

Project Stats

Owner: King County Department of Natural Resources, Solid Waste Division

Address: 18800 Orillia Road South, Tukwila, WA

Facility Master Plan: 2006

Design: 2006-2009

Construction: 2010-2013, 100,000 SF

Project Cost: \$92,000,000

Construction Cost: \$54,000,000

Developed Site Area: 13 Acres

Transfer Building: 64,000 SF

Designed Life of Facility: 50 years

A Sustainable Model for the Solid Waste Industry

Investing in Sustainable Regional Infrastructure

The Bow Lake Recycling and Transfer Station (Bow Lake) combines long-term planning in regional solid waste infrastructure, advancements in waste processing, and green building to create a high-performance industrial facility that will serve the needs of King County for decades to come. The station features sustainable strategies with multiple benefits that serve as a model of eco-friendly industrial and solid waste facility design. These features include highly efficient garbage compactors that reduce hauling trips and fuel consumption, natural daylighting of the tipping floor that saves energy while improving

safety, and innovative design for durability and low-maintenance.

Bow Lake builds on the success of the County's first LEED Platinum project, the Shoreline Recycling and Transfer Station, and demonstrates the County's practical, cost-effective approach to sustainable design. With the December 2013 adoption of updated King County [Green Building Ordinance 17709](#), County projects are now required to strive for LEED Platinum certification or similar levels of achievement as measured by alternative certification programs. King County is the second local government in the nation to make this significant green building commitment.



Green & LEED:

Certification Level: LEED NC v2.1
Platinum

Energy Savings: 63% savings versus
conventional design

Solar Power Generated on Site: 2.5%
of annual building energy use

Water Savings: 59% savings versus
conventional design

**Construction and Demolition
Materials Recycled:** 98% / 6,588 tons
diverted from landfills

Added LEED Cost: \$687,937 / 0.7% of
Project Budget

**Greenhouse Gas Emissions
Reductions:** 172.5 metric tons/yr.
(estimated)

Green Materials: See Materials
Section

Award: 2013 Northwest Construction
Consumer Council Green Project of the
Year for Achievement in Sustainability

About the Project

Project Description

Developed on a 13 acre site, Bow Lake includes a waste transfer building, associated office and crew spaces, scale facility, recycling areas, transfer trailer storage and maneuvering areas, underground utilities, paving, site lighting and landscaping. This new station replaces an older one, built in the 1970's, which could no longer keep pace with demand and did not meet current seismic code.

Bow Lake is the busiest transfer station in the King County system, handling one-third of the County's solid waste—a combination of mixed and pre-sorted solid waste, recyclables, and yard waste. Inside the building there is capacity to recover materials for recycling. Recovered materials, such as cardboard, are baled. The

facility operates seven days a week, 24 hours per day from Monday to Friday. It is a critical facility, with emergency operations capabilities. The tipping floor is split or "stepped", meaning the upper level for self-haul customers is separated from the lower, commercial tipping level by a safety pushwall. The tipping floor also slopes, with minimal drainage interruptions providing low maintenance vehicle operations. The waste processing area includes two hydraulic pre-load compaction units, for more efficient packing of trailers bound for the Cedar Hills Regional Landfill, reducing vehicle traffic and emissions.

The facility also includes two separate recycling components. First, a one-acre exterior area for collection and sorting of clean wood, scrap metal, paper, glass, plastics, textiles and yard waste. Second, inside the main



LEED Case Study

Bow Lake Recycling and Transfer Station

Design Consultants & Construction Team:

Civil and Structural Engineering:

SAIC Energy, Environment & Infrastructure (now known as LEIDOS)

Architecture/Sustainable Design:

KPG Interdisciplinary Design

Site Planning/Landscape Architecture:

KPG

Structural Engineering:

MLA Engineering

Mechanical Engineering:

LNS Engineers

Electrical Engineering:

Interface Engineering

LEED Consulting:

Paladino & Company

Construction Management:

KPFF Consulting Engineers

Construction Contractors:

Site preparation: Gary Merlino Construction Company

Construction Contractors:

Facility: Lydig Construction

Commissioning:

Ecotone

building, there is capacity for material recovery by separating recyclables from the solid waste. Recovered recyclables, such as cardboard, are baled and stored in the loading area until pick up. Manufacturers turn the recyclables into new products ranging from rebar to fleece jackets.

The previous transfer station was open-sided, which created neighbor and customer concerns about noise, odor, dust, and pests. The new facility features the County's new enclosed design standard, advanced air filtration, and high-pressure odor misting systems, work together to reduce these impacts.

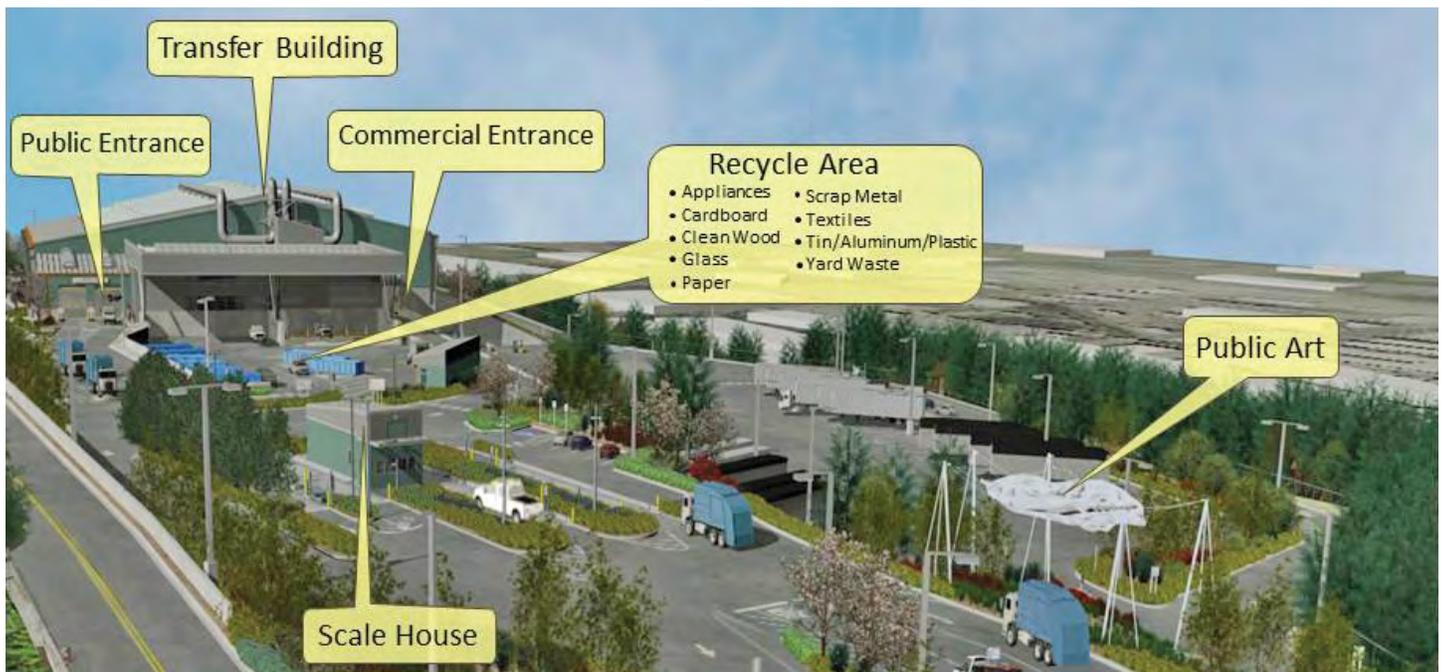
LEED & Sustainable Design

From initial planning to design and construction, Bow Lake was developed to address the long-term with respect to waste handling,

materials recovery, efficient operations, durability and resiliency. The station also builds on strategies and studies from the Shoreline Recycling and Transfer Station, completed in 2008, tailoring green building to an industrial application.

Site Construction, Design & Operations

Redevelopment of the site offered a massive design and construction challenge, including remediation of a closed landfill site, coordination with Interstate Route 5 (I-5) right of way areas, large areas of disturbed soil on sloping terrain, and protection of a creek to the north of the site. The old transfer station also remained in operation during construction of the new facility. The resulting project restores habitat, mitigates stormwater, and reduces vehicle emissions.



Sustainability Beyond LEED

The project incorporates two major innovations in sustainable industrial design & operations that go beyond strategies addressed by LEED.

“Inside-Out” Design: One of the largest innovations, the “Inside-Out” approach combines an exposed skeletal structure on the building exterior with high durability marine-grade finishes on the interior. This creates an interior that is easy to wash down with hoses and power-washers, with minimal areas for pests to nest.

Traffic Management: An automated traffic management system (ATMS) directs traffic to applicable areas across the site, streamlining operations and reducing vehicle idling emissions and noise impacts on neighbors. The ATMS is the first of its kind at a solid waste facility anywhere and has already proven successful. It promotes safe, efficient traffic flow, allows scales to be reversed and reconfigured to help clear heavy traffic and provides the County with the flexibility to serve customers with mixed loads of waste and recyclable materials.

Sustainability strategies related to site construction, design, and operations include:

- Comprehensive erosion and sedimentation control plan for protecting adjacent creek and steep grades
- Project construction vehicles used right hand turn only at non-signal intersection, with flaggers during high traffic periods (to reduce emissions and local traffic impacts)
- Temporary construction-phase color-coded painted lines for traffic routes by vehicle type (commercial haulers, public self-haulers, construction vehicles, etc)
- Construction vehicle tire wash minimized surface water contaminants
- Remediation/soil removal of large quantities of soil from historic landfill area plus on-going methane mitigation
- Separation of stormwater runoff to direct refuse-contaminated stormwater to the sanitary sewer to ensure that no contaminated water reaches the stormwater system
- All galvanized surfaces are epoxy-coated to prevent leaching of zinc (a heavy metal dangerous to salmon) into the ground and surface waters
- Site improvements include restored landscape, with removal of invasive species and addition of native vegetation and trees
- The Automated Traffic Management System (ATMS) reduces emissions from queuing vehicles

Water Conservation

The project will reduce potable water use by about 60 percent over traditionally designed systems. The water-saving strategy with the largest impact is the rainwater



1% for Art

Public Art is meant to inspire and inform, celebrate culture and contribute to identity of place. The work “Confetti Cloud” is no exception. Designed by artists Andy Cao and Xavier Perrot, this work of art serves as a canopy and visual frame to the sweeping views seen from the transfer station’s high perch and has most certainly helped define the sense of place when one is visiting the facility. Located next to the transfer station scale house, this high profile piece is evident to anyone entering and leaving the station. It can even be viewed by drivers headed south on I5 at the Orilla Rd. exit. The twinkly white glass shade is almost a misty drizzle in its appearance. While residents of the Pilchuk Glass School, the artists conceived of the piece when they discovered a treasure trove of glass fragments from other artist stockpiled and 40 years in the making. This piece is an extraordinarily sophisticated reuse of materials that provides further encouragement and education messaging about material reuse and waste diversion. A wonderful reminder that one person’s “trash” really is another one’s treasure.

King County created a 1% for Art Program in 1973, where one percent of a building project’s budget is set aside to purchase and display public art that enhances the visual aesthetic of our buildings.

collection system, two 15,000 gallon storage tanks that collect and store rainwater from the transfer station roof. Rainwater is used to wash the tipping floors, solid waste processing equipment, and to flush toilets—saving an estimated 1.8 million gallons of water annually.

Sustainability strategies related to water conservation include:

- Rainwater harvesting for use in the non-potable washdown water system
- Drought tolerant native plants landscape design, with no permanent irrigation system
- Low-flow water fixtures were installed in the locker room and toilet facilities. (0.5 gallons per minute (gpm) metered bathroom lavatories, 1.5 gpm kitchen sink,

and a 2.0 gpm showerhead; 1.1/1.6 dual flush toilets. (LEED applicable, non-process water savings = 43.3 percent)

Energy-Efficient Building & Operations

The facility is designed to use 61 percent less energy than the code baseline through natural daylighting, energy efficient fixtures and equipment, waste heat capture and reuse, a photovoltaic array, and commissioning of systems. The tipping area incorporates extensive skylights and translucent wall panels, which produce an even 60 lumens at operations level while dissipating glare through the use of diffusing polycarbonate panels. Computer and physical daylight studies of the Bow Lake design were



Resource List

King County Solid Waste Division

King County Green Building Ordinance 17709

GreenTools Program

LinkUp Program

U.S. Green Building Council (USGBC)

Integrated Design Lab

performed at the [Integrated Design Lab](#) (IDL) in Seattle to optimize the combination of daylighting techniques and a high-efficiency electric lighting dimming system.

In combination, the energy measures will reduce greenhouse gas emissions by an estimated 172 metric tons annually. Sustainability strategies related to energy conservation include:

- Use of variable-frequency drives on large motor equipment to reduce power consumption and improve motor life
- Natural daylighting by use of tubular skylights, translucent wall panels and large translucent panel skylight that span width of the building
- Stepped dimming fluorescent lighting system for the operations areas combined with extensive natural daylighting
- Efficient mechanical systems
- Energy Star appliances
- Low-mercury lamps

- Capture of waste heat from compactor hydraulic systems to re-use for hot water system
- A 15 kilowatt roof-mounted solar roof-top array
- Commissioning evaluation will assist County in realizing energy savings designed
- Waste compactors allow efficient trailer packing, for 30 percent less hauling trips and associated fuel savings

Materials & Waste Management

The building uses a host of green materials in the structure and interiors including high recycled or rapidly renewable content including: concrete rubble backfill, fly ash and slag in the concrete, asphalt with recycled roofing content, structural steel, aluminum, resin panels, bamboo plywood, recycled glass countertops, recycled-content gypsum board, insulation and glazing. The project incorporated 3,900 tons of recycled asphalt shingles (RAS) in the asphalt paving, locally sourced via the Solid



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Waste Division's [LinkUp program](#). The overall achievements in the LEED Materials and Resources category are impressive, which include:

- 26.4 percent of materials included recycled content
- 69.5 percent of the total materials value were locally manufactured within 500 miles of the site
- 59 percent of material locally sourced and extracted within 500 miles of the site
- 90 percent of all new wood purchased was FSC certified.

The construction team also "walked the talk" and recycled 98 percent of all construction waste, diverting over 6,500 tons of materials from the landfill.

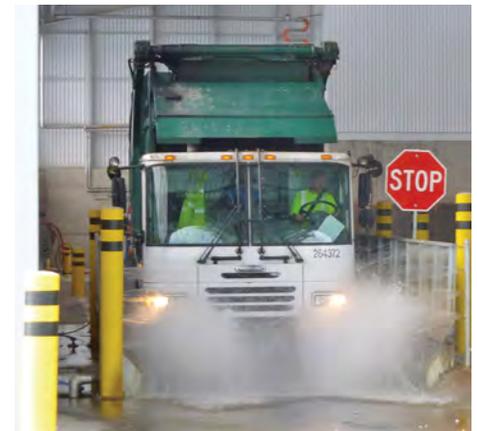
Indoor and Outdoor Air Quality

The building design incorporates daylight, natural ventilation, an enclosed design with odor control high-pressure misting system with organic anti-odor compound, and a dust-containment and filtration

system. These features result in better indoor and outdoor air quality, improved customer experience and safety, and increased worker safety and productivity.

Sustainability strategies related to air quality include:

- Tire wash for commercial customers exiting the tipping area to eliminate tracking of waste onto the site roads
- Truck washout station (with harvested rainwater)
- Dust extraction and collection system
- Dust control and odor misting system



Alternative Formats On Request:

206-296-4466

TTY Relay: 711

1-800-325-6165 ext. 6-4466

- Unique four-scale facility that features an automated traffic management system (ATMS) reduces wait times and vehicle emissions
- Methane barrier and venting system for all indoor spaces
- Vehicle exhaust gas monitoring system
- Exemplary Performance for Construction Waste Management
- Water Processing Efficiency
- LEED Accredited Professional

Green Value for Industrial Applications

Using a sustainable design approach, the Bow Lake Recycling and Transfer Station incorporates many innovations that provide long-term value for the County, with a minimal investment of project costs for sustainable design and LEED features. This investment delivers a durable, lasting facility that saves utility and operations costs while improving safety and productivity and reducing traffic impacts and emissions. In 2013, Bow Lake received the Northwest Construction Consumer Council's Green Project of the Year Award for Achievement in Sustainability.

Innovation & Design Process

Most jewelers would explain that platinum has a greater value because it's rarer, stronger and more durable. The same might be said of the Bow Lake Transfer Station. The project received 5 Innovation Points tipping the scale from LEED Gold to Platinum for the following strategies:

- Exemplary Performance for Daylighting
- Reduced Mercury Content based on its lighting selection

