



# Our Mission Statement

In order to learn more about how Wal-Mart, and the entire industry, can improve in the area of environmental sustainability, this store will experiment with materials, technology and processes which will reduce the amounts of energy and natural resources required to operate and maintain the store, reduce the amount of raw materials needed to construct the facility and substitute, when appropriate, the amount of renewable materials used to construct and maintain the facility.

McKinney, Texas Environmental Store



**WAL★MART**  
Wal-Mart Experimental Store

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# Bioswale

In order to slow the water that runs off from our parking area, Wal-Mart has created a richly planted channel called a bioswale. The shrubs, grasses and rocks help trap pollutants and cleanse the water before it goes into the wetland pond. It is actually the root systems of the plants that do the cleaning work, in a process called phytoremediation. Absorbing contaminants can occur directly through the roots themselves or by free-living organisms in the root-soil interface zone, about one millimeter in width, surrounding the living root hairs. Both the roots and these organisms act as a biological filter. Phytoremediation works well in our heavy clay soils, where we have low permeability.

Bioswales also help to reduce off-site runoff by slowing down the water enough to permit infiltration into the ground. This infiltration replenishes our groundwater sources. A bioswale can be any width and generally uses a variety of plants specifically selected for their ability to absorb pollutants and trap sediment. The plants also create a habitat for insects and birds and help cool the site more effectively than a similar area planted only with turf grass.

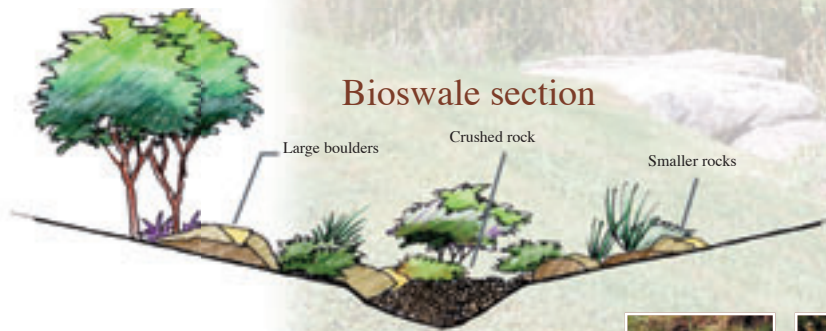
## Benefits

Cleans runoff from parking areas with vegetation.

Allows infiltration to reduce off-site runoff.

Reduces the need for costly stormwater piping systems.

Reducing the “Urban Heat Island” effect by increasing vegetation on the site.



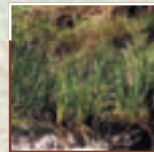
Bioswale section

Large boulders

Crushed rock

Smaller rocks

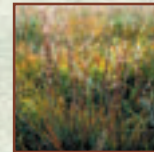
## A look at the plants used



Spikerush  
*Eleocharis palustris*



Bullrush  
*Scirpus sp.*



Copper Canyon  
Daisy  
*Tagetes lemmonii*



Switchgrass  
*Panicum virgatum*



Mexican Bush  
Sage  
*Salvia leucantha*



Little Bluestem  
*Schizachyrium scoparium*

# Heat Island Effect

Have you ever noticed that it feels hotter in the city than in the country? It actually is! Summer in the city is typically 6 to 8 degrees warmer than in rural areas. Scientists refer to this as the “Urban Heat Island Effect.” Wal-Mart is experimenting with products and systems designed to reduce the heat island effect.

The heat island effect manifests in temperature changes, in altered weather patterns, and in increased evaporation from various water sources. All of the buildings and pavements, especially in our very dense downtown cores, reflect and give off heat. This build-up of heat causes more violent thunderstorms, which can result in flooding and increased stormwater runoff. This effect also encourages us to use more energy for air conditioning, which in turn creates more air pollution.

On this site, we also lose moisture from our two ponds due to evaporation. On hot summer days, two factors come into play. Radiation from sunlight increases the amount of evaporation. Warm winds bring in heat energy and remove the vaporized moisture into the atmosphere. But at the same time, trees, shrubs and all of the green things on this site cool the air by transpiration, a process in which plants take in water from the ground and release it through their leaves. This return of water to the atmosphere is called “evapotranspiration.” Here in North Texas, the evapotranspiration rate is 15 to 25 inches per year, which is 50 to 60 percent of our total rainfall.

Wal-Mart’s experiments include a white “cool” roof that reflects the sunlight, allowing a savings in energy cost per year by reducing heat gain inside. Large trees have been transplanted into the parking lot to shade the surface. Shading is another way to combat the heat island effect because paved areas do not absorb energy in the form of sunlight when shaded. In addition, several types of shade structures are being tested to see how much benefit they can have in cooling the cars and the parking surface.

## Benefits

Large transplant trees provide shade in the parking area.

White roofs help reflect heat and lower energy usage.

Shade structures can help cool down cars and the parking surface.

## Heat island effect solutions



Large tree transplants



Green space



Shade arbor



Cool roof



Light colored pavement

# Pervious Pavement

Parking lots and sidewalks are considered impervious surfaces because they stop rain from infiltrating into the ground. Pervious pavement is designed to allow infiltration to occur right through the paving surface, so rain filters into the ground more like it would in a natural area. Wal-Mart is testing pervious pavement to see if it would be effective for the entire parking lot at future stores.

When impervious surfaces stop rain from infiltrating into the ground, they cause the water to run off to nearby areas. It goes into storm pipes, which eventually lead to creeks and streams. The more impervious surfaces an area has, the more water runs off instead of infiltrating. As more urban development occurs, the natural balance between runoff and infiltration is altered. Flooding increases because water is staying on the surface instead of having a place to sink deep into the soil.

The difference between pervious and impervious pavement is the openness of its structure. Pervious pavement is constructed on two "foundations": a layer of larger-sized gravel and a granular base. The large size of the gravel means that there are spaces between the pieces that allow water to pass through and absorb directly into the subsoil. It reduces or eliminates stormwater runoff in the area. When there's a smaller rainfall, the spaces "hold" the water temporarily. In larger rains, the water passes through and into the granular base where it can be absorbed through infiltration into the ground below. This type of system has proven to be one of the most effective ways to treat stormwater. A side benefit: the spaces between the gravel transfer cool temperatures from the earth upward, cooling the surface of the parking lot.

## Benefits

Allows infiltration of runoff into the soil below.

Reduce or eliminate the need for pipes, catch basins and other stormwater systems.

Allows cooler earth temperatures to cool the parking lot's surface.

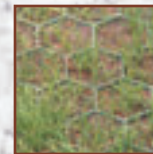
## Pervious pavement examples



Porous concrete



Porous asphalt



Open cell modular system



Open graded aggregate



Crushed shell



Open joint pavers

# Experimental Urban Forest

As our cities grow and expand, more and more areas which were once covered in forest are now covered with roads, parking lots and buildings. Having less forested land causes problems in our cities, such as increases in temperature, more reflected heat and greater air pollution. Every tree we preserve and every new one we plant within our cities increases the benefits from our "urban forest." Wal-Mart is experimenting with better ways to grow trees that will perform better in the urban environment.

In the urban environment, trees have many valuable functions. The leaves of trees absorb carbon dioxide from automobiles, a major component of air pollution in cities. Gasses are taken up into the leaves and absorbed into spaces in the cellular tissue. Trees cool the air and return oxygen to the atmosphere. The net cooling effect of a healthy tree is equivalent to ten room-size air conditioners operating 20 hours a day.

Another way trees improve air quality is by reducing the temperature, since the emission of many pollutants is temperature-dependent. Trees can also reduce urban energy use by shading buildings during the summer. In winter, the proper placement of trees can create a windbreak for nearby buildings.

Urban area soils are generally more compact and have fewer nutrients than are found in a true forest area. This particular site has heavy clay soils, which do not allow a lot of water or air to get to the plant roots. Adding compost to the heavy clay soil increases the pore spaces, allowing air and water to move throughout the root zones. Compost looks like good potting soil and is rich in nutrients. It is created when natural materials like leaves, grass and food decompose. Compost is a great alternative to chemical fertilizers. The goal of this experiment is to learn what types of trees will grow under these stressful conditions and how they will respond to the alteration of the soils.

## Benefits

Provide shade, absorb carbon dioxide and give oxygen back to the atmosphere.

Reduce the ambient air temperature.

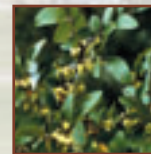
Reduce topsoil erosion.

Reduce the amount of urban water runoff.

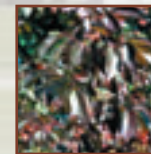
## Urban forest trees



Mexican Sycamore  
*Platanus occidentalis*



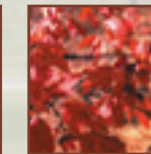
Cedar Elm  
*Ulmus crassifolia*



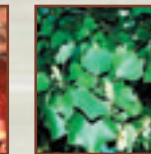
Texas Ash  
*Fraxinus texensis*



Mesquite  
*Prosopis pubescens*



Shantung Maple  
*Acer truncatum*



Tulip Tree  
*Liriodendron tulipifera*

# Water Conservation

## Water Conservation

Wal-Mart created this rainwater harvesting and treatment system to help conserve water. It is anticipated that the system will provide 95 percent of the water needed for irrigation on the site. It will also reduce demand on local stormwater systems by containing a portion of the site's runoff on-site.

The system contains the following components (see the sketch to the right):

### Rainwater Collection

**Building roof:** All of the rainwater that falls on the building roof is conveyed via a series of pipes into the large rainwater harvesting pond.

### Parking Lot

Runoff from approximately two acres of the parking lot runs through the bioswale, which filters the water and conveys it to the wetland pond.

### Stormwater Cleansing

**Wetland:** The primary function of the wetland is to treat the stormwater through physical, biological and chemical processes. The wetland will capture and/or treat many of the pollutants in the runoff including sediment, trace metals, hydrocarbons and nutrients such as nitrogen and phosphorous. This cleansing process protects the quality of water downstream. Specific plants Wal-Mart has installed in the wetland will perform phytoremediation, which is the process by which plants clean up water.

### Rainwater Retention

**Rainwater harvesting pond:** A permanent pool of water is retained in this pond. Its primary use is for site irrigation. One means of maintaining the quality of this pond's water is a sub-surface aeration system that releases small bubbles of air into the water, creating a small current. This brings water from the bottom of the pond to the top and reduces the chance of sludge build-up on the bottom of the pond or algae blooms on the surface. On the left side of the pond, photovoltaic cells have been installed to power this system.

### Water Circulation

**Windmill:** The windmill circulates water from the rainwater harvesting pond through the wetland. This allows it to be cleaned by the plant material. Water flowing through a large galvanized pan at the base of the windmill is coming from the rainwater harvesting pond into the wetland.

In addition to providing water quality and conservation benefits, the pond system also reduces localized flooding and provides wildlife habitat. It attracts a variety of birds and serves as a habitat for frogs, insects and other wildlife. This rainwater harvesting and treatment system is a demonstration of our commitment to respect the environmental right and interests of our neighbors and the communities in which our stores and clubs are located.



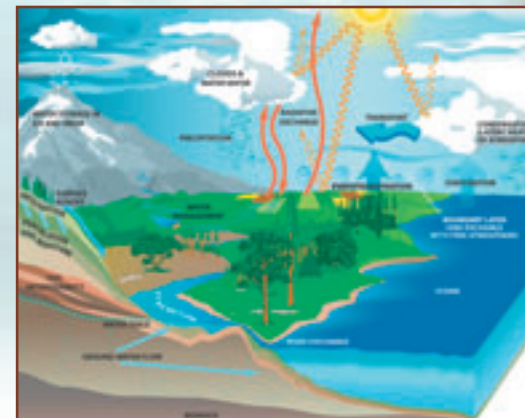
## Benefits

Captures water from the roof and a portion of the parking lot for irrigation use.

Circulation from one pond to another aids in cleaning the water.

Reduces demand on city water sources.

## The water cycle



# Wildflower Meadow

For the larger open areas on this site, Wal-Mart has chosen to create wildflower meadows. Wildflowers were selected because they need no irrigation after establishment, and because they provide a diversity of color and interest throughout much of the year. The mix selected contains flower species which reseed themselves year after year, along with grasses native to North Central Texas. Restoring this area as a native wildflower field saves water, reduces air-borne emissions from mowers and avoids the use of chemical fertilizers.

As we learn more about the natural processes of the land, the value of landscaping becomes clearer. One of the leading organizations in Texas for native plant education is the Lady Bird Johnson Wildflower Research Center in Austin ([www.wildflower.org](http://www.wildflower.org)). Their mission is “to educate people about the environmental necessity, economic value and natural beauty of native plants.” Another place to learn about the benefits of native plants and wildflowers is the Native Plant Society of Texas ([www.npsot.org](http://www.npsot.org)).

## Benefits

Reduces or eliminates the need for mowing and irrigation.

Reduces the use of fertilizers and lessens air-borne emissions from maintenance equipment.

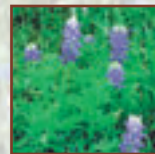
Provides seasonal color and interest.

Meets one of the primary missions of Lady Bird Johnson, founder of the Lady Bird Johnson Wildflower Research Center.

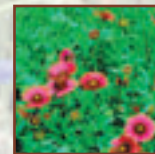
## Wildflower meadow plants



Mexican Hat  
*Ratibida columnifera*



Bluebonnet  
*Lupinus texensis*



Gaillardia  
*Gaillardia artista*



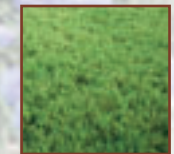
Plains Coreopsis  
*Coreopsis tinctoria*



Side Oats Grama  
*Bouteloua Curtipendula*



Blue Grama  
*Bouteloua Grailis*



Plains Buffalo Grass  
*Buchloe Dactyloides "Plains"*

# Wind Turbine

To supplement the energy this store needs to operate, Wal-Mart has installed a 50-kilowatt wind turbine. The energy it produces will reduce the electricity consumption of this Supercenter by approximately 5 percent—enough energy to power 10 average size homes!

The Bergey XL 50, from Bergey Windpower Company, is the newest and most advanced small wind turbine on the market and Wal-Mart is the first company to install them for commercial use. The XL 50 has been designed for low average wind speed areas, where wind power has not been practical. This model will operate in wind speeds as low as 4.5 mph. The average wind speed in McKinney is approximately 10 mph. The turbine is mounted 120 feet high and has a 46-foot diameter rotor. The tail turns the device to face the wind and the backward tilt of the rotor provides storm protection in winds up to 120 mph. Since the wind turbine has only three moving parts, it requires only minimal maintenance.

Here's how the turbine works. When the wind passes over the three fiberglass blades, it causes them to move just like air passing over an airplane wing drawing the plane up and forward. As they turn, they create a rotary movement called torque, that in turn drives an electric generator. Wind is not constant and we need steady power for our Supercenter, so power processor electronics mounted at the base of the tower convert the variable wind power into utility-grade electricity. The electrical output is then fed into the store's main circuits, where it substitutes for power typically provided from the utility company. The higher the wind speed, the more power the turbine produces and the lower the Supercenter's consumption of grid-supplied power. Having the turbine on a high tower improves performance.



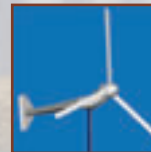
## Benefits

Provides energy using only the wind.

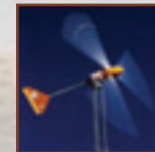
Reduces consumption of electricity from the utility company.

Helps to reduce the amount of greenhouse gasses emissions created by the commercial production of electricity.

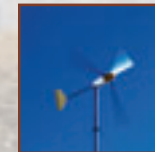
## Wind turbine examples



Bergey XL.50  
50 Kilowatt Turbine



Bergey BWC EXCEL  
10 Kilowatt Turbine



Bergey XL.1  
1 Kilowatt Turbine

# Xeriscape

## Xeriscape- \zir-e-skap\ - water conservation through creative landscaping

Water is becoming an increasingly precious natural resource. To conserve water in this landscape, Wal-Mart has chosen to eliminate the traditional Bermuda grass lawn and use only native grasses, which, after establishment, do not need irrigation or mowing. Lawn grasses require extensive water to stay green in our hot Texas summers. Another water saving strategy Wal-Mart has chosen is to use climate appropriate plants, watered by a drip irrigation system, which have adapted to the dry conditions found here in Texas. Many of the plants used on this site are native to Texas and this region and require less water than plants found in nurseries. These two decisions are part of a xeriscape approach to landscaping, which aims to create attractive environments while using a minimal amount of water other than natural rainfall.

Conserving water in the xeriscape method also involves the proper use of mulches. After planting, a thick layer of mulch is placed to protect the plant roots from harsh weather conditions and hold moisture in the soil. The mulch layer acts as insulation and also inhibits weed growth. Several mulch types are being used on this site. Rubber mulch from recycled tires is used in the garden area. Other areas have decomposed granite or shredded hardwood mulch from a local source.

### Our Experiments

Testing a large number of drought tolerant native trees, shrubs and perennials.

Trying different types of mulches to check the water holding capacity and long-term durability.

Measuring the amount of water needed to maintain this site versus a traditional tree, shrub and lawn installation.

## Benefits

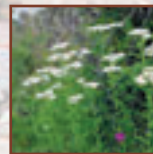
Conserve water with drought tolerant plants.

Reduce mowing and water use by eliminating turf grass.

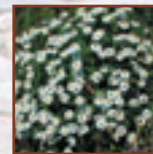
Hold more water in the soil by using a thick layer of mulch.

Reduce the amount of fertilizers and other chemicals necessary for native plantings vs. traditional ornamental plantings.

## Xeriscape plant examples



Yarrow  
Achillea millefolium



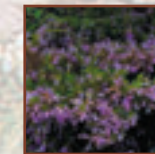
Blackfoot Daisy  
Melampodium leucanthum



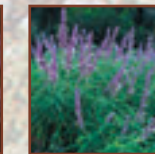
Cherry Sage  
Salvia greggii



Lantana  
Lantana camara



Mexican Oregano  
Pollomntha longiflora



Mexican Bush Sage  
Salvia leucantha

# Solar Energy

## Building Integrated Photovoltaic: Roof Mounted Polycrystalline

Polycrystalline photovoltaic laminates have been integrated into the Garden Center's canopy to help reduce the store's demand on the local electrical power grid. Polycrystalline photovoltaic cells are fingernail-thin wafers mounted between glass and plastic with a unique clear interlayer allowing natural light to penetrate to the plants below. The Garden Center canopy is estimated to generate 14,585 kwh per annum, which is enough electricity to power 486 single-family homes for one day and reduces greenhouse emissions by an estimated 22,100 pounds per year, lowering the demand for local power generation. An average household CO2 output is 22,750 pounds per year.

## Building Integrated Photovoltaic: Roof Mounted, Clerestory Amorphous

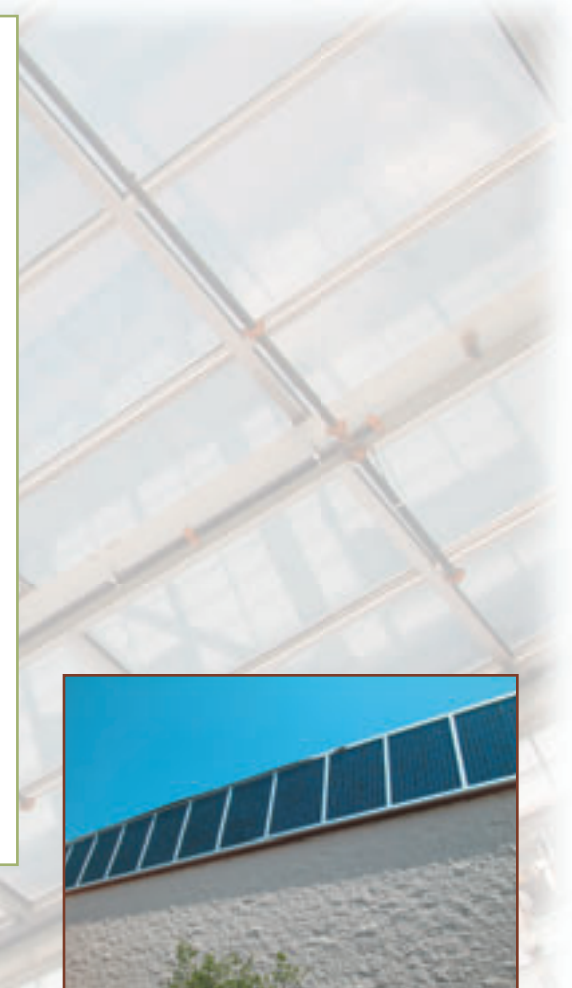
Thin film photovoltaic laminates have been integrated into the roof of the entry vestibules. The active portion of the thin film, the amorphous photovoltaic panel, is suspended between layers of clear glass allowing natural light to penetrate into the vestibule. These photovoltaic panels generate electricity reducing the store's demand on the local power grid. Each vestibule is estimated to generate approximately 4,177 kwh per year. Combined, this is enough electricity to power 270 single-family homes for one day and reduce greenhouse emissions by 12,750 pounds per year.

## Building Integrated Photovoltaic: Curtain Wall, Clerestory Mounted Polycrystalline and Amorphous

Thin film and crystalline photovoltaic laminates have been integrated into the south facing, front entry façade of the store. The crystalline laminates have been used at the top of the building creating the signature "blue stripe" (best viewed from outside). Thin film laminates have been used in the clerestory to allow natural day light to enter the store at the checkout registers (best viewed from inside). These photovoltaic panels generate electricity for use in the store and reduce the store's demand on the local power grid. The façade-mounted crystalline panels are estimated to generate 23,544 kwh per year. This is enough electricity to power up to 780 single family homes for one day. The façade-mounted thin film laminates are estimated to generate 2,431 kwh per year. Reducing dependence on conventionally generated power, the two laminates are estimated to reduce greenhouse emissions by 37,750 pounds per year.

## Photovoltaic: Flat Roof Mounted Thin Film

Thin film photovoltaic laminates have been mounted on the roof of the Tire and Lube Express. Adhered directly to the new roof membrane to generate electricity the photovoltaic laminates will reduce the store's demand on the local power grid. Although the system is small in size, it still can produce 5,710 kwh of electricity energy per year, enough to supply power to 190 single-family homes for one day and reduce greenhouse emissions by 8,300 pounds per year.



# Recycling Efforts

## Recycled Food Waste

Food waste from the produce, deli, meat, and dairy departments is typically hauled to a landfill. In this experimental store, the food waste is separated from other grocery garbage. Since this is organic waste, it is hauled to a local commercial composting facility where it is processed and made into compost. The compost is then available for purchase in this and other stores decreasing the impact of organic waste on local landfills.

## Reduced Volatile Organic Compounds

Standard building materials like paints, adhesives, flooring, and even furniture off-gas toxins called Volatile Organic Compounds (VOCs) that have been linked to a wide variety of human illnesses. Wal-Mart used low and no VOC building materials in this Supercenter to provide a healthy indoor environment for its customers and employees.



## Fly Ash Content in Building Concrete

The amount of materials required for construction of this building was reduced because fly ash was utilized in the building's concrete. Fly ash, an inorganic byproduct of the coal industry, replaces traditional materials such as lime, cement, and crushed stone, which require energy to produce. Every ton of fly ash utilized saves the equivalent of one barrel of imported oil (energy). Approximately 800 tons of fly ash were used in this building's slab and foundation system.

## Construction Waste Recycling

Much of the construction materials and waste used during the building process was recycled rather than sent to the local landfill. To set up a recycling program for glass, paper, aluminum, and other materials in your home, contact IESI at 2138 Country Lane, McKinney, Texas 75068 or call 469-452-8000.

# Climate Control

## Reflective Coating on the Building

The west face of the building has been coated with reflective ceramic paint to reduce heat gain inside the building. This ceramic paint is available in any color. Energy is saved during the summer months because the heat gain typically experienced by the west face of a building is reflected. The paint reflects the heat and the building requires less mechanical cooling.

## Radiant Floor Heating

Specific areas of this building have a radiant floor heating system to improve comfort. A radiant floor heating system conducts heat through the floor using hot water which is pumped through a series of tubes in the concrete floor. The slab is warmed resulting in heat radiating from the floor (radiant heat). Radiant heat has a unique benefit: in the same way it feels comfortable standing in the sun on a cool day; this radiant heating system transfers warmth that helps shoppers feel comfortable even in the cool refrigerated section. Additionally, since radiant energy warms us so effectively, the thermostat can be set at a lower temperature than a typical forced air heating system would comfortably permit. This kind of heating conserves energy through the even release of heat from the floor.

## Reduced Building Height

This building is 12 inches lower in height than a typical Wal-Mart Supercenter. The height reduction meant less building materials were needed to construct this store, and it reduced heating and cooling needs, which lowers energy usage.

## Air Distribution System

This building is utilizing a concept called Displacement Ventilation. The fabric ducts (Duct Sox) have many small holes which can distribute an even air flow along the entire length of the duct. The ducts are mounted 11-ft above the floor and supply air at low velocity and moderate temperature (typically 65-68 °F). The supply air quickly mixes with the surrounding air and slowly falls to the floor level. At the floor level the air is warmed by the occupants and other heat sources and rises slowly to the upper levels of the room, which are allowed to get much hotter than the lower 10 ft. The return air opening to the air conditioning unit is located just below the roof deck to return the hottest air. This system is estimated to save about 700,000 kwh of electricity per year, which is enough to power about 70 single family homes for an entire year.

## Captured Waste Heat from Refrigeration

Traditional refrigeration equipment expels heat into the Earth's atmosphere through air-cooled condensers. In this Supercenter, however, heat generated by the building's refrigeration system is captured and redirected to heat the water used in the restrooms' sinks, and to help heat the water used in the radiant floor heating system beneath the entrance vestibule, cash register area, frozen foods' open cases, and tire and lube express. Thus, less heat is released into the atmosphere, and less energy is needed to heat restroom water and keep the Supercenter warm on cold days.



# Internal Lighting

## Main Store Area Lighting

The lighting system in this Supercenter uses the smaller, more efficient, and optically superior T5HO (high output linear fluorescent) lamps, which produce as much light as two T8 lamps used in other Wal-Mart stores. The color of the lamps, referred to as color temperature, has been increased to 5000K to match the daylight entering the store. The color temperature contains more blue light than is traditionally used in retail stores, allowing you to receive more light on the retina of the eye, improving the ability to see merchandise in the store. Additionally, other lamps used in the office and storage areas have less mercury than standard fluorescent lamps making them more environmentally friendly.

## Reduced Nighttime Lighting Levels

At night, the artificial light levels in this Supercenter are lowered to help customers' eyes adjust to the change of light when going in and out of the store, and to reduce energy consumption.

## Natural Daylight and Dimming Controls

Skylights and clerestories allow daylight directly into the store. Light sensors monitor the level of natural light available and dim, or turn off the lights, when sufficient daylight is available. Dimming reduces the energy loads for the building throughout the day. Lighting energy use in a typical Supercenter has historically been approximately 1.5 million kwh per year. The lighting savings at McKinney are projected to approach 300,000 kwh a year. Reduced electric lighting load also reduces the energy required to cool this building as lights give off heat.

## LED Lights in Grocery Cases

LED lighting is used inside the grocery cases in place of fluorescent strip fixtures. LED lights have a longer life span than fluorescent lights, produce less heat, and use significantly less energy than typical grocery case lighting. In addition, fluorescent lighting is typically seen with a yellow or blue hue. Utilizing 5000K LED lighting, the true colors of products are viewed inside the grocery cases.

# Internal Building Experiments

## Passive Cooling at the Garden Center

The Garden Center shade structure is oriented to take advantage of natural breezes on site. In addition, a cupola (a small vaulted dormer-like roof on the top of a larger roof area similar to a chicken coup) with thermostatically controlled louvers and fans was added. As the temperature rises the thermostat opens the louvers allowing hot air out of the space. Simultaneously, cooler air is drawn in near the customers.

## Recovered Cooking Oil Bio-Fuel Boiler

In most Wal-Mart Supercenters, cooking oil used to fry foods and waste engine oil from the Tire and Lube Express is collected and recycled off-site. In this Supercenter, however, cooking oil and waste engine oil are burned in a bio-fuel boiler to generate heat that is then directed into the heating, ventilation, and radiant floor heating systems.

## Burning Used Motor Oil

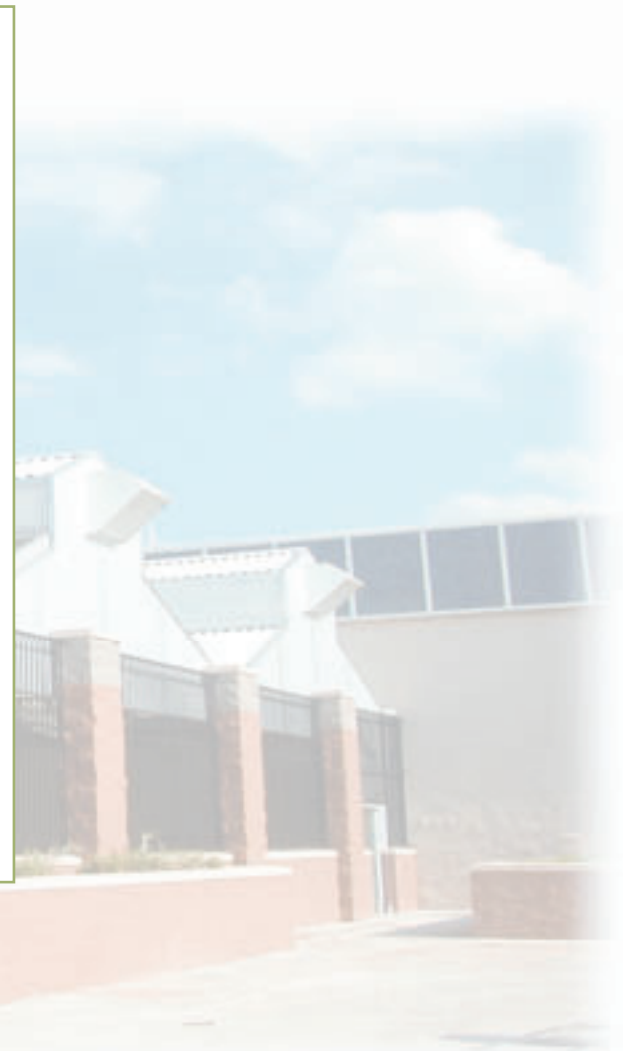
Used motor oil from the store's Tire and Lube Express is collected and saved for use in a bio-fuel boiler. Normally, this used motor oil is safely collected and hauled to a recycling facility. By burning the oil in an on-site boiler this waste is re-used and energy is conserved. The boiler generates heat on site to heat the building. This reduces the demand for natural gas to operate mechanical equipment. Combined with cooking oil collected from the deli, the natural gas saved is just over 30,000 therms, which is estimated to be enough to heat and to provide hot water for 26 single family homes in McKinney for an entire year.

## Alternative Freezer/Cooler Refrigeration Units

Typically, refrigerated display cases are open-air construction that allows the refrigerated air to leak out. This results in the cases having to work harder (using more energy) to keep the product cold. Glass doors have been added to the display cases in an effort to reduce the load on the refrigeration systems. Additionally, the refrigeration systems have been redesigned from air-cooled ground mounted units to distributed water-cooled roof mounted units with cooling towers. By relocating the refrigeration systems to the roof, copper piping and refrigerant loads were reduced by more than 40%. In combination with the added glass doors at the display cases, an estimated energy savings of 645,000 kwh annually will be achieved, providing enough power for 65 single family homes for an entire year.

## Air Conditioning Condensation Water

Condensation (water) from air conditioning systems is usually a waste byproduct that is discarded. In this Supercenter, however, condensation from the store's refrigeration and air conditioning systems is collected, stored in the pond on the east side of the building, and used to help irrigate the landscaping.



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