



Main entry on south face



North face on Lowry Blvd.

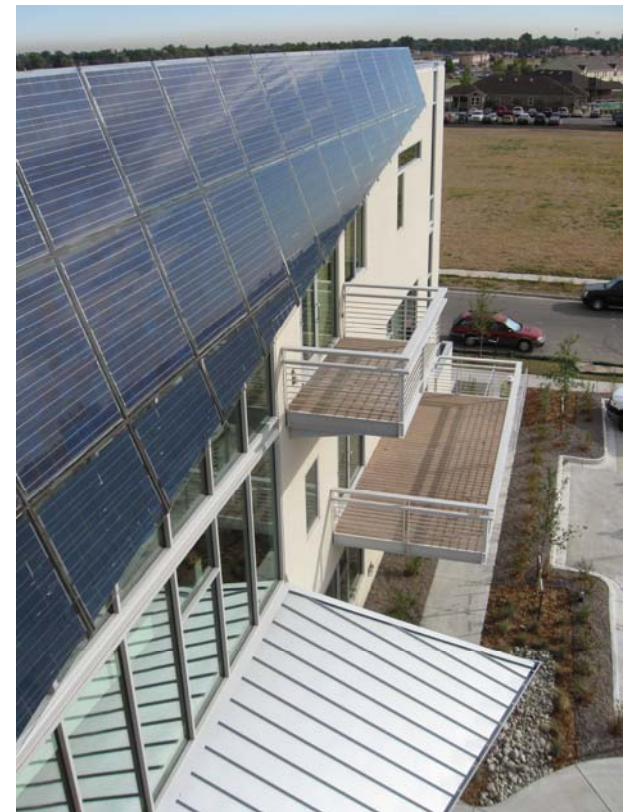
LEED® Program

The LEED® green building certification program is the nationally accepted benchmark for the design, construction, and operation of green buildings.

The team registered the office with the certification goal of LEED® Platinum. Project members strived to find cost effective green solutions and looked at the building as a whole to find synergies within the systems. Water and energy savings were a priority in evaluating strategies, as was the quality of the indoor environment. Total Community Options felt it was important to provide a healthy and comfortable building that employees love to work in and are proud of.

General Information

Total Community Options' new 45,000 sqft corporate headquarters centralized departments that were spread across the city. The three story office building houses roughly 260 employees and is located on a site on the former Lowry Air Force Base in Denver, Colorado. As a non-profit organization, savings from long term operating efficiencies allow more funds to be spent on programs and services. Annual savings in operating costs was a primary driver in the decision to pursue a green office building. Although the building will be owner occupied, the building has a flexible design that is easily adaptable for future use by other potential tenants.



Roof view of solar mansard and Trex balconies

Lowry Community

The Total Community Options office building is part of the Lowry Redevelopment – a former U.S. Air Force Base that has been redeveloped into a mixed-use, sustainable community. The Lowry Redevelopment has been recognized with several local and national smart growth awards including the "Governor's Smart Growth and Development Award" and the "1999 Sustainable Community Award" from the U.S. Conference of Mayors and National Association of Counties.

Many of Lowry's buildings are being built to maximize energy efficiency, minimize pollution and conserve natural resources. As an infill development, Lowry is utilizing existing urban infrastructure and road systems. Old runways from the Air Force base were recycled into new streets, trees were preserved or moved, and many original buildings have been reused. Parts of



Remnants of Air Force base are still present



Hanger No. 2

the base required clean-up before the land could be developed. Utilizing a Brownfield site helps reduce sprawl and returns land back to usable community space. The mixed use nature of the development allows people to live and work in close proximity. The community includes health care, homes, businesses, shops and schools all connected by a series of trails and parks.

Lowry has developed a support system for alternative transportation also. TransOptions promotes the utilization of transportation other than a personal vehicle -- bus, carpool, vanpool, biking, walking and telecommuting. The TLC office will tie in to these resources and also provide their own onsite amenities.



Shops at Lowry Town Center



Town Center plaza and fountain



Bike racks near main entrance

Alternative Transportation

The staff at Total Community Options are encouraged to use alternative transportation. The pedestrian-friendly nature of the community with close proximity of housing and basic amenities reduces the mileage between destinations and the number of required car trips. Staff can bike or hop on a bus to go to nearby shops and restaurants. Bike racks and a shower room with changing facilities are provided. Several local buses have routes within walking distance of the office. There are also walking trails that connect to many of the local amenities and community services at Lowry. Parking spaces are reserved for carpooling and low-emitting/fuel-efficient vehicles such as the many hybrid models that are now available.



Changing room for bicyclists



Lowry community and trail system



One of six preferred parking spots

Landscaping

Landscaping was selected for the Rocky Mountain Region's dry climate. These plants are not only beautiful but also use less water. The landscape was designed to reduce water consumption by 80% through careful plant selection and irrigation design. Drip lines paired with efficient sprinklers and controls conserve water and direct water where needed. Scheduling watering times in the evening or morning reduces evaporation. An area of edible landscaping was planted in the main parking median to be enjoyed by all. The wood trellis over the seating area was constructed with wood certified by the Forest Stewardship Council which ensures sustainable forestry practices.

Connection to Outdoors

The exterior of the office is surrounded by a series of pathways, outdoor spaces and seating areas. These outdoor spaces can be used by employees as informal meeting spaces, a place to eat lunch, or simply a place to relax and enjoy the mountain views. People spend 90% of their day indoors; connecting to nature can provide a much needed break. The greenways surrounding the office also tie into the Lowry public parks and open space program which includes approximately 800 acres of trails and bike paths, a sports complex, recreational facilities, natural areas, neighborhood parks, a dog park, and a golf course.



Seating area in west garden



Drought tolerant Ice Plant



Benches line the path through the gardens



Strawberries planted in median

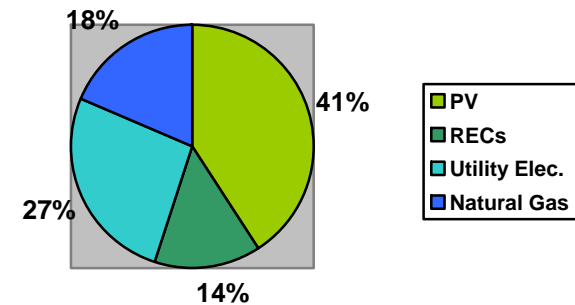


410 Sunpower PV panels

Heat Island Effect - Roof

The heat island effect is created when dark surfaces build up heat and increases the temperature of an area compared to its surroundings. Urban areas can be 10 degrees warmer than surrounding rural areas due to large quantities of asphalt paving and dark roof surfaces. The roof on the Total Community Options office is covered with a white reflective TPO roofing product that reflects light and heat away from the roof. This lowers the temperature of the roof and saves energy by requiring less cooling.

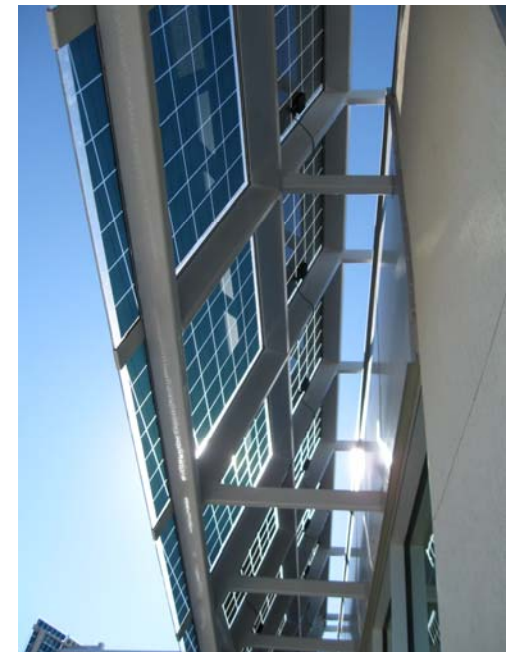
Energy Use by Type



90% of the PV power is generated on the roof

Renewable Energy

The 100 kW photovoltaic (PV) system provides 50% of the electricity for the building (a portion of the building also uses natural gas). Another 35% of the electricity is offset for two years by purchasing Renewable Energy Certificates (RECs) that support renewable energy production projects at other locations. There are two types of PV systems used on the building. The largest portions of PV panels are typical crystalline panels laid on the roof. Laminated glass PV is featured on the mansards on the front of the building. The panels convert energy from the sun into an electrical current. An inverter must change the DC power to AC before the building can use it. The system is tied to the utility grid to take advantage of net metering. During the day the building uses electricity from the PV panels and sends any excess back to the grid earning a credit (meter runs backwards). At night, or when demand is high, the building uses energy from the utility and the meter runs forwards.



Laminated glass PV



Full cut-off pole fixture

Site Lighting

Exterior lighting fixtures were selected to prevent light pollution of the night sky. Many fixtures waste light by allowing some to be directed up into the sky. Full cut off fixtures direct light only towards the ground where it is needed. A lower light power density can save energy and reduces glare, which can affect security and comfort.

Tubular Skylights

Often mistaken for light fixtures from the interior, Solatubes concentrate sunlight and direct it deep into the space through a relatively small tubular opening. The light output from the tubular skylight is the same as skylights much greater in size. The tube is lined with a highly reflective surface so little light is lost as it travels the length of the tube. The dome at the top is also designed to collect more sunlight than a typical skylight, bending light rays and redirecting them into the tube. The third floor restrooms each have several Solatubes.



Solatubes

Heat Island Effect - Paving

Dark colored pavement contributes to the heat island effect – an area of higher temperatures created by dark surfaces absorbing and re-radiating heat back into the surroundings. The parking areas at Total Community Options are concrete instead of asphalt. Concrete is a more durable surface and the light color reflects heat. The Solar Reflectance Index (SRI) measures how hot a surface will get when exposed to the sun. Materials with a high score are cooler. Typical new gray concrete has an SRI of 38-52 compared to asphalt with an SRI of 0. Pervious paving, such as the gravel walkways throughout the landscaping, and plants also help lower the temperature.



Parking lot with concrete paving



Bollard



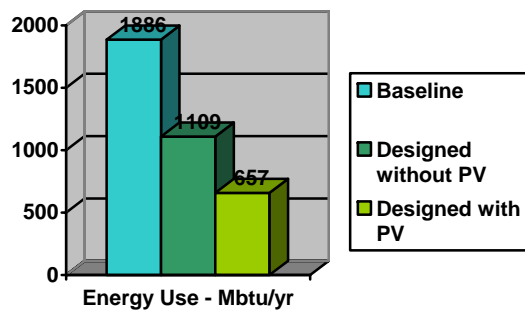
Pervious gravel pathways and landscaping



Low-E glazing

Energy Conservation

The Total Community Options corporate headquarters saves 70% in energy costs compared to a typical office building (43% without the PV panels). Passive systems such as daylighting, increased insulation, building orientation and natural ventilation were utilized to significantly cut energy use before mechanical systems were evaluated. The site is oriented 45 degrees from true north. To reduce the west exposure the building was oriented along a southwest to northeast axis, with the smallest amount of wall facing those directions. A portion of the building is pulled out at an angle to face directly south. High performance, low-E glazing was specified and windows were minimized as much as possible on the southwest face of the building. The window to wall ratio was optimized to provide the best possible daylighting while maintaining thermal performance. Both rigid insulation and spray foam insulation were used in the wall system to achieve R-19. A tight building envelope with increased levels of insulation helps to mitigate the transfer of heat through exterior walls. A three-story lobby and vestibule located at the main entrance serves as a buffer zone to the rest of the building. The energy efficient Daikin system is a variable refrigerant flow system that delivers cooling to multiple fan coils units in the space. The intelligent inverter allows more control in all zones and also runs at variable speeds. The building has been fully commissioned to ensure performance as designed.



Daikin system on roof



Spray foam insulation



Thermax rigid insulation

Regional Materials and Recycled Content

Total Community Options supports the local economy by specifying regionally grown landscaping plants and brick manufactured in Colorado. Concrete is also a local material and contains recycled aggregate and a recycled byproduct, fly ash, in the cement. Using local materials reduces pollution and fuel consumption from transportation. The exterior balconies are covered in Trex decking made from 98% recycled or reclaimed plastic and wood fibers. Much of the building envelope also contains recycled content – roofing, insulation, composite wall panels and the window and door systems.

Construction Recycling

The General Contractor was diligent in implementing a construction waste management program and staying on top of sub-contractors to ensure they were sorting materials into the correct dumpsters. Dumpsters for brick, scrap metal, concrete, wood, cardboard and drywall were kept onsite. In addition, all office plastic, glass, metal and paper was recycled. The project diverted over 50% of construction debris from the waste stream. Construction and demolition waste accounts for 26% of non-industrial landfill waste in the United States.



Locally sourced brick



Regional plants thrive in Denver's climate



Concrete collection dumpster



Wood to be recycled



Balconies are accessed off the break rooms

Water Conservation

Water is a precious resource in the state of Colorado. Frequent drought conditions and water restrictions remind us of the importance of responsible water use. Water conservation is a necessity for continued growth in the region. The fixtures throughout building are designed to save 50% of the water compared to a conventional office building. Low flow faucets and showerheads have reduced opening sizes to restrict water flow. Restroom faucets are equipped with sensors to automatically turn on when hands are placed under the faucet and off when hands are removed preventing waste from continually running faucets. New technology such as dual flush toilets and pint urinals use less water than typical equivalents. A dual flush toilet saves even more water when you use the small flush option (.8 gallons compared to 1.3 gallons in our ultra low flow versions). Water conservation also saves energy, as there is less water to heat and less water to treat down the line.



Plumbing fixtures in the restroom cut water use in half



Motion sensor faucet



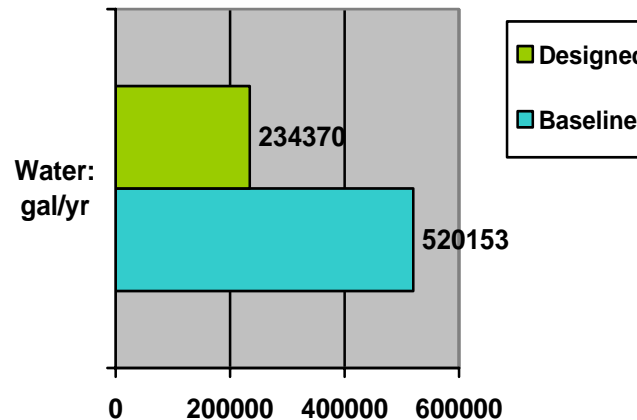
Two flush buttons – small flush and bigger flush



Dual-flush toilet



Urinal uses only a pint of water





Recycling bins are built into the break rooms as part of the recycling program

Recycling Program

The Total Community Options recycling program includes glass, plastic, metal, paper and cardboard. Accessible bins are built into break room cabinetry to make recycling easier. Copy centers and other areas of high paper use also have large recycling bins. Smaller desk side bins are provided to staff for convenience. The average office worker uses 10,000 sheets of paper per year according to the Lawrence Berkley National Lab, the greater part of which can be recycled. The majority of recyclables other than paper come primarily from food and beverage containers and packaging.



The carpet, gypsum board and ceiling tiles all have recycled content

Recycled Content Materials

Using materials with recycled content conserves resources and limits the amount of material going to the landfill. The gypsum board used in this facility is made from synthetic gypsum, which contains 95% recycled content and is manufactured regionally. Steel is also a material with high-recycled content. Steel is used for the stairs, rails, hollow metal doors and framing of the structure. Concrete flooring contains fly ash, a byproduct of power plant production. Other products that were selected to have recycled content are ceiling tile and toilet partitions.



Built in recycling grommet



Steel building structure



Stained concrete flooring

FSC Wood

Forest owners engaging in responsible forestry practices can apply for forest certification through the Forest Stewardship Council (FSC) program. FSC has created a recognized standard of forest stewardship principles that promote environmentally responsible, socially beneficial and economically viable forest management. Highlights of the principles include preserving ecosystems, respecting the rights of indigenous people, sustainable harvesting, worker health and safety and diversifying forest resources. Forests undergo monitoring and periodic assessment to ensure standards are maintained.

The purchase of FSC products supports businesses in the forest industry that are making a commitment to sustainable forestry. Wood doors were selected to be FSC certified and to contain no urea-formaldehyde (which helps indoor air quality). Other FSC products on the project include the windowsills and balcony trim.



Railings in Atrium have FSC wood wall caps



FSC wood door



Windowsills throughout facility are FSC wood



Doors also contain no urea-formaldehyde for better air quality



Thermostat for Thermafuser and CO2 monitor

Indoor Air Quality

Poor indoor air quality can aggravate allergies and asthma and also cause headaches or illness. High concentrations of CO2 can be deadly. CO2 monitors located in areas of high occupancy ensure enough fresh air is brought into the building. Occupants can also control the amount of fresh air through operable windows. Natural ventilation helps save energy by reducing some of the reliance on mechanical systems. Walk-off mats at entries trap dirt and particulates before they can be tracked throughout the facility. Total Community Options is a non-smoking facility. Designated smoking areas are provided outside away from building entrances and air intakes.

During Construction

Pollutants come from many sources during construction. Preventing contaminants from entering the building through best practices during construction increases the chances of maintaining healthy indoor air quality once the building is occupied. Key strategies included protecting the HVAC system and minimizing exposure to toxic materials through ventilation, source control and housekeeping. Materials stored onsite were protected from airborne pollutants and moisture damage, which could lead to future mold issues. To prevent dust and debris from contaminating them, ducts were sealed with plastic when not in use. HVAC systems were activated at the end of construction and MERV 8 filters were used to prevent particulates from entering the system. Indoor air quality testing was performed to ensure any harmful chemicals had been flushed out of the building.



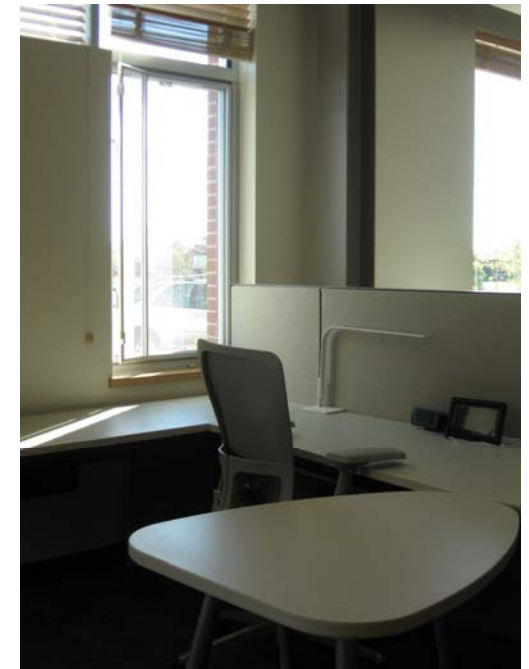
Ducts protected with plastic during construction



Duct with Thermafuser

Thermal Comfort

Perimeter spaces were designed with operable windows to give individuals control over the temperature in their area. Regularly occupied spaces on the interior without access to windows have adjustable air diffusers called Thermafusers. Thermafusers allow individuals to control their comfort by adjusting the amount of air coming out of the diffuser to achieve a certain temperature set point.



Workstations have operable windows



Focus room with low emitting materials

Low Emitting Materials

The best way to maintain good indoor air quality is to eliminate sources of contaminants. Low VOC and other non-toxic finishes are better for the health and comfort of occupants. You might notice that low VOC paints, coatings, sealants and adhesives used during construction have no lingering smell. That new building smell you typically experience are all the chemicals off-gassing into the air. Low VOC paint has virtually no smell and can be used when spaces are occupied. Low emitting materials like the Green Label Plus carpet and urea-formaldehyde free composite wood used in the building are better for the health of occupants. Carpet meeting the emission standards of the Carpet and Rug Institute's Green Label Plus program earn certification. Cabinetry, doors and countertops in the facility also contain no urea-formaldehyde.



Low VOC paint



Kitchen cabinets are urea-formaldehyde free



Green Label Plus Carpet



Low emitting carpet and paints were used in open office areas

Interior Lighting

Lighting controls cut waste by turning on lights only when conditions require supplemental illumination. Perimeter spaces in the building have both daylight and occupancy sensors. When daylight levels are high fixtures near windows turn off. Interior spaces without windows only have occupancy sensors to turn on lights when someone enters the room. Light fixtures automatically shut off after a programmed period of time that the room is unoccupied. Task lighting provides individual controls so users can suit light levels to the task. The lighting selected also contributes to the overall efficiency of the building. Open office areas use linear fluorescent direct/indirect fixtures and the corridors have compact fluorescent downlights and decorative lighting. LED lighting is used for emergency exit signage, step lighting and under cabinet fixtures.

Daylight & Views

Daylighting takes advantage of a free resource - sunlight. When paired with daylight controls this strategy saves energy by reducing the need for electric lighting. Support spaces such as copy centers and mechanical rooms were placed farthest from glazing so regularly occupied spaces could take advantage of daylight and mountain views. Glazing was added to interior rooms without perimeter windows to bring in additional light and provide views to the outdoors. High performance low-E glazing allows light in while preventing heat transfer. Window coverings provide flexibility in controlling the amount of light. All perimeter spaces have shades or blinds to control glare and heat gain.



Shades reduce glare while still allowing a view



Interior rooms with glazing to let in light and views



Workstations aligned to take advantage of daylight



Mountain views from workstations



Cork flooring in the Lounge

Rapidly Renewable Materials

Rapidly renewable flooring comes from raw materials that easily replenish themselves. Cork flooring comes from the cork oak tree. The bark is harvested every nine years and grows back after it is removed. Linoleum (often confused with vinyl flooring) is made from natural materials such as linseed oil, powdered cork, wood flour and limestone. Both are durable and easy to maintain.

Green Cleaning

The Total Community Options office has a comprehensive green cleaning program. The policy addresses environmentally friendly chemical cleaners, equipment and housekeeping practices. Non-toxic cleaners benefit the health of staff and janitorial personnel. To minimize exposure of building occupants isolated chemical storage and mixing areas are provided. Cleaning products and disposable housekeeping products are bought in bulk or chemical concentrate to reducing packaging. Paper products and trash liners are also available with recycled content. Janitorial personnel are trained in chemical safety, sustainable practices and proper maintenance techniques.



Carpet requires regular maintenance



Linoleum flooring



Cork flooring is also used in the Break rooms

New Work Model

Nationally there is a growing interest in redefining the traditional work place model. New technology allows us greater freedom and flexibility. A new generation of transient workers challenge the idea of private desks and instead look at alternative work space configurations such as “on demand” spaces and “drop in” centers. It is common for employees to work more out of the office, do many tasks in informal settings, and perform multiple functions from a single location. Many of the staff at the Total Community Options Corporate Headquarters spend a good amount of time working outside of the office. The office environment must change to capitalize on this shift. A smaller space can serve a greater number of employees with shared spaces that are multi-functional and can serve the needs of staff currently working in the office. More efficient use of space allows the overall square footage of the building to be reduced, saving first building costs and operating costs over the life of the building. The Total Community Options Corporate Headquarters was originally programmed for 60,000 sqft and was reduced to 45,000 sqft after implementing these strategies. The hybrid spaces also facilitate collaboration between staff. Because staff are not tied to a specific place people can move around to work with a variety of teams.



Shared private office



Educational kiosk in Lobby

Educational Program

Take the virtual tour of the Total Community Options corporate headquarters online. It is available for public viewing on the Total Community Options website. Sustainable information about the building is also available on the kiosk in the lobby of the building. Signage identifying green strategies used in the building is posted throughout the office to educate staff and visitors. Visit the green office tips page on the website for ideas on how you can make a difference with tasks you do every day.



Drop-in workstations