



*LOW IMPACT DEVELOPMENT  
in the Texas Hill Country*

---

# WHAT IS LOW IMPACT DEVELOPMENT?

## Landscape Architecture 101

Integrated Site Design that Minimizes  
Resource Disturbance & Consumption

---

*LID in the Texas Hill Country*

**LID = SUSTAINABILITY**

**A. Environment/Ecosystem**

**B. Economics**

**C. Excellence (Quality of Life)**

**D. Education**

---

*LID in the Texas Hill Country*

# LID RESOURCE ELEMENTS

**A. Site/Ecosystem Function**

**B. Water**

**C. Energy**

**D. Materials**

**E. Education**

---

*LID in the Texas Hill Country*

## **SITE ECOSYSTEM**

**A. Geology**

**B. Soil**

**C. Topography/Slope Aspect**

**D. Water/Drainage**

**E. Vegetation**

**F. Wildlife**

**G. Air/Prevailing Winds**

---

*LID in the Texas Hill Country*

# **WATER**

- A. Surface Water/Groundwater**
- B. Water Quality & Recharge**
- C. Flooding**
- D. Rainwater Capture**
- E. Stormwater Management**
- F. Water Conservation**
- G. Irrigation**

# ENERGY

- A. Design – Shade, Natural Light, Winds
- B. Electricity – Air Cond. Timers, Motion Detectors
- C. Natural Gas - Heating
- D. Wind & Solar Power
- E. Media Technology
- F. LED Fixtures – Interior & Exterior
- G. Transportation/Mobility – Trails, HOV, Bicycle Facilities

# **MATERIALS**

- A. On Site – Mulch, Soil, Rock**
- B. Local – Within 30-60 Miles**
- C. Durable – Minimum Finishes & Maintenance**
- D. LOW VOC's**
- E. Minimal Waste**
- F. Repurpose Structures**
- G. Reflect Local Architectural Vernacular**
- H. Native Plants**



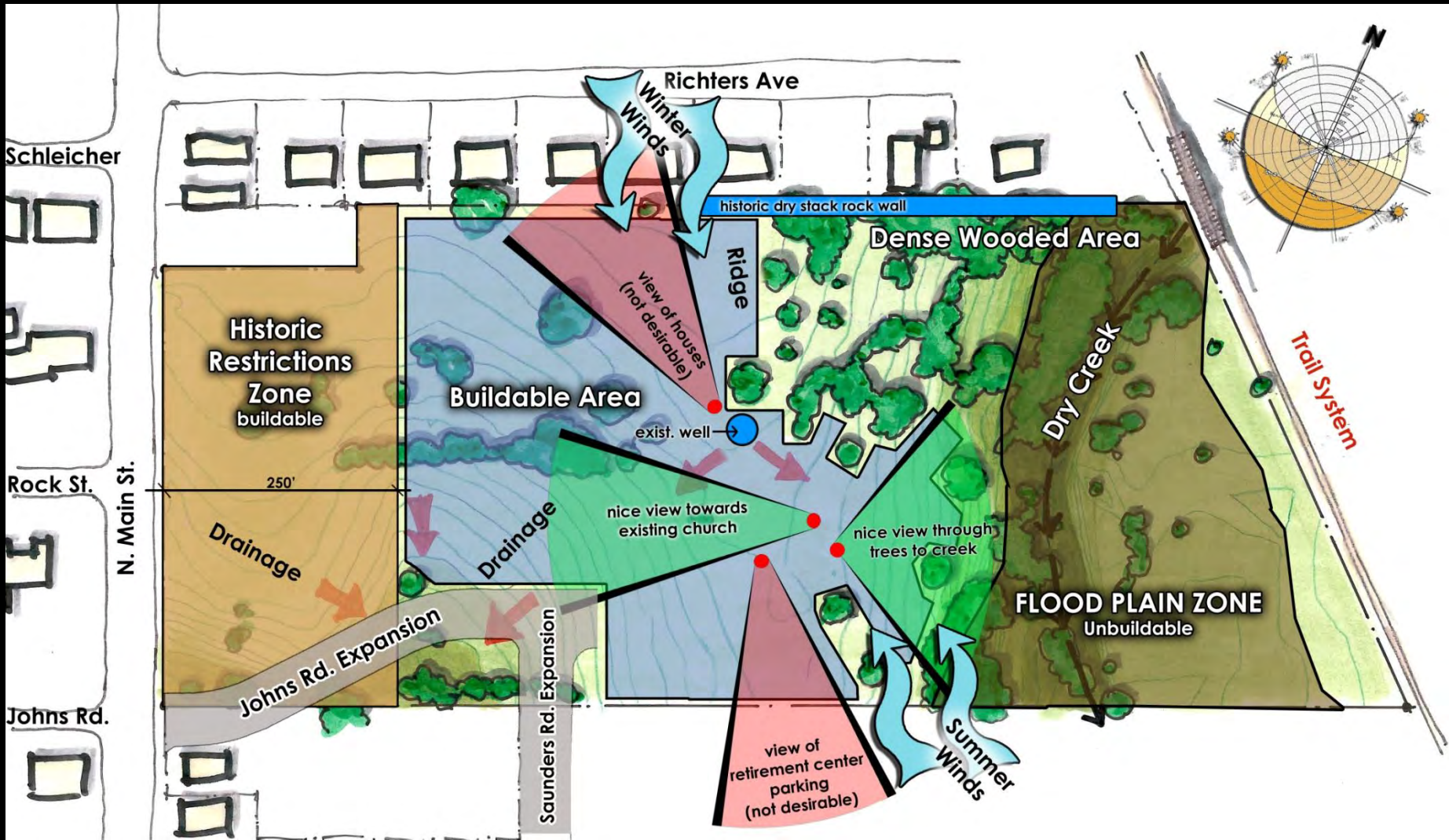
# EDUCATION

- A. Conservation
- B. Sustainability
- C. Resource Protection
- D. Cultural History



---

*Case Study - Patrick Heath Public Library*



# Site Analysis & Inventory

## *Case Study - Patrick Heath Public Library*

# SUSTAINABLE SITE STRATEGIES

- Native Habitat & Riparian Restoration
- Native Plants & High Performance Irrigation
- Rainwater Harvesting
- Stormwater Detention Basin & Bioswales
- Cultural Resource Awareness
- PHPL Heritage Plaza Interpretive Display
- Smokehouse & Grape Arbor
- Windmill & Water Tank
- Outdoor Classroom
- LED Lighting – Parking and Area Lighting

---

*Case Study - Patrick Heath Public Library*

## **LID STORMWATER GOALS**

- A. Reduce Non Point Source Pollution**
- B. Capture Rainwater where it falls**
- C. Shave Stormwater Peak & TSS volume**
- D. Reduce Flooding**
- E. Reduce Maintenance Costs**
- F. Enhance Groundwater Recharge**

---

*Case Study - Patrick Heath Public Library*



## Cultural & Natural Resource Images

### *Case Study - Patrick Heath Public Library*



Public Art



Shaded Courtyard



Trail Head



Rainwater Harvest



Dry stack stone wall



Water/Spring Features



Trailhead Restroom



Watershed



Bioswales/Recharge



Smokehouse



Dino Trax



Geology



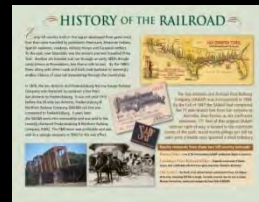
Retaining Wall



Amphitheater



Wayfinding Signage



Interpretive Signage



Pedestrian Bridge



Sculpture



Mosaic



Drinking Fountain



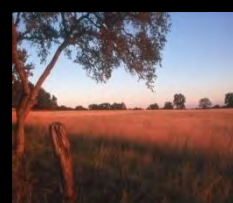
Windmill



Entry Monumentation



Bicycle Rack



Native Grasses



Stone Benches



Trail Linkage

# Thematic Landscape Amenity Images

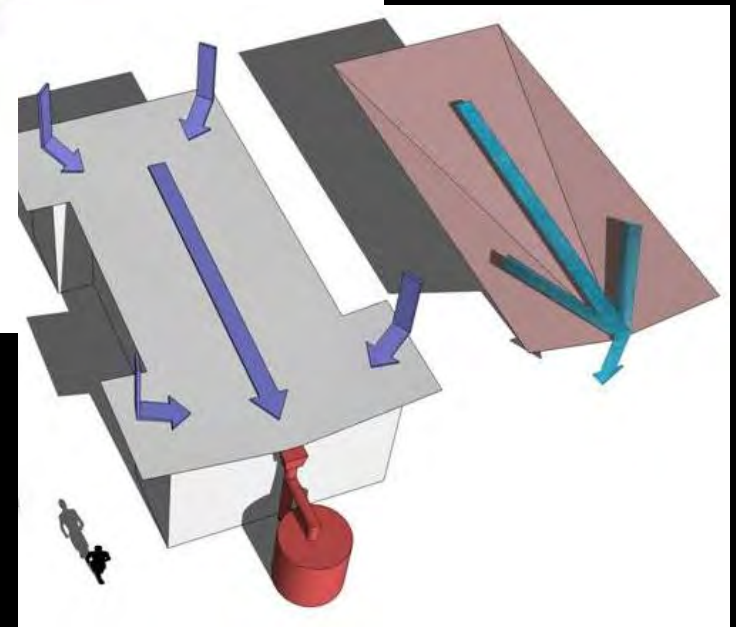
## *Case Study - Patrick Heath Public Library*



## Civic Campus Master Plan – Phase 1

### *Case Study - Patrick Heath Public Library*





## Water Harvesting

### *Case Study - Patrick Heath Public Library*





## Native Landscape Plants - Trees

### *Case Study - Patrick Heath Public Library*



Lindheimer Muhly



Zoysia



Buffalo Grass



Texas Sedge



Gulf Muhly



Bushy Bluestem



Seep Muhly



Feather Grass

## Native Landscape Plants – Grasses/Sedges

*Case Study - Patrick Heath Public Library*



## Native Landscape Plants - Shrubs

### *Case Study - Patrick Heath Public Library*

## **LID - TREATMENT TRAIN**

- A. Rainwater/Condensate Capture**
- B. Pervious Pavement**
- C. Grass Filter Strips**
- D. Bioswales**
- E. Stormwater Detention**
- F. Waterway Restoration**

---

*Case Study - Patrick Heath Public Library*

# PATRICK HEATH PUBLIC LIBRARY WATERSHED



## Case Study - Patrick Heath Public Library



---

*Case Study - Patrick Heath Public Library*





---

*Case Study - Patrick Heath Public Library*



---

*Case Study - Patrick Heath Public Library*



---

*Case Study - Patrick Heath Public Library*



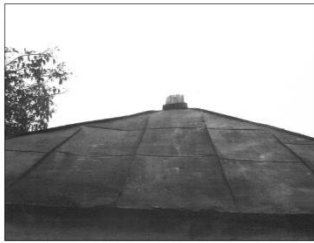
---

*Case Study - Patrick Heath Public Library*



---

*Case Study - Patrick Heath Public Library*



**11 SMOKEHOUSE ROOF PHOTO**  
PHOTO NOT TO SCALE



**8 SMOKEHOUSE WEST ELEVATION**  
PHOTO NOT TO SCALE



**5 SMOKEHOUSE DRYSTACK WALL**  
PHOTO NOT TO SCALE



**10 SMOKEHOUSE DOOR PHOTO**  
PHOTO NOT TO SCALE



**7 SMOKEHOUSE EAST ELEVATION**  
PHOTO NOT TO SCALE



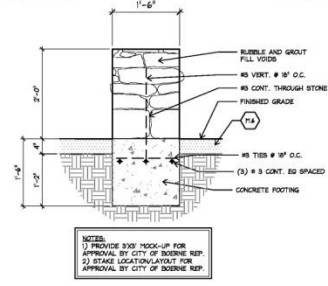
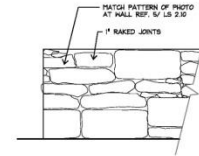
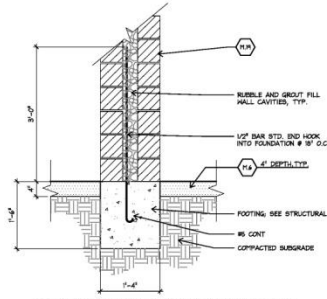
**4 SMOKEHOUSE DRYSTACK WALL**  
PHOTO NOT TO SCALE



**9 SMOKEHOUSE NORTH ELEVATION**  
PHOTO NOT TO SCALE



**6 SMOKEHOUSE SOUTH ELEVATION**  
PHOTO NOT TO SCALE



**NOTES:**  
1) PROVIDE 2X2 "HOOK-UP" FOR APPROVAL BY CITY OF BOERNE REP.  
2) STAGE LOCATION/LAYOUT FOR APPROVAL BY CITY OF BOERNE REP.

**PERFORMANCE SPECIFICATION**

**General Notes:**  
Contractor is responsible for moving the existing building stone and materials from the existing roof as a temporary access to landscape architect 24" x 24" size sample illustrating finish color, sheen and texture. Use existing used materials as template for determining replacement materials. Stone for projects will will be placed on the project site by the Owner. Call or email Paul Beardsley to request existing structure materials at (282) 448-3483, paul@beardsley.com. Color images of the structure are available for greater depiction of structure prior to assembly.

**Roofing:**  
Install a new flat seam metal panel, see specifications 07-4013 Plain Seam Metal Panels, use the existing roof as a temporary access to landscape architect 24" x 24" size sample illustrating finish color, sheen and texture. Roof framing and sill is constructed of cedar poles. Use copper plates for roof decking.

**Walls:**  
Reinforce the building shell consists of riveted steel, not fine grained sand. Porcelain joints to be same grade flush with stone face. Small pieces of insulate chinking are use structurally see photos. Use tapered corner stone for the exterior structure edges. Use existing stone (total for doorway).

**Clearance:**  
To be supplied by Owner, see landscape architect for installation.

**Foundation:**  
See structural plans for footing.

**Drystack Wall:**  
Foster to be use for securing wall stone, rubble and grout fill if necessary. Joints shall be raked for the appearance of a dry stack foundation wall.

**Foundation:**  
See detail sheet for wall footing.

**Stone:**  
The only portion of the surface of the stone that will be cleared of lichen, moss or other uncleaned material will be the surface where mortar will be applied. All exterior stone faces will remain as existing. Contractor to contact landscape architect to verify adequate stone quantity before construction.



Patrick Heath Public Library  
City of Boerne

443 N. Main, Building 100, Boerne, Texas, 78006

|                 |                  |
|-----------------|------------------|
| DATE:           | 13 DECEMBER 2009 |
| DESIGN BY:      | PJM, JB, BS      |
| CHECKED BY:     | FB               |
| PROJECT NUMBER: | 0811             |
| DATE:           |                  |
| SCALE:          |                  |
| DETAILS:        |                  |
| DATE:           |                  |

**LS 2.10**

# Smokehouse & Dry Stack Wall

## Case Study - Patrick Heath Public Library



---

*Case Study - Patrick Heath Public Library*



---

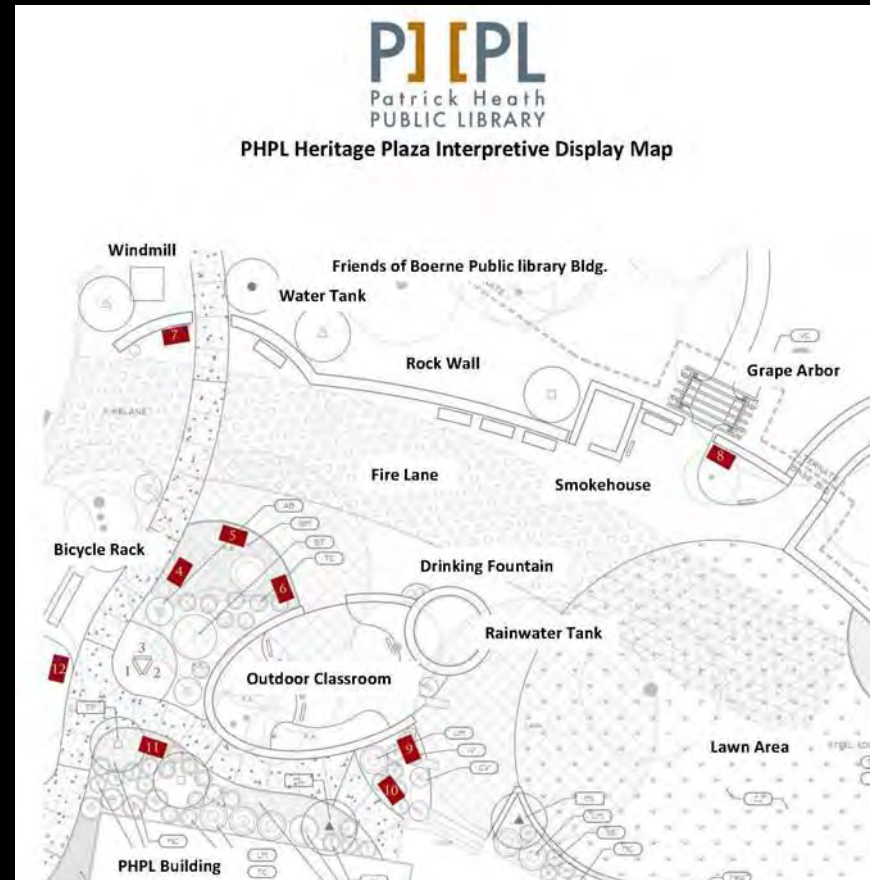
*Case Study - Patrick Heath Public Library*



# EDUCATION

## Kiosk & Interpretive Panels

1. Our Watershed
2. History of Boerne
3. History of Kendall County
4. Local Watersheds
5. The Water Cycle
6. Wildlife Habitat
7. Wells & Windmills
8. Civic Campus History
9. Caves and Sinkholes
10. Rainwater Harvest
11. Sustainable Practices
12. Local Groundwater



*Case Study - Patrick Heath Public Library*

# LID LESSONS LEARNED

- A. Allocate adequate time to fully understand the existing site's conditions and constraints so that all of the opportunities for optimizing the use of the site can be accurately identified.
- B. Ensure that construction methods avoid soil compaction in all future water storage and percolation areas.
- C. Diligently protect tree root zones, install and properly maintain all dripline fencing.
- D. Utilize as much on-site material as feasible.

---

*Case Study - Patrick Heath Public Library*



# WATER

Yours, Mine & Ours

A publication by the Cow Creek Groundwater Conservation District

*LID in the Texas Hill Country*

## INTRODUCTION

### *Conserve, Capture, Clean - A Powerfully Simple Solution - Continued*

Several immediate no cost and low cost solutions that decrease our water use are presented in detail in this manual. You will also find solutions that can move us from conserving a dwindling water supply, to generating more water through rainwater harvesting. Today we are fortunate to have modern technology which enables us to quickly install water saving devices and efficient rainwater harvesting systems. The combination of conservation and harvesting, along with ensuring the water we do have is clean, can be a centerpiece for community action; a clear call that reflects pride in our heritage, respect for ourselves and our neighbors, and a deep respect for the earth and its resources. No one person can solve our water crisis. Together we ensure a prosperous future.



Photos by Paul Barwick



### **Patrick Heath Public Library Stormwater Detention Basin & Bioswales**

Paul Barwick, ASLA, Hon. TSA

It is best to capture rainfall where it falls, keeping it on site and getting it into the ground as quickly as possible so flooding and erosion can be minimized and groundwater recharge maximized. To implement this strategy a series of depressed vegetated median islands and open space areas were designed to capture the first flush of stormwater pollutants from roadways and parking lots. This water is then conveyed to a stormwater detention basin, to hold and slowly release stormwater runoff. In addition, once the rainwater tanks are full the excess rainwater from the roof is directed to the basin and gradually released. Finally, a variety of permeable surfaces such as mulched plant beds, decomposed granite paving, concrete pavers with sand joints, and turf grass areas were installed to allow for greater water infiltration.



Photo by Janet Thome

## A NEW WATER CULTURE

### Patrick Heath Public Library

#### A Model for Sustainability

In 2008, the Boerne City Council, with support from citizens, had the desire, inspiration and foresight to look to the future for emerging sustainability practices and technologies.

The result was the Patrick Heath Public Library (PHPL) that opened June 4, 2011 and was awarded LEED (Leadership in Energy and Environmental Design) Gold certification by the United States Green Building Council. This is the first building on the Boerne City Campus located on North Main and Johns Road and first LEED Gold certified public building in Kendall County.

The 30,250 square foot, \$7.1 million library utilized a comprehensive program of design and sustainability strategies to produce energy-efficient results measurable in a 37% reduction in water use and 17.5% reduction in energy use. The building is sited in the trees to effectively shade and capture natural sunlight and prevailing winds. A variety of stormwater management strategies were utilized to maximize water capture, flood abatement and minimize runoff.

Energy and Water Conservation Strategies included interior and exterior LED lighting technology, rainwater catchment and air conditioning condensate collection (23,400 gal. storage capacity), exclusive installation of native and adaptive, drought resistant plants, low flow drip and tree bubbler irrigation and a high tech evapotranspiration-based irrigation controller.

Site Resource Conservation and Protection Strategies included cultural resource surveys, substantial removal of exotic and invasive plant and animal species, protection of native tree root zones, restoration of overgrazed areas with native grasses, silt prevention fencing, and other retention methods using hay bales.



Photo by Paul Barwick

*"The inspired goal for the PHPL was set by the City, its elected officials and citizens to produce a real world example of sustainability, of which, implementation of a variety of low impact development strategies for this important community asset was of primary importance."*

*- Paul Barwick, City of Boerne*

## Implementation of Best Management Practices

*Bioswales* are landscape elements designed to remove silt and pollution from surface runoff water. They consist of a swaled drainage course with gently sloped sides (less than six percent) and filled with vegetation, compost and/or riprap.



*Curb cuts* are approximately a foot (0.3 meters) in width, and can be utilized in parking areas or sidewalks to allow for a drainage path of water runoff to flow into an area where it may infiltrate such as grass or a garden.



Photos by Paul Barwick



*Stormwater outfalls* are the discharge point of a waste stream into a body of water.



Photo by Janet Thorne

## A NEW WATER CULTURE

### Implementation of Best Management Practices



A *filter strip* is an area of vegetation, generally narrow and long, that slows the rate of stormwater runoff. It allows sediments, organic matter, and other pollutants that are being carried by water to be removed by settling out. Filter strips reduces erosion and stream pollution and can be a best management practice.



A *stormwater detention basin* or retarding basin is an excavated area installed on, or adjacent to, tributaries of rivers, streams, lakes or bays to protect against flooding and, in some cases, downstream erosion by storing water for a limited period of a time.

Photos by Paul Barwick

#### Lessons Learned

In the course of building the Library, the city learned several important lessons:

- Allocate enough time to fully understand the existing site's conditions and constraints so that all of the opportunities for optimizing the use of the site can be accurately identified.
- Ensure that construction methods avoid soil compaction in all future water storage and percolation areas.
- Diligently protect tree root zones, install and properly maintain all dripline fencing.
- Utilize as much on-site material as feasible.

## Patrick Heath Public Library

### The Library As Classroom

The Patrick Heath Public Library was built not only to save water and energy, but also to heighten awareness of site and building design that facilitates life in the New Water Stewardship Culture.

The conservation practices implemented at the Library educate home and business owners about innovative energy and water conservation practices that they can adopt. The Library's integration of the natural and built environment along with the integration of historic and modern designs presents visitors young and old with an inspiring vision of a future that is more about reclaiming the simplicity of the past than implementing complex solutions in the future.

Natural and Cultural Resource Outreach Strategies include:

- 🌿 Installation of donated vintage 40' windmill and water tank display.
- 🌿 Relocated and repurposed 1870's limestone smokehouse.
- 🌿 A grape arbor.
- 🌿 An outdoor classroom for nearby schools.
- 🌿 Interior and exterior interpretive elements that promote watershed and water resource awareness.
- 🌿 Sustainable building practices.
- 🌿 Wildlife habitat protection.
- 🌿 Awareness of geologic features.
- 🌿 Hosting of culturally significant events and resources.



Photo by Paul Barwick

### What is LEED?

Leadership in Energy and Environmental Design (LEED) comprises a suite of rating systems for the design, construction and operation of high performance green buildings, homes and neighborhoods.

Developed by the U.S. Green Building Council, LEED is intended to provide building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.



Photo by Circle Thomas Hines



# LOCAL LID RESOURCES

San Marcos – Green Infrastructure –LID Practices

San Antonio River Basin LID Technical Guidance Manual

Cow Creek GCD Water Users Manual

San Antonio Watershed Stewardship for the Edwards Aquifer  
Region – LID Handbook

New Braunfels Low Impact Water Quality Program

Land/Water Sustainability Forum LID Design, Cost & Performance  
Case Studies

---

*LID in the Texas Hill Country*

“In the end, our society will be defined not only by what we create, but by what we refuse to destroy.”

- John C. Sawhill



---

*LID in the Texas Hill Country*