

# Green Infrastructure Basic Principals & Tools

The screenshot shows the TAB Program website. At the top is a purple navigation bar with the TAB logo (a tree) and the text 'TAB TECHNICAL ASSISTANCE TO BROWNFIELDS'. The navigation menu includes 'Home', 'About', 'Education', 'Online Tools', 'Resources', and 'Services'. Below the navigation bar, the heading 'TAB Program' is displayed in green, followed by the subtext 'TAB provides free technical assistance with brownfields redevelopment efforts'. The main content area features a 'THEN.' image of a paved, empty lot and a 'NOW.' image of a green infrastructure site with trees and a stream. A purple overlay on the right side of the 'NOW.' image contains the text: 'Free Technical Assistance to Local, Tribal, and State Brownfields Efforts'.

Margaret Renas  
Delta Institute (a TAB Partner)  
Technical Assistance to Brownfields  
(TAB) Program  
Kansas State University  
February 3, 2017

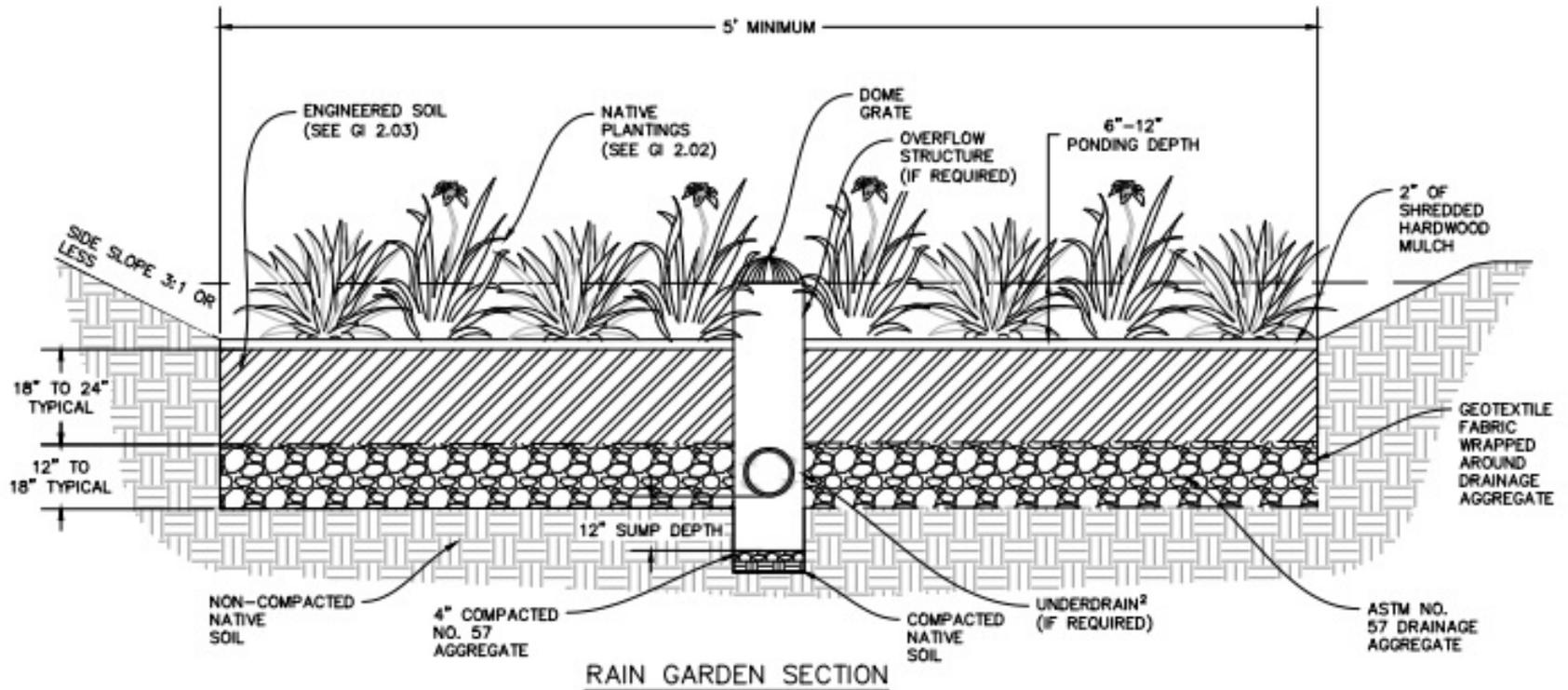
# Today's Presentation

- **What is Green Infrastructure (GI) / Types of GI**
- **Why do we need GI?**
- **GI and Brownfields**
- **Tools for GI and Brownfields**

# What is Green Infrastructure? Types of GI



# For Engineers



Cross Section of Rain Garden



**Bioswale**



**Rain Garden**



**Stormwater Planters**

## **Permeable Pavers and Pervious Pavement**





**Underground Storage**



**Green Roof**

**Cistern**



# Why Do We Need GI?



## Past: Primarily Natural Habitats

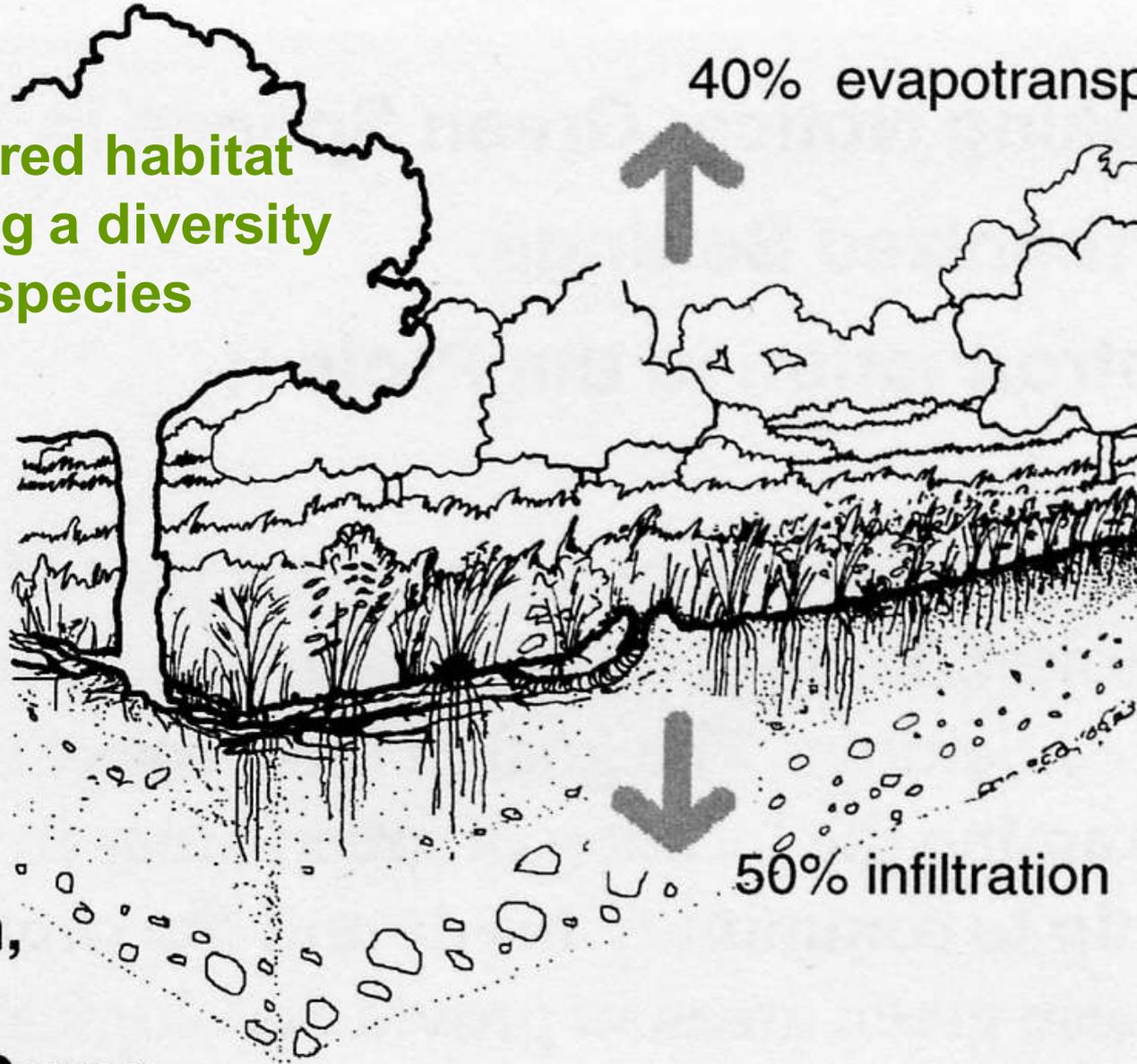
**Multi-layered habitat  
supporting a diversity  
of native species**

10%  
runoff

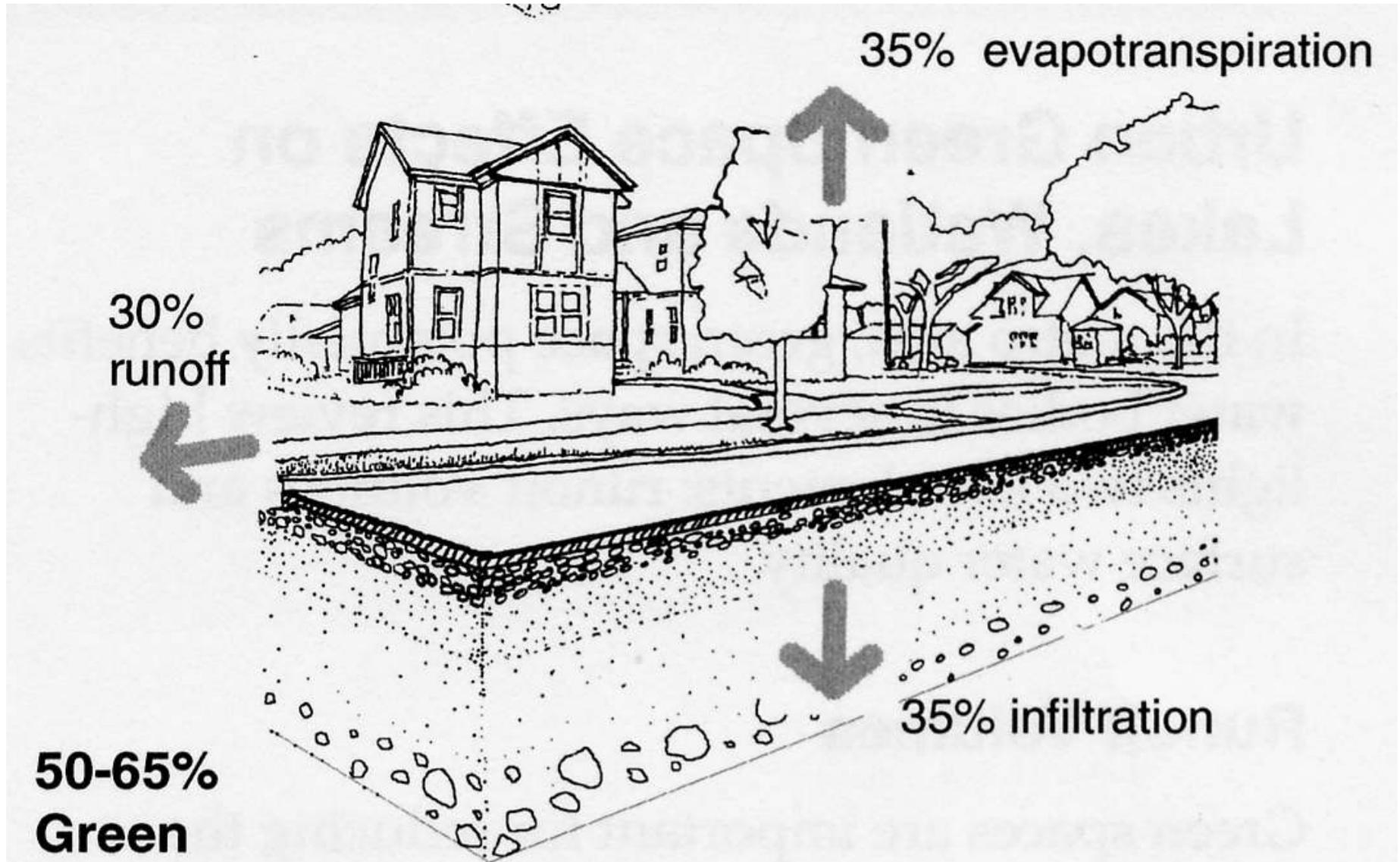
40% evapotranspiration

**All Green,  
Natural  
Ground Cover**

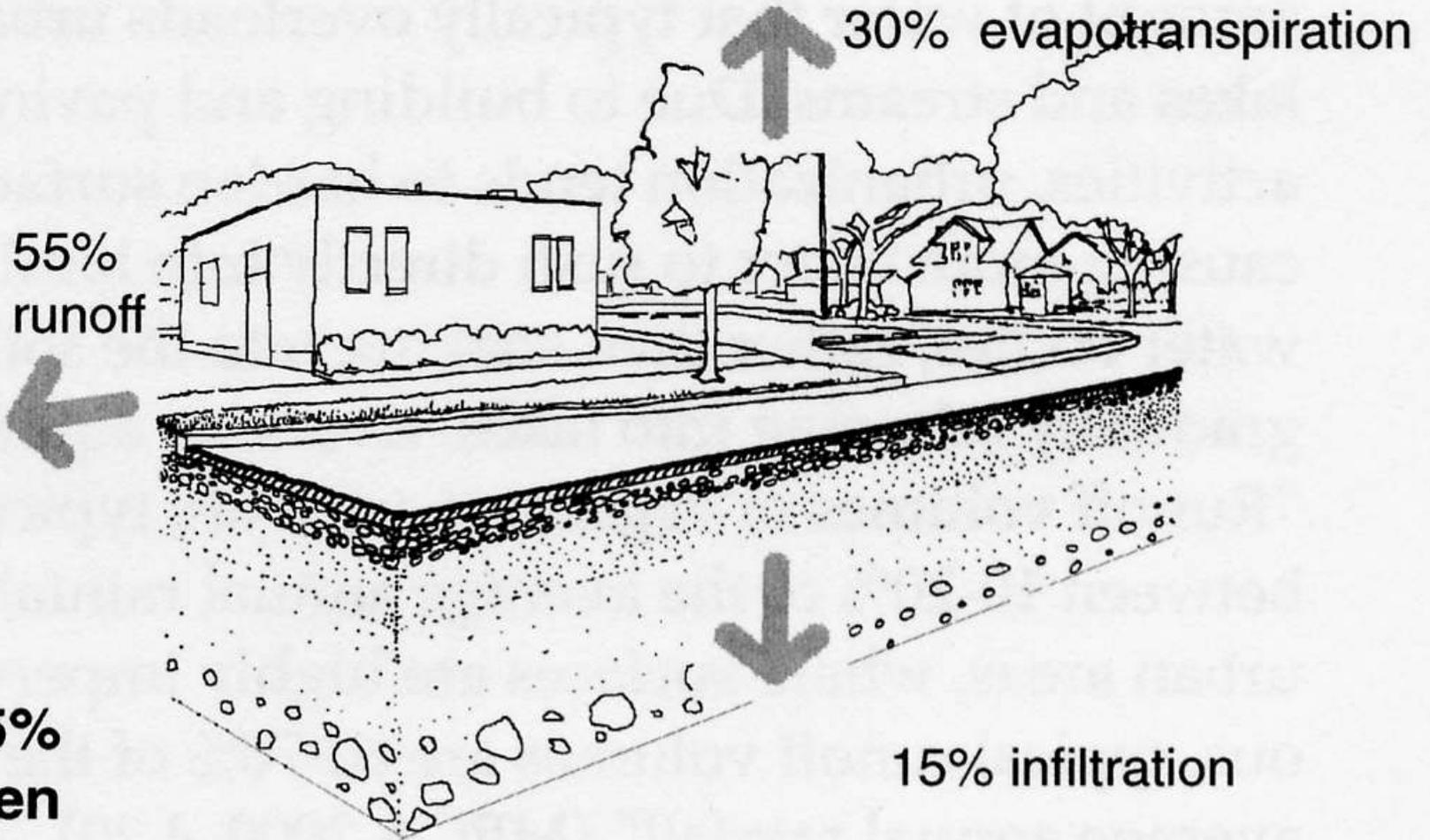
50% infiltration



**More diverse plants introduced that are pleasing to people,**  
but plants become less native/replaced with hardscape



**A habitat** is created that is predominantly hardscape.



# Healthy Stream



# Stream Channel Erosion



# Effects of Stormwater and CSOs in Urban Environments

Per FEMA, “About 20-25% of all economic losses resulting from flooding occur in areas not designated as being in a ‘floodplain’, but as a consequence of urban drainage.”



# Role of Green Infrastructure in Stormwater Management

- **Community Level: *Supplement* grey infrastructure (sewers)**
- **Development Level: *Replace* grey infrastructure**
- **Management of Stormwater Volumes**
- **Filtration and Biodegradation of Pollutants**
- **Recharging of Groundwater**

# GI and Brownfields





# **Linking Green Infrastructure to Brownfield Redevelopment: A Case Study**





# TAB

TECHNICAL ASSISTANCE TO BROWNFIELDS



**GI Parcel**



**Developing Parcel**



**RECOVERING RESOURCES,  
TRANSFORMING WATER**

Our 2015  
Strategic Plan

[FIND OUT MORE >](#)



# Stakeholders



# Tools for GI and Brownfields



# TAB Resources

The screenshot shows a web browser window with three tabs: 'Projector | Timesheet', '(471 unread) - margaretr', and 'Online Training Details -'. The address bar shows the URL 'https://www.ksutab.org/education/training/details?id=201'. The website header is purple and features the TAB logo (Technical Assistance to Brownfields) on the left and navigation links: Home, About, Education, Online Tools, Resources, Services, Contact. On the right of the header, there are links for '> Help' and '> Sign in', along with the text 'Not a member? Get a free account.'.

## Online Training: Infrastructure for Green Redevelopment of Brownfields

TAB Program > Education > Online Training > Training Details

**Review Questions: 22**

Welcome to the Infrastructure for Green Redevelopment of Brownfields training course.

The purpose of this course is to help participants 1) explain the basic concepts behind green infrastructure and why it is significant to brownfield redevelopment, 2) distinguish the different types of green infrastructure relevant to water management and transportation, 3) describe the economic benefits of installing green infrastructure on brownfields, 4) describe the basic planning process for implementing green infrastructure with brownfield redevelopments, 5) recognize municipal green infrastructure templates, and 6) identify sources for GI financing.

The course is a series of short lectures accompanied by supplemental materials. The supplemental materials are .pdf versions of the slides from the lectures including the transcript, provided as a reference for further study. The lectures and supplemental materials are accessible from the Associated Learning section at the bottom of this page. They are listed in order of recommended viewing.

**Scroll down to begin.** Once you have viewed the materials, please select the Launch Review button at the bottom of the screen. This will take you to a short test to help you review the course content. After taking the test and achieving a score of at least 80%, a certificate of participation will be available for printing.

**PRESENTERS:**

 **Eugene Goldfarb** was the Midwest Environmental Officer for the U.S. Department of Housing and Urban Development for approximately 15 years and retired in 2004. Eugene was a certified planner (AICP) from 1981 through 2012 and is still a licensed attorney in Illinois.

At the bottom of the browser window, there are four tabs for PDF files named '2016-ATC-Registra...pdf'. A 'Show all' button is visible on the right. The Windows taskbar at the bottom shows the search bar, taskbar icons for File Explorer, Chrome, and other applications, and the system tray with the date and time '4:02 PM 9/23/2016'.

# **TAB GI Online Training Modules**

- **Module 1: Introduction to GI**
- **Module 2: Types & Uses of GI – Water Management & Transportation**
- **Module 3: Economic Development & Broader Benefits of GI**
- **Module 4: Planning Process for GI**
- **Module 5: Tools for GI Decision Making**
- **Module 6: Funding for GI**



# Resources

TAB Program > Education > Resources

Category

Topic

Related Material

Resources (14)

Keyword Search

green infrastructure

## Title



GI for Stormwater – Design Considerations



GI Green River Pattern Book



GI Retrofitting Large Landscape for Sustainability – Morton Arboretum

# Delta Guidance



*GREEN INFRASTRUCTURE  
DESIGNS  
SCALABLE SOLUTIONS TO LOCAL  
CHALLENGES*

JULY 2015

delta institute 

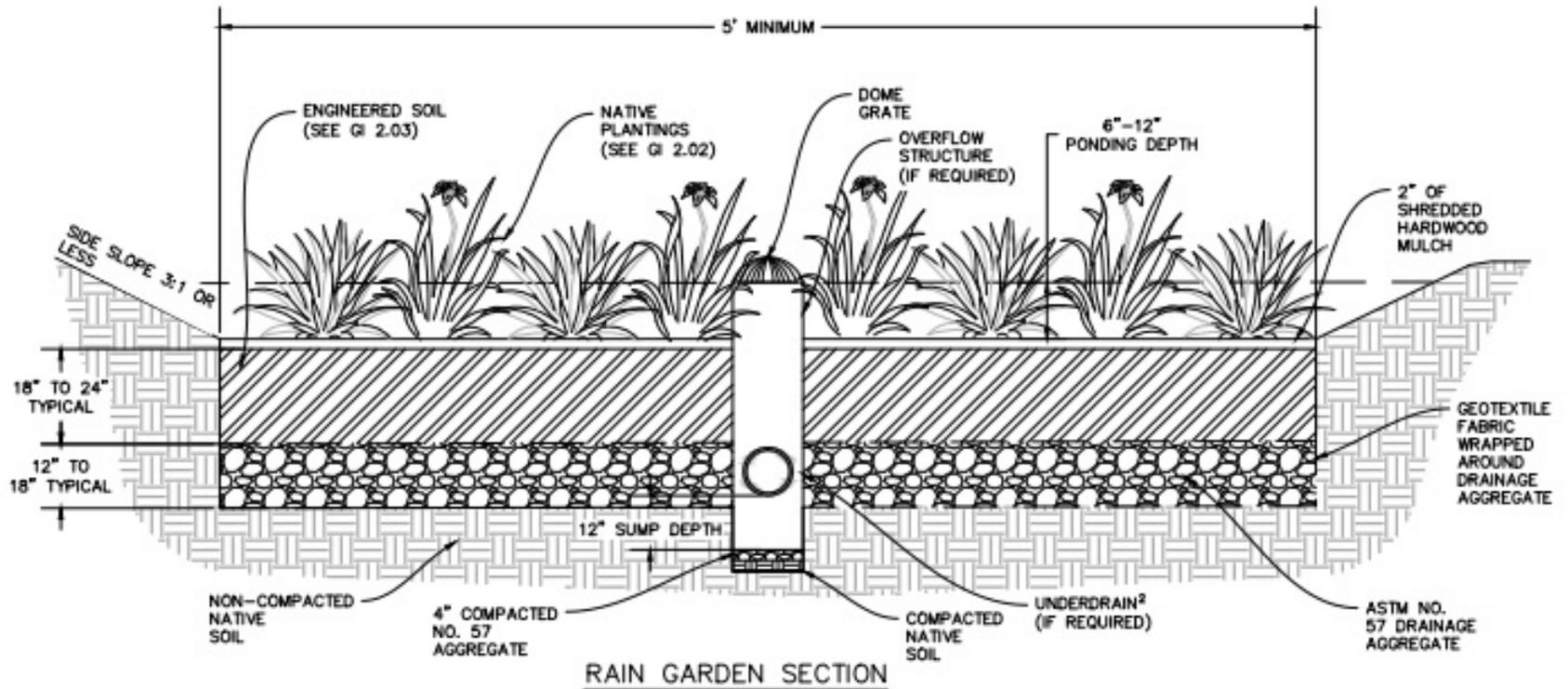
GUIDON   
SUSTAINABLE ARCHITECTURE • ENGINEERING DESIGN

<http://delta-institute.org/delta/wp-content/uploads/Green-Infrastructure-Designs-July-2015.pdf>

# Toolkit Features

1. Decision support trees, basic information on green infrastructure
2. Templates, plan sets, cross sections, and material specifications
3. Estimation tools for installation and maintenance costs

# For Engineers

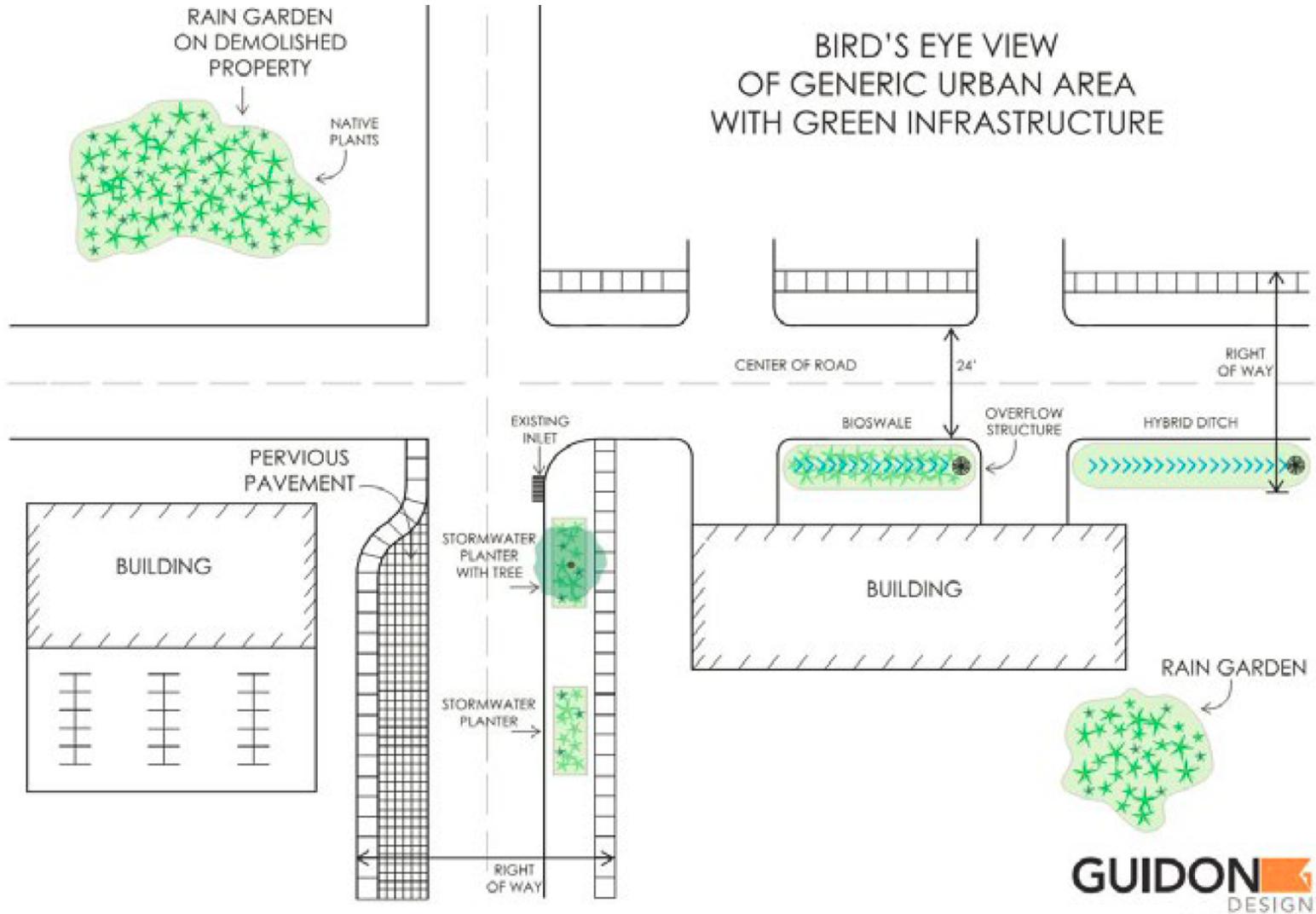


Cross Section from Rain Garden Section

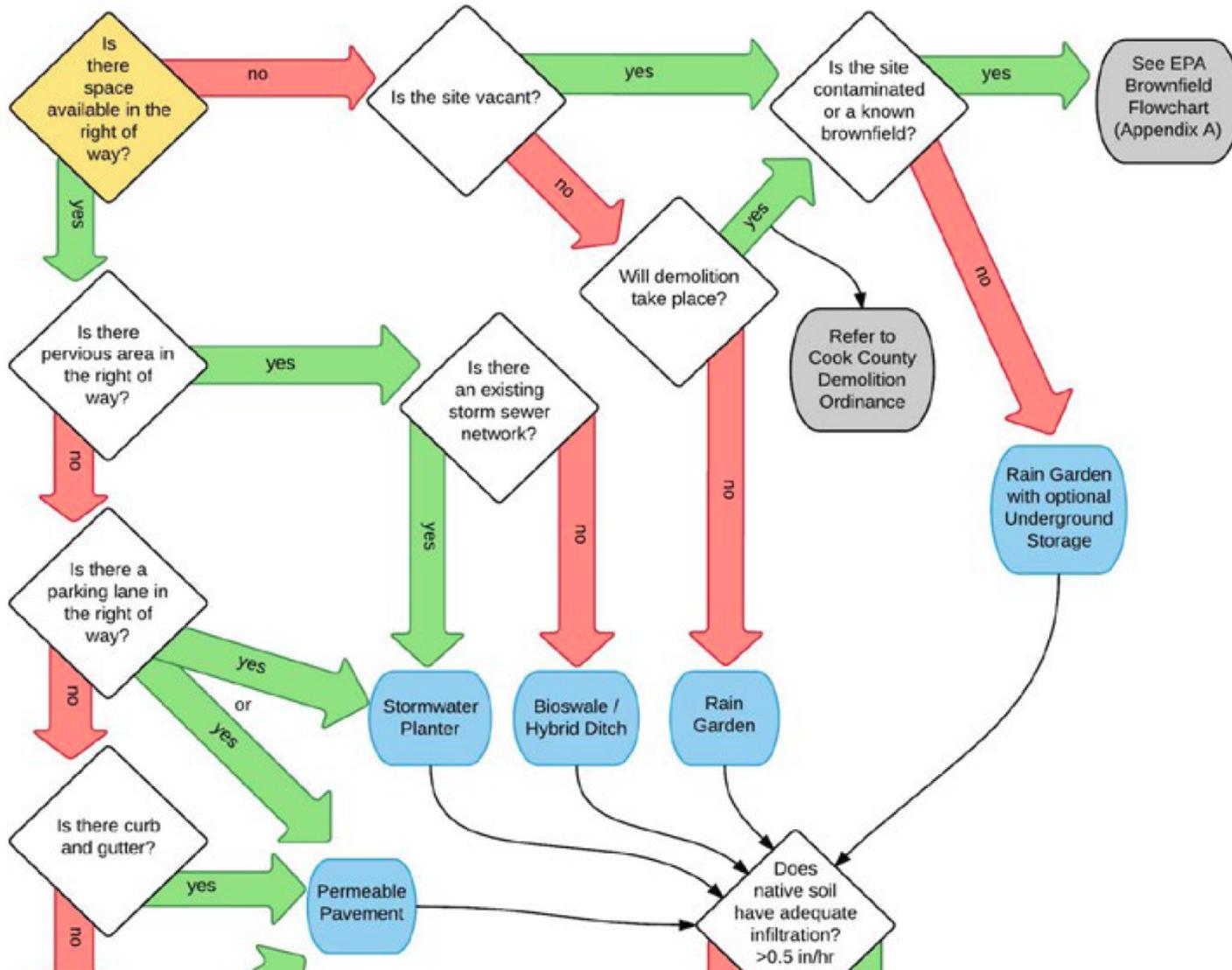
# For Municipal Managers

	Item	Description	Installed Cost <sup>1</sup>	Unit
<i>GI Technique</i>	<i>Permeable pavement</i>	<i>Pavers, stone layers (bedding, base, and subbase), geotextile and excavation</i>	<i>\$ 15.00</i>	<i>SF<sup>2</sup></i>
<i>Required component</i>	<i>Bedding layer</i>	<i>2" ASTM No. 8 Stone</i>	<i>\$ 45.00</i>	<i>TON</i>
	<i>Base layer</i>	<i>4" ASTM No. 57 Stone</i>	<i>\$ 30.00</i>	<i>TON</i>
	<i>Subbase layer<sup>3</sup></i>	<i>6" ASTM No. 2 Stone</i>	<i>\$ 35.00</i>	<i>TON</i>
	<i>Geotextile</i>	<i>Non-woven geotextile fabric</i>	<i>\$ 5.00</i>	<i>SY</i>
	<i>Curb</i>	<i>Containment curb</i>	<i>\$ 35.00</i>	<i>LF<sup>4</sup></i>
<i>Custom options</i>	<i>Underdrain</i>	<i>12" HDPE perforated storm pipe</i>	<i>\$ 32.00</i>	<i>LF</i>
	<i>Connect to existing storm structure</i>	<i>Core drill existing structure, connect overflow pipe</i>	<i>\$ 1,500</i>	<i>EA</i>

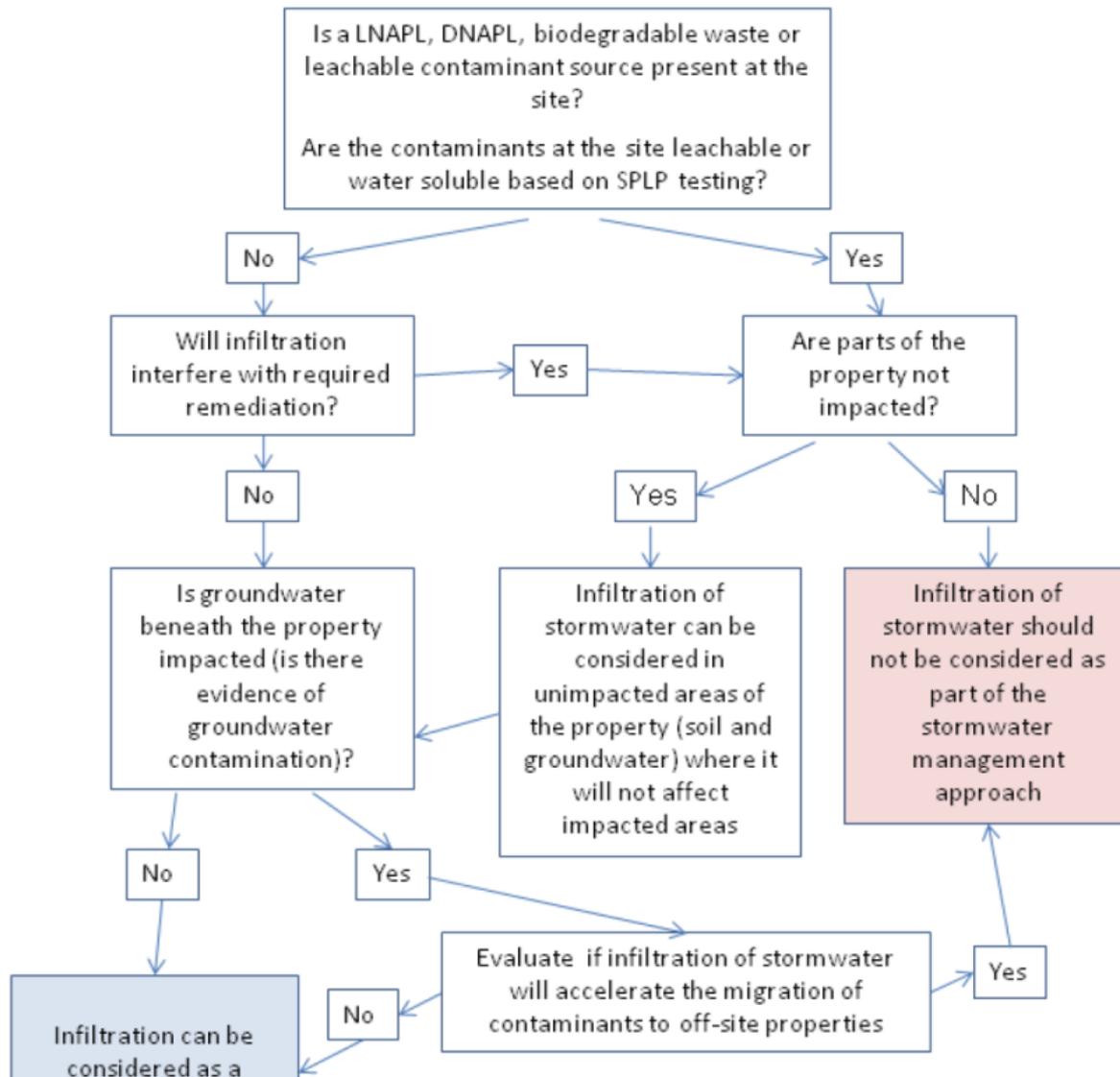
# For Planners



# Green Infrastructure Flow Chart



## Decision Flowchart for the Use of Stormwater Infiltration at Brownfield Sites



# Download The Toolkit & Open Source CAD Files

[www.bit.ly/greeninfrastructuretools](http://www.bit.ly/greeninfrastructuretools)

# NJIT – Decision Tool

## Green Storm Water Infrastructure Decision Tree for Brownfield Sites

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Web site: <http://www.ksutab.org>

*\* TAB acknowledges TAB Partner Eugene Goldfarb and Great Lakes Environmental Planning as contributor to these slides.*