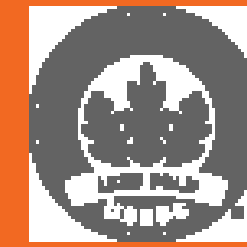


# OUR ENERGY SAVINGS

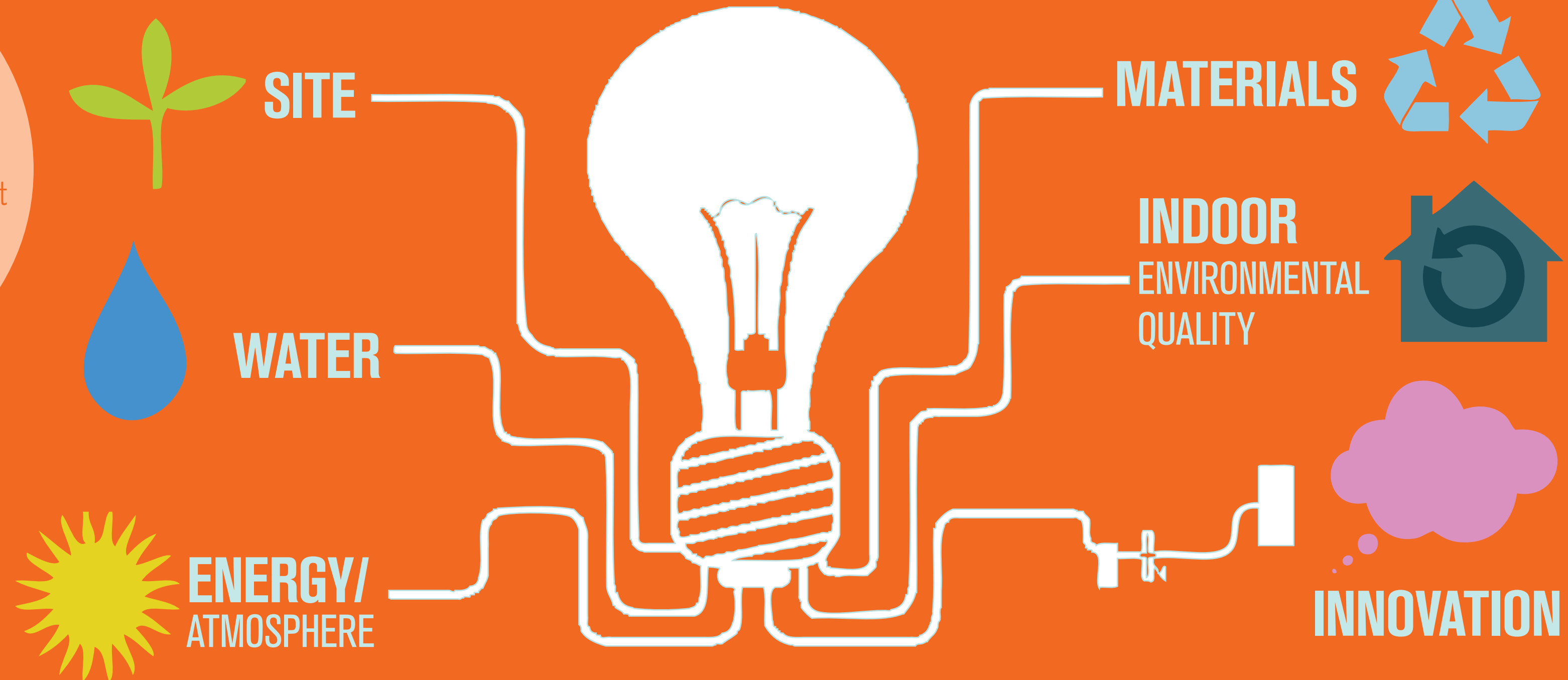
FOR THE FUTURE AT THE SAM GARY BRANCH LIBRARY



The LEED® (Leadership in Energy and Environmental Design) Green Building Rating System is the nationally accepted benchmark for the design, construction, and operation of high performance green buildings. The Sam Gary Branch Library is certified LEED Gold.

**SIX** The library was designed to achieve certification through a holistic rating system which scores the building in six areas:  
**AREAS**

Designing a building that helped preserve the environment for future generations was an important goal at the **Sam Gary Branch Library**



Energy conservation was a primary focus when considering strategies for the library.

**STAY PUT**  
Got 12 minutes?  
Learn more about energy saving features on the following slides...

Key team members who worked on the project:

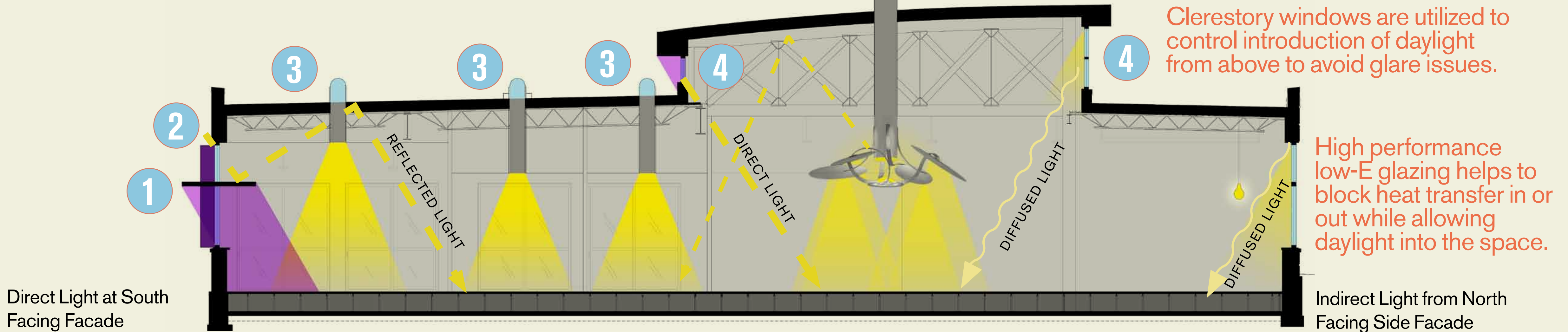


# DAYLIGHTING & CONTROLS

Using natural light from the sun instead of electric lighting fixtures is a strategy called *daylighting*.

Lighting fixtures in the library are programmed to dim as the amount of natural light increases. Sensor controls turn off lighting when spaces are unoccupied.

“Sundolier” daylight harvester tracks the path of the sun and focuses light rays to reflectors to ensure consistent natural light penetrates deep into spaces throughout the day.



Clerestory windows are utilized to control introduction of daylight from above to avoid glare issues.

High performance low-E glazing helps to block heat transfer in or out while allowing daylight into the space.

Direct Light at South Facing Facade

Indirect Light from North Facing Side Facade

## LIGHT SHELVES

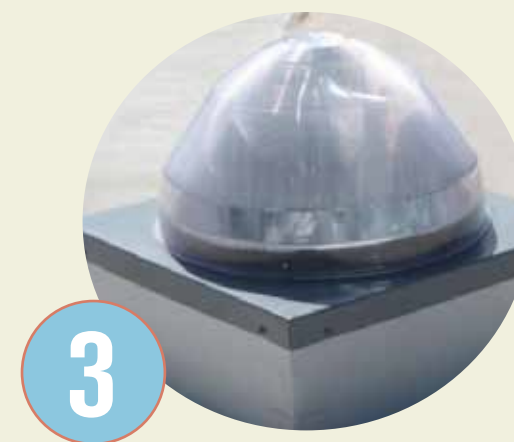
and overhangs on the south and west sides of the Library bounce natural sunlight deep into the interior and block glare from direct sunlight that is hard on the eyes.

## VERTICAL FINS

on west facing windows provide passive sun control by blocking the lower west sun in the summer to keep the inside of the library cool.

## SOLATUBES

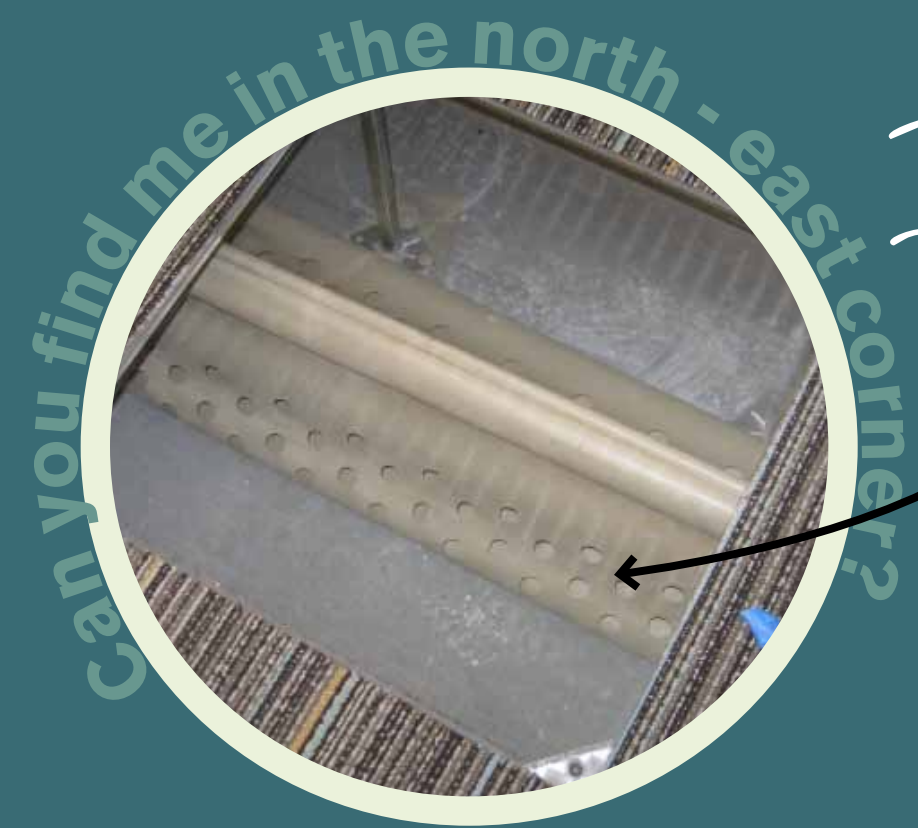
on the roof use collectors to concentrate natural daylight and flood the interior through highly reflective tubes, limiting the need for electric lighting. They are so bright they are often mistaken for light fixtures.



# UNDERFLOOR AIR DISTRIBUTION



**BELOW YOUR FEET** is an underfloor air distribution system commonly abbreviated **UFAD.**



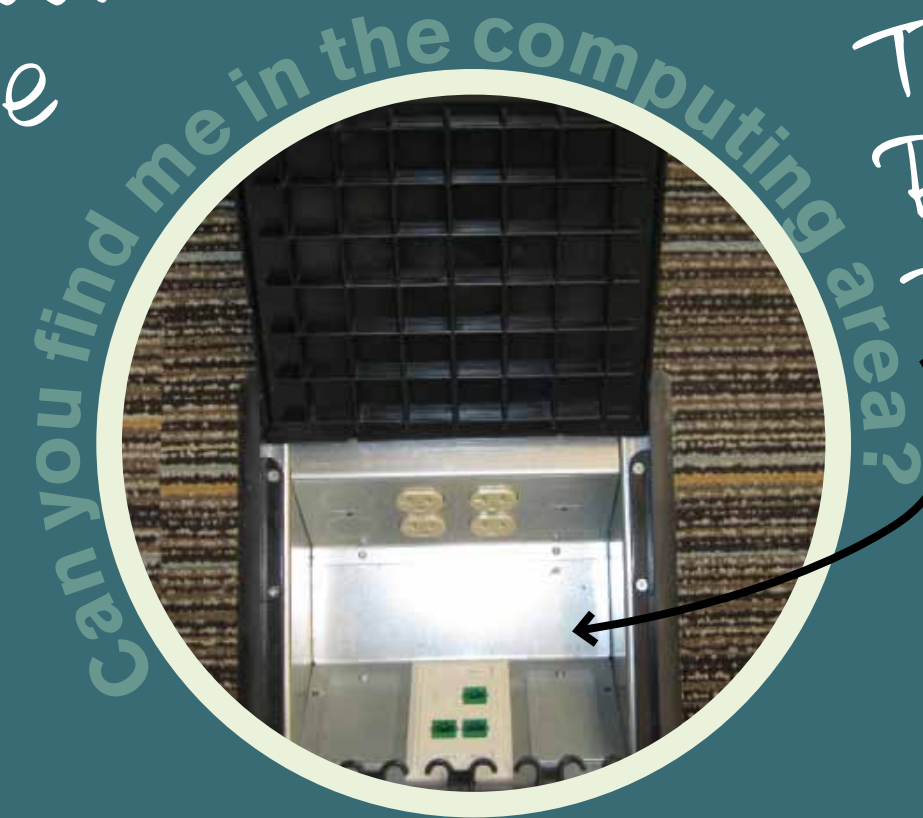
## DUCT SOCKS

are fabric ducts that help distribute air to the far corners of the room. UFAD systems are more energy efficient because they can use slower air speeds and don't need to heat and cool the air as much since the air is delivered through in floor diffusers at the level of the occupants.



## INDIVIDUAL COMFORT CONTROL

UFAD systems allow users more individual control over the temperature in the immediate area through adjustable diffusers that twist to produce more or less air (Just like in an airplane). The library has several types of floor diffusers: fixed, manually adjustable, and automatically adjustable



## GREATER FLEXIBILITY

Raised floor tiles can be moved so power outlets, diffusers, and other controls can be easily moved to different locations in the floor. This allows greater flexibility in space use and arrangement of furnishings.

Heated and cooled air flows through the space under the floor and out the floor diffusers.

Typical air delivered overhead needs greater air speed and is often overheated or cooled to compensate for the mixing that occurs on the way down to occupant level.

# **BUILDING ENVELOPE** IS THE FIRST LINE OF DEFENSE IN KEEPING THE BUILDING COMFORTABLE.

Because walls and roofs are passive systems they require no energy to perform, unlike active mechanical systems that need natural gas or electricity to function.



## **HIGH PERFORMANCE GLAZING**

with a low-E coating to keep heat outside in the summer and heat inside in the winter.



*Saves energy, saves money.*



## **WALL & ROOF INSULATION**

prevent thermal transfer through the envelope.



*In addition to the typical batt insulation placed between the framing, the walls also have an exterior layer of spray foam which insulates and air seals the structure.*



## **MASONRY THERMAL MASS**

Heat travels slower through thermal mass keeping the temperature constant inside.



*Thermal mass can be a benefit in the winter as it continues to radiate stored heat after the sun goes down.*



# Sam Gary Branch Library Case Study

Denver, CO

## Community

The library is sited just north of the Stapleton Community Town Center at the corner of 29<sup>th</sup> Drive and Roslyn Street. The 28,500 sqft, single story building will provide for the needs of the community, including children, teens, adults and families. This library is unique to the Denver Public Library system in that it is a "hybrid" library style, merging the Family and Contemporary Service library styles, and it is one of the few library's designed to meet Denver's Green Print program requirements.

## Water Conservation

Colorado frequently experiences drought conditions so water conservation is important to maintain the water supply for all. The low flow plumbing fixtures in this restroom cut the water use to 30% of a typical building. Regional, drought tolerant landscaping saves additional water and requires little maintenance.

## Healthy Indoor Air Quality

The health of occupants was an important consideration when selecting materials for the library. Low VOC paints, sealants and adhesives create healthy indoor spaces by not off-gassing into the surrounding air. Green Label Plus certified carpet and FloorScore flooring contains no harmful chemical air pollutants. Carpet with lower VOC's are an allergy and asthma friendly flooring option. Walk-off mats at entrances help prevent particulates from being tracked into the building. Additional features that contribute to good indoor air quality are related to the management of the facility. Carbon dioxide monitors are tied to the ventilation system to increase the amount of outside air provided when needed. Green housekeeping practices use safe, non-toxic cleaning agents and environmentally-friendly maintenance procedures for a healthier indoor environment. The underfloor air distribution system has moisture sensors under the floor to help detect potential problems before water can cause damage or mold. The library is also a non-smoking facility.

## How do the library plumbing fixtures achieve 30% water savings?

The following water-saving plumbing fixtures have been installed in the library:

- Sloan Toilets, 1.28 gpf
- Sloan ADA Urinal, 0.125 gpf
- Sloan Bath Faucets, 0.5 gpm
- Chicago Faucets, 1.0 gpm



## Daylighting Strategies:

Tubular skylights concentrate sunlight, illuminating rooms with natural light, eliminating the need for conventional lights.



Light shelves help bounce sunlight deep within the building and dimmable light fixtures automatically adjust based on the amount of daylight available.



Clerestory windows maximize daylight availability and cut down on the need for additional electric lighting



Metal vertical fins on the building exterior block the heat and glare from the west sun.



## Energy Conservation

Passive systems were used at the library to reduce the load before introducing mechanical heating, cooling and lighting systems. The building envelope system utilizes spray foam, fiberglass batt insulation and high performance low-E windows. The combination minimizes heat transfer through the wall, maximizing energy efficiency and reducing mechanical loads. The Light-colored concrete sidewalks, plaza and roof, in conjunction with shade trees, help to reduce the Heat Island Effect, which can raise the temperature in urban areas by as much as 10 degrees. These reflective surfaces also reduce the cooling load of the building.

The primary heating and cooling system for the library utilizes an underfloor air delivery system, commonly abbreviated UFAD. A fan coil unit provides supplemental heat at the perimeter where heat is lost through the windows. UFAD systems deliver air closer to the occupants of the room. The main area of the library uses adjustable diffusers so visitors can adjust the amount of air near them to make it warmer or cooler. Small rooms designed to accommodate groups have diffusers in the space with thermostats that regulate the temperature in response to heat generated in the room. Underfloor air systems allow more flexibility in the layout of furniture and systems. Floor tiles with power and network connections can be rearranged as the needs of the space change. Duct sox are fabric ducts under the floor that distribute air to the far corners of the room. They inflate when filled with air and deflate when not in use.



Lighting in the library is tied to occupancy and daylight sensors to turn off lighting when it is not needed. Natural light is shown to boost productivity, and the reduction in electric lighting saves energy. Many daylighting strategies were used throughout the building. As special art exhibit highlights the power of the sun with a daylight harvester that is installed on the roof. It tracks the sun and focuses light on a reflector hanging from the ceiling. A building automation system also cuts energy use by turning off equipment and lights when not in use. ENERGY STAR equipment is installed in the library to further cut energy use.



## Environmental Materials

Sustainable interior materials include rubber flooring consisting of granules of rubber and a natural, rapidly-renewable material - cork. The bark of the Cork Oak tree can be harvested every nine years and then grows back so it can be harvested again. This flooring is also FloorScore certified as a low-emitting product. The carpet contains recycled content and is also Green Label Plus certified. The exterior of the library is constructed out of locally-produced brick and block which helps supports the local economy and cuts carbon emissions by eliminating long-distance transportation. The gypsum board used to clad the walls is both regionally produced and has high recycled content, utilizing a by-product of the coal industry (fly ash). Other products that contain recycled content are the gypsum ceiling tiles, insulation, doors, and many of the glass terrazzo countertops installed in the building.

A recycling program has been implemented for staff and visitors that includes receptacles for paper, glass, metal, plastic and cardboard. During construction, construction crews recycled 95% of the construction waste generated on-site. Materials were sorted into recycling dumpsters for each type of waste generated and taken to recycling centers.



## Sustainable Site Features



Despite the constraints of the site and the urban nature of the development, the community showed strong interest in having an exterior gathering place to meet and enjoy the library in conjunction with the outdoors. An exterior landscaped plaza was placed adjacent to the main entrance and provided with seating areas. The active

Stapleton community will likely arrive with strollers and bikes so bike racks are also provided in the plaza area and strollers can be placed in the large entry lobby. Biking and walking not only reduces carbon emissions but encourages healthy lifestyles. All public areas of the library have views of the outdoors, with views of the mountains out of the west facing windows. The Stapleton Community is sensitive to the surrounding environment. The exterior site lighting uses full cut-off lighting fixtures which prevent light pollution, directing light down where it is needed, instead of up at the sky.



## About LEED and USGBC

LEED® is an internationally recognized green building certification system, providing third-party verification that a building or community was designed and built using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO<sub>2</sub> emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

The U.S. Green Building Council® is committed to a prosperous and sustainable future for our nation through cost-efficient and energy-saving green buildings. With a community comprising 78 local affiliates, more than 20,000 member companies and organizations, and more than 140,000 LEED® Professionals™, USGBC® is the driving force of an industry that is projected to contribute \$554 billion to the U.S. gross domestic product from 2009- 2013. USGBC leads an unlikely diverse constituency of builders and environmentalists, corporations and nonprofit organizations, elected officials and concerned citizens, and teachers and students. USGBC is the developer of the LEED green building certification program and the convener of the Greenbuild® International Conference & Expo.