrete sidewalk meets tree box.

Precast concrete tree box 24” wide x 6” height curb side inlet at top of box, top of box shall meet flush with top of existing concrete curb.

Existing subsurface:

4” factory made weep hole per manufacturer’s recommendations for box weep holes per box shall match tree box note 4.

Instill planting soil media in 6” lift water thoroughly in between lifts.

No. 87 aggregate heavier course refer to detail ③ sheet 17 for shaft detail.

No. 3 aggregate underdrain blanket wrapped in non-woven geotextile filter fabric. Install filter fabric per manufacturer’s recommendations.

Center tree in box.

Tree Box inlet.

Remove top ½ of burlap turn down top 2/3 of wire basket if present.

18” Ht. Decorative Steel railing.

3” stone mulch, do not place against trunk.

2” shredded hardwood mulch.

Planting soil media.

6” perforated, corrugated pipe underdrain with suck connecting individual tree boxes. Install level, locate underdrain as close to back of curb as possible in order to precast concrete with existing utility poles. Refer to general note 0.

Tree Box / 3’ Width Planting Area with underdrain: Longitudinal Section

Scale: 1/2”=1’-0”

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Construction Tree Boxes

- Choosing the correct variety of tree
- Interconnected tree boxes vs. individual boxes
- Proprietary boxes vs. custom design
  - Infiltration considerations
  - Less surface area
- Media type
  - Water quality or water quantity only
- Pretreatment/trash and debris
Tree Box Lessons Learned

- Tree box is very heavy and may settle over time
- Challenging to combine level of the box with sloping sidewalk
- Need buy-in for how tree box is ADA compliant (curb, railing, grating)
- Tree boxes can be too expensive to put in unless you are doing numerous applications at a time
- Consider tree trench with visual tree box on surface
Tree Box Maintenance Considerations

- Salt Resistant Trees
- Inspection of GI/Monitoring
- Typical Urban Tree Maintenance
- Cold Weather Climate Functionality
- Cost effective only in significant numbers
- Proprietary products cost prohibitive
In Summary...

- Green does not entirely replace gray
- Be thoughtful of your current surroundings
- Green can reduce capital costs and O&M of gray technologies
- Get out from behind your computer and experience your basin
- Not all green infrastructure will work in every location
- You will run into utilities
- Design with the end in mind
- Operation and Maintenance of these practices are still evolving
- When in doubt go with something tried and true
Knowledge of infrastructure + Dedication to sustainability = Right firm for the job

Questions

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