SWANA 2014 Excellence Award – Transfer Station
Bow Lake Recycling and Transfer Station
King County Solid Waste Division

Executive Summary

The new Bow Lake Recycling and Transfer Station was built on the site of a facility dating from the 1960s. The open design of the old station failed to control dust, odor and vectors, and the facility suffered from inadequate vehicle queuing, structural deficiencies and a lack of recycling and emergency waste storage capacity.

The new 2,400 ton per day facility features an enclosed, long-span Transfer Building designed to protect self-haul customers from high-volume waste handling while providing the flexibility to allow selective material recovery and baling. An Automated Traffic Management System regulates traffic through four vehicle scales, allowing independent re-weighing of mixed loads headed for both the Transfer Building and the dedicated yard waste and recycling area.

Measures such as rainwater harvesting, waste heat collection, daylighting and electronic lighting controls make the facility energy-efficient and sustainable; careful attention to phasing permitted uninterrupted 24/7 customer service throughout the construction period.

1 Design of the Facility

1.1 Discuss the design of the Transfer Station

The Bow Lake Recycling and Transfer Station project site has been used as a solid waste transfer facility within King County’s Municipal Solid Waste (MSW) system for both commercial and self-haul customers since the 1960’s. The site operates 24-hours a day except weekends, and receives the largest tonnage of any other facility in the County’s system, accounting for 30% of all MSW. The original Bow Lake Transfer Station was one of 8 similar facilities constructed for the King County Solid Waste Division (SWD). In 2010 construction began on a replacement facility on the same site and the new state of the art Bow Lake Recycling and Transfer Station was completed in October 2013.

As a building type, Transfer Stations are traditionally associated with noise, dust, odor, and grime. These unwanted characteristics were addressed head-on at the Bow Lake facility. The new transfer building was designed as an enclosed facility with an “inside-out” approach. The concept is thus: the items inside the facility are more harmful to the building structure and finishes than the weather on the exterior. The team developed a wall and roof system with washable interior surfaces and minimal dust ledges contributing to the long 30-year design life of the building. Separation of self-haul customers from the primary industrial vehicles by way of a stepped tipping floor is another element of design. The
facility incorporates the use of long-span steel construction to allow unimpeded maneuvering of vehicles within the building, maximum use of operational space, and allowing operators to have maximum visibility while working. This measure was taken for both function and safety.

Previous transfer station design section (left) and completed Bow Lake Recycling and Transfer Station (right) illustrating stepped tipping floor, enclosed building.

The site and relationship of physical elements are situated to take advantage of natural topography to make up grade changes between significant program elements. New collection capabilities were added to the facility including Yard Waste Collection, customer sorted recycling, loading docks, and long-term emergency container storage.

### 1.2 Merits of the facility

#### Safety

**Segregated vehicle traffic:** Throughout the facility vehicle operations and customers are separated through the use of dedicated traffic lanes and physical barriers such as a stepped tipping floor. This effort was done to minimize traffic conflicts and avoid situations where commercial customers maneuver close to self-haul customers who stand outside of vehicles when using the facility. Further reduction in vehicle traffic conflicts can be attributed to the use of a bypass route for long-haul trailer delivery and pick-up. Because of pre-compacted, weighed loading, long-haul transfer vehicles can bypass the scale facility and avoid both inbound and outbound queuing lanes. This saves transit time for long-haul operations, and alleviates traffic congestion at the site entry and exit points.

**Tipping wall:** The project incorporates a stepped tipping floor design. Commercial waste haulers, who are experienced driving large vehicles and have the largest volume of waste, tip directly onto the flat receiving floor. Self-haul customers use a higher elevation tipping area where they are buffered from the industrial equipment by a 42-inch high “tipping wall”. The wall minimizes the possibility of falls onto the receiving floor.

**Clear sight lines:** A panoramic elevated view of the tipping floor from both the supervisor’s office and break spaces allows the operators to remain safe from equipment and separate from vehicle fumes, dust, and other contaminants. At the trailer yard, operators have a warming area with panoramic views of the compactor bay and maneuvering trailers.

#### Capacity

**Adequate Queuing:** In the Facility Master Plan, facility queuing goals were established to accommodate an increased speed of service for customers. Because of the close proximity between scale plaza and site entry automated traffic systems and multiple queuing lanes were created. Throughout the facility, queuing lanes were developed at major site activity areas such as the Recycling, Yard Waste, and Self-Haul areas. Long-haul vehicles were removed from the shortened inbound queuing lane and given a circular site access pattern. An example of design capacity is found below:
### Scale Plaza Queuing

<table>
<thead>
<tr>
<th>Customer Type</th>
<th>Inbound Queue Capacity*</th>
<th>Outbound Queue Capacity*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Commercial Hauler</td>
<td>50 Vehicles in 3-lanes of mixed traffic, ATMS system optimized scaling approach</td>
<td>27 Vehicles</td>
</tr>
<tr>
<td>Self-Haul Customer</td>
<td></td>
<td>25 Vehicles</td>
</tr>
<tr>
<td>Long-Haul Vehicles</td>
<td>Bypass Road</td>
<td>Bypass Road</td>
</tr>
</tbody>
</table>

*Queuing capacity includes driving lanes only.

**Traffic management:** Traffic management at the site is managed through several different techniques, an active queuing management system at the scale plaza, signage throughout the facility, and Station Operators receive training in traffic safety techniques. The primary design element for traffic is the counter-clockwise flow of traffic through the site, which virtually eliminates bisecting traffic, and smoothed the flow of traffic without crossover and four-way intersections.

**Emergency Storage:** The previous facility had minimal on-site emergency surge capacity allowing only one day of peak storage. The new facility is designed to accommodate three days of anticipated MSW, on the tipping floor, up to 7,404 tons (2,468 tons per day x 3 days) using the peak daily tonnage projection for the year 2030. This storage capacity is provided in the event of service disruptions such as natural disaster, extreme weather conditions, or emergency operations. Additional emergency storage can be provided using enclosed trailers parked at the facility, providing approximately 1,200 tons of capacity in 44 trailers.

**Recycling:** This facility is the first within King County to have material recovery where recyclables are separated from the solid waste. The recyclables are sorted into bins and then baled on site. Bales can be stored until pick up using the facility’s cargo loading area.

**Dedicated recycling area:** Bow Lake receives a combination of mixed and pre-sorted solid waste, recyclables, and yard waste. The facility includes a 1-acre collection and yard waste exterior areas for collection and sorting of clean wood, scrap metal, paper, glass, and yard waste. Manufacturers turn the recyclables into new products ranging from countertops to fleece jackets and more.

**Reweigh option for mixed loads of MSW and recycling:** The previous facility did not have a fee based recycling capability and recyclable tonnages delivered to the site were unable to be tracked. The new facility allows KCSWD to vary tipping rates based upon recyclables/yard waste/and MSW tonnages by having a turn-around scale re-weigh option.
Impact Reduction

**Dust and odor:** The high-pressure misting system is supplemented by an active, high-volume dust containment and filtration system to deal with particularly dusty loads of solid waste. Taken together, the misting and dust collection systems maintain good indoor air quality and minimize the amount of dust and odors that leave the site. The facility employs an active high-pressure misting system that includes natural odor eliminating chemicals. The facility also includes a solid waste pre-load compaction system that permits the use of sealed long-haul trailers, which do not allow odors to escape.

**Noise:** The building is entirely enclosed, which limits garbage truck backup beep and engine noise from impacting neighboring properties. The design of the site and the placement of the buildings buffer residences to the west from the operational areas of the facility.

**Birds and other vectors:** A constant at all transfer stations is the infiltration of rodents and birds seeking opportunities to not only consume garbage, but to nest within close proximity to food sources. The new facility actively deters rodent nesting through the use of hard materials such as concrete, metal, and rigid insulation. Birds are deterred through a passive wire system at the perimeter of all building roofs. The interior exposed structure of the facility is smooth, and much consideration was given to minimize locations for birds to perch and nest.

**Transfer trailer trip reduction:** Transfer trailer trips from the site to the Cedar Hills Regional Landfill have been reduced by about 30% due to the use of pre-load compactors and fully enclosed hauling trailers that allow for consistent loading. At the old station, tamped loads would weigh between 13-23 tons, and the varying weights meant more trips. With the pre-load compactors, Bow Lake’s trailers can now leave with consistent 25 ton loads, consistently reducing not only fuel consumption, but vehicle emissions and green house gases, traffic (on and off-site) and long term wear on vehicles.

Disaster management

**Seismic design:** The project location is within a USGS High Hazard Zone. The entire structure, including outbuildings and scale facility have been designed to meet earthquake code standards related to the project location.

**Conference rooms designed to be used as emergency command centers:** The transfer station was designed to remain operational in the event of a natural disaster. The facility offers two conference rooms with full A/V equipment and emergency power generator. The project was designed to allow operations to resume immediately following a major storm or seismic event.

**Design for immediate occupancy seismic standards:** The facility is designed to meet Factory Mutual Global I-90 wind standards for the entire building envelope. The Emergency storage on the tipping floor has capacity for up to three days of solid waste intake. Other design aspects included standby power generation, and a fully functional Command center.

1.3 Innovative or Unique Aspects of the System

**Daylighting and auto-dimming fluorescent lighting:** During the design phases, daylighting models were studied and tested using the Daylighting Design Lab in Seattle, Washington. Six different roof and wall glazing concepts were given quantifiable measurements within a scale model of the 64,000-sf tipping floor. The use of modeling led to the design of an extensive natural daylight system in the transfer building maximized by use of tubular skylights, translucent wall panels and large translucent panel skylight spanning the entire width of the tipping floor space. Computer and physical daylight studies optimized the high-efficiency dimmable lighting system to automatically adjust to changing natural light levels. The combined effect of all energy saving strategies is a facility that uses 63% less than the ASHRAE standard for energy-efficient buildings. The daylighting is supplemented by high-efficiency fluorescent lights that automatically dim depending on the level of daylight. These measures contribute to significant energy savings, improved safety and worker comfort, virtually eliminating the “blackout” drivers experience when transitioning light exterior to dark interior buildings.
Natural lighting – Use of semi-transparent panels minimizes overhead lighting needs.

Rainwater harvesting for washdown: The rainwater collection system can hold 30,000-gallons of rainwater from the transfer building roof and is used to wash the receiving floor, solid waste processing equipment and to flush toilets, saving an estimated 1.8 million gallons of water annually. The design reduced potable water use by 59% over a traditionally designed system. Low flow water fixtures were installed in the locker room and toilet facilities. Drought tolerant native plants were used to avoid the need for a permanent irrigation system.

Vehicle tire wash: Commercial hauling vehicles exiting the Transfer Building pass through an automated tire wash to remove contaminants from tires that would otherwise compromise surface water quality and possibly result in waste track-out on the neighboring roads and highways.

Compactor waste heat collection: Heat generated from the compactor hydraulic power units (HPU) is collected and used to provide the building’s hot water supply. This dual purpose effort both cools the HPUs and provides hot water for the facility.

Variable Frequency Drive (VFD) Motor-Controls: These sophisticated electronic controls significantly reduce power consumption and increase HPU motor life. The Bow Lake is the first facility where this control technology has been applied to solid waste pre-load compactors.

High Recycled Content and Sustainable Materials: Bow Lake used materials with 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-content gypsum board, insulation and glazing. 90% of wood used on the project is certified by the Forest Stewardship Council (FSC). Fly ash used within the concrete prevents 83 tons of CO2 from being introduced into the atmosphere. Post-consumer recycled content totaled 34% of all materials and 35% of all materials were manufactured within 500 miles of the project site. The project’s asphalt paving contains Recycled Asphalt Shingles, preventing more than 3,901 tons of used shingles material from being sent to landfill.

High Recycled Content and Sustainable Materials: Operator break room and conference room furnished with rapidly renewable, high recycled content, recyclable, no-VOC materials, and low energy consumption appliances.
**Construction Waste Diversion:** A comprehensive construction waste management plan resulted in more than 97% of the demolition and construction waste being diverted from the Cedar Hills Landfill. This percentage exceeds the exemplary performance standard of 95% by LEED NC-2.1 guidelines.

**USGBC LEED:** The project was developed under the United States Green Building Council (USGBC) LEED process which provides a systematic way of quantifying and documenting the sustainability measures incorporated into the design. While targeting a minimum LEED Gold certification level, the project has been awarded sufficient credits to achieve LEED Platinum certification.

### 1.4 How is facility an improvement over prior transfer station?

**The old, outdated, undersized scale facility:** The previous station could accommodate an average capacity of 750 tons per 10 hour day and a peak capacity of around 1,400 tons for a 24 hour period. Average Daily Tonnage 2005: 792 tons peak average and 1235 tons peak. The new transfer station is designed for an estimated tonnage projected to 2030 and illustrated in the table below. **Note:** Weighed recyclables collection was not included in the 2006 Facility Master Plan.

<table>
<thead>
<tr>
<th>Component</th>
<th>2030 Quantity (tons)</th>
<th>2030 Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW, Average Daily</td>
<td>1,384</td>
<td>1,047</td>
</tr>
<tr>
<td>MSW, Peak Daily</td>
<td>2,468</td>
<td>2,104</td>
</tr>
<tr>
<td>Yard Waste, Average Daily</td>
<td>38</td>
<td>150</td>
</tr>
<tr>
<td>Yard Waste, Peak Daily</td>
<td>127</td>
<td>428</td>
</tr>
</tbody>
</table>

*Tonnage from 2006 Facility Master Plan Update, Bow Lake Recycling/Transfer Station*

**Tipping Floor:** The original facility consisted of an open air canopy with direct-dump discharge into an open maceration pit with waste tamped into top load trailers. MSW was tamped using knuckleboom cranes, however it was not compacted. The discharge area was two sided, capable of serving 8 customer vehicles concurrently dumping into two top-load trailers.

The new facility optimizes flexibility and efficiency through: 1) Large, flat area for commercial tipping, 2) waste handling operations have room to maneuver, 3) a push-wall allows operators to guide waste towards compactor chutes with less overrun, 5) the floor allows loaders to scrape the waste rather than drive over it reducing long term maintenance needs for vehicles, 6) a stepped floor protects self-haul customers from operations equipment and falls. The large tipping floor allows space for recyclables recovery and processing with less maneuvering than a compact space.

**Previous inadequate queuing:** Previous transfer station queuing was minimal with only one entrance and one exit lane at the facility. See 1.2 Merits of the Facility for more information about adequate queuing.

Prior lack of preload compaction: There were no weighing scales in the trailer loading bay to help operators determine when the trailer reaches optimum load. Transfer trailer payloads averaged around 18 tons. Bow Lake’s trailers can now leave consistently with 25 ton loads. See 1.2 Merits of the Facility for improved Transfer trailer trip reduction information.

**Aging facility with inadequate seismic design:** Early evaluations of the previous transfer station revealed the facility was no longer in conformance with modern seismic code. The new facility was constructed using IBC 2006 Building Code standards, as an Essential Facility, **Group IV.**

**Lack of emergency storage capacity:** The original facility, with open sided structure and tarp covered tamped topload transfer trailers provided minimal storage for MSW and operated at full (90%-100%) of capacity each day when it was demolished in 2012. See 1.2 Merits of the Facility, for more information about Emergency Storage.
Nonexistent recycling facility: Without recyclables the original facility used a free self-serve recycling system consisting of 3-4 roll-off containers. The recycling capacity was limited and the County did not have the ability sort mixed waste on site or bale recyclables. See 1.2 Merits of the Facility, for more information about Recycling.

On-Site Water and Wastewater Systems: The previous transfer station produced over 700,000 gallons of Leachate wastewater annually due to a system that combined both stormwater and wastewater. With no connection to a sewer main this wastewater was collected in tanks and taken for disposal to leachate lagoons at the Cedar Hills Landfill. The new facility has separated Leachate collection, stormwater collection and treatment, and rainwater collection. Separating stormwater and rainwater from Leachate conveyance has greatly reduced the amount of water requiring treatment, and connection to a new sewer main has eliminated the wastewater tank trips to Cedar Hills Landfill.

2 Environmental Controls & Regulatory Compliance

2.1 Environmental protection, “state of the art” transfer station

On-going environmental protection

Every aspect of this facility is designed to provide improved on-going environmental protection above and beyond a traditional solid waste transfer station. From LEED Certification through regulatory agency monitoring and practical approaches to handling MSW, the Bow Lake Facility exemplifies a modern, environmentally conscious facility. Examples of on-going protection include: Leachate is separated from stormwater and rainwater, reducing overall volume of water requiring treatment. Environmental enhancements include a vehicle tire wash with water treatment reducing the volume of wastewater, a methane gas mitigation system, reduced trips to Cedar Hills Landfill (30% less), and reduced annual energy use by 63% over the code minimum.

Environmental protection during construction

King County assumed risk in redeveloping the site that is a closed landfill, where the extent and level of soil contamination was unknown. The team’s environmental specialist developed a detailed health and safety plan for the project to utilize during mass excavation. Strict TESC measures were implemented from the outset of sitework until project completion.

Removal and disposal of landfill material: Soil conditions had to be considered and tested as the project progressed to ensure stability and to avoid contact with contaminated soils. A stockpile of unsuitable soils remaining from the construction of I-5 had to be removed from the site. Due to the site’s soil conditions and historic use as a landfill, a methane gas mitigation system was installed under new buildings. The constructed monitoring system includes active monitoring, methane barriers, and ventilation.

2.2 Human health, environmental quality and resource conservation

Going above and beyond the baseline regulations, the facility embodies a holistic approach to transfer station design. The entire project symbolizes King County’s continuing efforts to protect health, environment, and conserve resources. Highlighted elements include:

On-going environmental protection: The facility uses 63 percent less energy than a similar code-minimum project. This level of savings reduces carbon dioxide emissions by 172 metric tons annually.

Material recovery and recycling provisions: The facility diverts materials from landfill including Yard Waste/Organics, recyclables, and construction waste.
Daylighting: Used extensively to provide even lighting distribution levels improving safety conditions and saving energy. See 1.3 Innovative or Unique Aspects of the System for additional daylighting information.

Work environment: The work environment is improved through the use of natural daylighting, low/no VOC materials, MERV clean air filters, and combined break/warming areas.

Waste heat harvesting: Heat generated from hydraulic power units (HPU) of the compactors is collected and used to provide the building’s hot water supply. This dual purpose effort both cools the HPUs and provides hot water for the facility.

PV panels: 60 photo-voltaic cells (15 kilowatts = 2.5 % building power provided).

LEED: The project has been awarded LEED Platinum certification.

2.3 Is the site in environmental compliance?

The main facility permit is the Solid Waste Operating for which compliance inspections are conducted regularly. Other permits include the Industrial Wastewater Discharge Permit and the Department of Ecology NPDES permit. During construction, the site followed a strict TESC plan, protecting local waterways and restoring native plant species. See 2.1 Environmental protection, state of the art transfer station for more information.

As a complete project, the design simplifies environmental compliance for the county through the following key items: a fully-enclosed MSW/Processing building; paved impervious traffic areas with special provisions for collecting leachate; no exposed zinc-leaching surfaces; restored native plants; developed leachate collection system, and designed an active/passive ventilation system contributing to improved indoor air quality over a standard enclosed transfer station.

2.4 Awards, letters or facility inspection data

The facility has been fully operational since October 2013 and to date has earned the following recognition:

NWCCC Award: The project was awarded the 2013 Green Project of the Year, $10M-$100M Category by the NWCCC.


USGBC LEED: The project has been awarded LEED Platinum certification.

2.5 Complimentary to other local solid waste management systems?

As part of the continuing efforts of the County to serve the community, the Facility responds to the SWD’s guidance documents, the Comprehensive Solid Waste Management Plan and the 2006 Transfer and Waste Management Plan. prepared in accordance with Washington State law Revised Code of Washington (RCW) 70.95. Draft policies, recommendations, and goals are presented for the following elements of solid waste management: system planning, waste prevention and recycling, solid waste collection and processing, the transfer system, landfill management and solid waste disposal, and system financing. The Transfer and Waste Management Plan provided recommendations for upgrading the division’s aging transfer system, strategies for extending the lifespan of the Cedar Hills Regional Landfill,
and options for preparing the landfill for eventual closure. The Bow Lake Recycling and Transfer Station is a realization of the County’s plan.

3 Program Planning

3.1 Description of the facility’s planning process

The project team responded to a variety of challenges including difficult topography and soils, maintaining uninterrupted transfer station service during construction and coordination with multiple jurisdictions and public agencies throughout a multi-phased planning process.

Comprehensive Solid Waste Management Plan: Economic analyses, project objectives, facility requirements, site selection considerations and other aspects of the business model were articulated in the County’s 2001 Comprehensive Solid Waste Management Plan (CSWMP), the 2006 Solid Waste Transfer and Waste Export System Plan (SWTWESP) and supporting studies. These plans were developed through a regional public inter-jurisdictional planning effort which addressed all aspects of solid waste management within King County, including capital projects. And they are the foundational planning documents for the development of Bow Lake.

Facility Master Plan: The 2006 Bow Lake Facility Master Plan (FMP) represented a bridging document between the 2001 CSWMP and the more detailed basis of design engineering that followed. It included detailed project scoping; functional requirements and design criteria; phasing and scheduling analyses and cost estimates. The FMP was reviewed for conformance with the 2001 CSWMP and 2006 SWTWESP, and approved by the King County Council before proceeding with detailed engineering.

Basis of Design Document: Front-end engineering design (FEED) techniques were employed in the preparation of the 2007 Bow Lake Basis of Design Report (BODR). The BODR summarized preliminary detailed site evaluations, environmental assessments, functional requirements and design criteria, phasing analyses, cost estimates and equipment lists. The BODR also included building programming and parameters for civil, architectural, structural, mechanical and electrical design. Constructability and values analyses were also undertaken during preparation of the BODR.

Alternative Procurement Process: KCSWD employed a “best value” selection process authorized under RCW 36.58.090 to select the facility contractor. This process afforded extensive opportunities for the three shortlisted proposing contractors to interact with the owner and the owner’s design team at multiple stages in the selection process. The process provided assurance with respect to cost, schedule, quality assurance procedures, construction safety plans and environmental protection measures.
**Value Engineering:** The Bow Lake project was subject to value engineering, constructability reviews and a risk analysis process that extended from the beginning of the design process through the end of the construction period. The contractor and third party consultants all participated in the process, which played a significant role in achieving an on-time project delivery, minimized construction conflicts and managed project budget.

**Split Construction Contract:** The front-end project planning efforts identified significant benefits to project schedule and risk management by dividing the construction into two contracts: one for site preparation and another for facility construction. This allowed the extensive preparatory civil site work to get underway during the favorable earthwork season while the detailed design was being completed and the facility construction contractor was being selected.

**Phased Construction:** The Bow Lake Recycling and Transfer Station is the busiest transfer station in King County’s system, handling one third of all of King County’s solid waste. It was essential that operations at the existing facility would remain unimpeded throughout the entire construction process, which included five construction phases: A) Site preparation, B) Construction of the new replacement facility, C) Deconstruction of the existing facility, D) Construction of the new scale facility and trailer storage area, E) Deconstruction of the existing scale facility

### 3.2 Is the planning process effective?

The multi-part planning process consisting of: 1) Comprehensive Solid Waste Management Plan, 2) Facility Master Plan, 3) Basis of Design Report and 4) Design Documentation was highly successful. Background documentation provided continuity throughout the project and informed the design and construction phases. The project team, including stakeholders, design team, and contractors were able to understand each element of the complex project because of readily available planning documentation. The Facility was delivered on time, overall cost was 4% under budget, and the project was completed without any service interruptions.

### 3.3 Plan for addressing system downtime

Bow Lake handles over 30% of the solid waste in the King County transfer system and it was essential to have uninterrupted service for private and commercial customers during the construction period. In-Operation Emergency Downtime is addressed through the inclusion of standby power generator, direct-drop provisions, three-day emergency storage, flexibility in charging different fees for different materials using re-weigh scale option.

### 4 Performance, Economics and Cost Effectiveness

#### 4.1 Describe the efficiency of the operation

**Functional and Safe Tipping Floor:** The facility has a stepped tipping floor with self-haul customers separated from commercial haulers and operations vehicles by a physical barrier. The barrier serves multiple purposes: it allows operations vehicles to scrape debris along the barrier, self-haul customers are able to be easily seen by operations staff, and the separation allows large commercial vehicles room to maneuver without combining with people who are standing outside of their cars. The striped self-haul floor is designed and striped to allow a safety shadow between vehicle and wall, whereby customers have a place to stand when unloading MSW.
ATMS and segregated traffic flows: The scale plaza operates three (3) 60-foot low profile pit scales, and one (1) 90-foot low profile bi-directional scale. Traffic flow is directed using an Automated Traffic Management System (ATMS) reducing scale wait times and minimizing the number of vehicles waiting at idle in the inbound and outbound queues. The ATMS activates lights, direction signals, and lift gates to manage the scales. Additional systems at the scale plaza include the use of card readers for Commercial Haul customers with an account and the use of a Pneumatic Tube delivery system to the outermost scales for Self-Haul customers. These cohesive systems allow the facility to operate with only a single, two-sided scalehouse and two attendants at peak-volumes.

Bird Deterrent System: Fixed bird wires on all buildings, smooth interior finishes, and the use of compaction into closed containers has greatly minimized bird accumulation at the site.

Material Recycling and Recovery: The large tipping floor allows County operators to quickly separate high value recyclables from the landfill waste by sorting and diverting it to bins, roll-off boxes, and a baling unit with conveyor located at the north end of the facility.

Two preload compactors: The use of this technology allows solid waste to be compressed into bales and ejected into lightweight, 53 foot transfer trailers or rail shipping containers. Trailer loads are monitored using the compactors’ built-in scaling system to ensure efficient loading below the maximum roadway load limit. This methodology results in a nearly 30% reduction in the number of transfer trucks when compared to conventional top-load systems. This saves fuel, reduces traffic and minimizes road wear.

4.2 Operational Performance

Operational performance has been observed several different ways at the facility following the opening of the fully functional facility. The following elements highlight the achievements of operational performance goals:

Waste Handling: The facility is meeting tonnage handling forecasts for MSW and the facility has seen an increase in the amount of Yard Waste tonnage that is able to be processed at a rate above and beyond the 2013 forecasts. In the first three full months of operation of the yard waste direct drop chute, collection has increased 146%. The facility is the first King County Transfer Station with the ability to separate and process recyclables from the MSW stream.

<table>
<thead>
<tr>
<th></th>
<th>2013 Forecast</th>
<th>2013 Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>MSW</td>
<td>243,300 tons</td>
<td>242,600 tons</td>
</tr>
<tr>
<td>Yard Waste</td>
<td>4,100 tons</td>
<td>3,100 tons*</td>
</tr>
<tr>
<td>Recyclables</td>
<td>No forecast*</td>
<td>1,614 tons*</td>
</tr>
</tbody>
</table>

*Yard waste and Recyclables collection areas were not completed until October of 2013 and current numbers are on pace to exceed collection goals

Energy Performance: Another amazing benchmark achieved at the facility is exemplary energy savings through the use of a commissioned active/passive ventilation system. Using passive ventilation in conjunction with the active high volume air system resulted in 51.6% energy savings over a traditional active only system. This active/passive system combined with the use of heat recovery equipment for hot water and the use of daylighting/high efficiency lighting fixtures has reduced the overall building energy use by 63% over code minimum.
Natural Ventilation Performance Final Energy Analysis – Annual Savings

<table>
<thead>
<tr>
<th></th>
<th>Baseline - Fan Energy without Natural Ventilation</th>
<th>As Constructed with Natural Ventilation</th>
<th>Energy Savings through Natural Ventilation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>326,748 kWh/yr.</td>
<td>158,186 kWh/yr.</td>
<td>168,562 kWh/yr. 51.6%</td>
</tr>
</tbody>
</table>

### 4.3 How does the organization foster customer service?

**Provision for school education and tours:** King County Transfer stations are the public face of the solid waste system. The KCSWD is always striving to improve their customer service. All on-site personnel including scale and transfer station operators directly serve the public, helping them to use the transfer station safely; informing them of rates and available services; and providing education about safety and environmental issues such as illegal dumping and covering loads during transport. A learning space and separate restroom facility was designed near the entry of the facility for easy access for educational tours and events.

**Signage:** Consistent with King County policy, all signage at Bow Lake, and all critical public information materials are presented in both English and Spanish. Materials are in development in additional languages that are well-represented in the service area. Solid Waste Division staff have gone above and beyond the normal requirements of customer service to help customers retrieve items that were accidentally disposed. In these incidences, staff have pulled aside trailers suspected of containing the lost items and searched through garbage until, in several cases, valued artwork or family heirlooms have been located.

**Website:** The division’s website, (http://your.kingcounty.gov/solidwaste/index.asp) which has also been created in Spanish, continues to be a well-tapped source of solid waste information, with nearly 1.4 million unique page views in 2013. Over 75 percent of those visits were to the following sites:

- The “What Do I Do With ...?” website: Guides the user to the many vendors that accept materials for reuse, recycling, or disposal. The six most frequent searches continue to be for Appliances; Electronics; Batteries; Furniture; Landscaping/Land clearing; and Construction and Demolition Debris.
- Transfer station and facility-related information: Includes division hours of operation, directions, and station closures, as well as daily updates on the status of facilities during major weather events.
- Garbage and Recycling site: Includes city-specific curbside hauler information, location, and driving directions to the nearest transfer facilities, contact information for each suburban city, and details about special recycling events. Also includes environmental education topics such as Recycle More and Zero Waste.

**Public Information:** The Take it Back Network: A partnership of government agencies, retailers, repair shops, charitable organizations, and recyclers that provides consumers with options for recycling certain wastes – and their hazardous components – in a safe and cost-effective manner.

### 4.4 Facility operates within budget, and costs appropriate for size?

**Staffing:** Due to increased operations efficiencies, the facility is staffed with half of the estimated operators from the 2006 Facility Master Plan (FMP). Though the County only needs the current number of employees, the facility has been designed to accommodate staffing increases till 2030. Due to facility operations efficiency, staffing is proving to be effective with fewer operators needed than anticipated, as illustrated below.

<table>
<thead>
<tr>
<th>Daily Staffing</th>
<th>2006 FMP</th>
<th>2011 Estimate</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Operators</td>
<td>14</td>
<td>17</td>
<td>10</td>
</tr>
<tr>
<td>Scale Operators</td>
<td>6</td>
<td>10</td>
<td>4</td>
</tr>
</tbody>
</table>

**Enhanced Commissioning:** The use of Enhanced Commissioning contributed to increased energy savings through efficiencies gained from a highly tuned system. Energy modeling for the new facility indicated the facility uses more than 63% less energy annually than a code minimum building of similar size.
4.5 Facility designed and operated as budgeted and expected?

As a publicly owned facility, the revenue generated at Bow Lake is combined with revenues of the other solid waste transfer stations operated by the County, revenue specific to Bow Lake is unavailable. However, the new, fully operational facility was designed and completed 4% under budget, handling anticipated tonnages at rates set by the County.

5 Utilization of Equipment/Systems and Technologies

5.1 Types of equipment being utilized

The use of compaction equipment was important to the County and vital to operations within the new, larger facility. Though the list of equipment is longer for the new Transfer Station, the overall operations efficiency is improved, and environmental impacts are reduced.

<table>
<thead>
<tr>
<th>Current Operations Equipment</th>
<th>Mobile Equipment</th>
<th>Previous Operations Equipment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fixed Equipment</td>
<td>Fixed and Mobile Equipment</td>
<td></td>
</tr>
<tr>
<td>Preload compactors (2)</td>
<td>Wheel Loaders (2)</td>
<td>D7R Dozer (3)</td>
</tr>
<tr>
<td>Conveyor/baler</td>
<td>Forklift</td>
<td>Knuckleboom Crane (2)</td>
</tr>
<tr>
<td>Tire Wash</td>
<td>Vactor trucks</td>
<td>Forklift</td>
</tr>
<tr>
<td>Rainwater Collection System</td>
<td></td>
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<tr>
<td>Dust Filtration System</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pneumatic Leachate Collection Valves</td>
<td></td>
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</tbody>
</table>

5.2 Detail efficiency and effectiveness of equipment

The combined use of new equipment has smoothed operations at the facility and contributed to the ability to handle increased tonnages, the equipment not only provides increased operational ability, it is reducing operations costs due to the following factors:

- Trips to Cedar Hills Landfill have been reduced by 30% due to pre-weighed compaction and enclosed transfer trailers
- Aggregate rainwater collected is reducing the amount of potable water used to wash floors and lowers the amount of dust and odor within the facility
- Cardboard collection and baling reduces the volume of space needed to contain loose recyclables
- The use of two large loaders allow more waste to be maneuvered to be staged for compaction with less movements
- High volume dust collection allows the facility to filter out contaminants prior to release into the atmosphere
- Previous Dozer equipment cost $313,515 annually in fuel, maintenance, and repairs. The new, efficient wheel loaders cost $203,587 for fuel, maintenance, and repairs, a savings of more than $100,000 per year. Due to the use of top-load compaction, knuckleboom cranes were not needed in the new facility, providing additional maintenance cost reduction
- The facility is currently running smoothly and efficiently within projected MSW tonnages

6 Worker Health & Safety

6.1 Describe employee training frequency and safety procedures
Training & Meetings: During construction site specific safety meetings were held for each trade involved on the project. The weekly construction meeting included safety as the first item on the agenda. Project superintendents and safety supervisors also possessed 40-hr Hazwoper plus 8-hr Supervision certifications.

On-Going Training for Bow Lake staff includes initial training for all of the operators: This is also followed up with quarterly meetings with the operators to discuss any new station issues and any new or potential safety items that need to be addressed. These meetings provide the basis for review of operating and safety procedures. KCSWD also has annual training sessions that focus on proper standard operating procedures for spills within the facility and hazardous materials handling.

6.2 Describe safety procedures and injury rate management

Safety Procedures and Injury Rate Management - During Construction: Providing a safe and healthful workplace for the team began with clear pre-planning and communication to all project personnel and subcontractors. Safety was foremost on the site and activity ceased on several days because of potentially hazardous conditions due to ice and wind. The Contractor’s Safety Department visited the site weekly and for incidents. Health and safety best practices were identified as basic responsibilities of the site personnel and supplemented by assistance, coaching, and monitoring by the Contractor’s Safety Department enforcing Best Management Practices (BMP’s) and regulations when necessary.

Safety Program Employed - During Operation of the Facility: The Solid Waste Division has developed a comprehensive health and safety plan, and specific basic safety rules for its transfer stations, this along with specific procedures for personal protective equipment use, lockout tag-out procedures, cold and hot weather procedures, ladder safety along with training in equipment safety, blood borne pathogens, chemical safety, fire safety and asbestos awareness work together to help employees prevent injuries.

7 Public Acceptance, Appearance and Aesthetics

7.1 Discuss overall appearance of facility

Structures: The overall project appearance is reflective of both the project’s function and use as a modern, sustainable industrial facility. The building form, structure, and appearance are a direct function of building form following function. Building heights were carefully calculated to minimize visual impacts from residences to the West, I-5 Southbound, and buildings below the facility to the East. Building materials and finishes were selected to provide the highest durability to meet the 40-year design life of the facility. Interior finishes were selected to reflect their use of natural, sustainable materials and provide high durability with low long term maintenance.

Landscaping: Similar to the primary goals of the overall facility, landscaping design at the project site was the use of hearty, native plantings, combined with hillside slope restorative plantings. Additionally, functional plantings requiring minimal maintenance were selected.

7.2 Describe the maintenance program

The facility undergoes a regular inspection program (weekly, monthly checklists), and solid waste operating permit inspections by Public Health. In addition to the inspections, the elements as constructed have a long-lasting design life and require minimal maintenance as outlined below:

Low-maintenance finishes: Durable, recyclable/recycled content finishes were selected throughout the building. Wear-resistant flooring is utilized in all areas. Concrete and resilient flooring were used in office areas.
Low-maintenance roof: The Gutter/downspout design utilized large gutters that empty into downspouts tight-lined to underground rainwater collection tanks.

No mechanical equipment on roof: To simplify routine maintenance, mechanical equipment was kept clear of the primary roof structure and is accessible by rooftop staircase. Mechanical equipment within the tipping floor area is kept to a minimum alleviating bird nesting areas and providing a cleaner surface finish.

Low-maintenance landscaping: Due to the use of native, hearty landscaping the project did not need to install a permanent irrigation system. Plantings having minimal flowers/berries/and species were selected to survive and require little maintenance.

7.3 Does the program provide public relations and public education?

Outreach during design and construction: Direct contact with city officials was sought early in the project planning process and focused on these strategies:

Direct Contact with City Officials: The SWD conducted a public involvement process as part of the project and provided an opportunity for customers, area residents and other interested parties to learn about and to offer their comments on the planned renovations. They worked with the host city, Tukwila, and with other cities in central and south King County whose residents use the Bow Lake facility, to publicize the planned renovation.

Project Mailings: A project flyer was given to all customers at the station and provided an opportunity to provide written feedback regarding the project. In addition this flyer was provided to local municipalities and community groups.

Social Media: A project webpage was established and maintained on the King County website that provided information about the project from pre-design activities through final construction completion. Special features on the website included public notices and 3D videos of the project’s features.

Minimized Inconvenience: To minimize inconvenience to the public, the County decided to keep the Bow Lake station open 24 hour per day throughout the 5-year redevelopment period. The County also made extensive use of both County and contractor flaggers throughout the construction period to safeguard the public and minimize the delay of customer traffic on the project site.

Open House: A preliminary Open House community meeting was held at the local community center during the State Environmental Policy Act (SEPA) review phase, well in advance of construction. This introduced the new project, its timing and the potential effects the project would have on the community.

Public Education: The new facility is designed for tour groups and classes upon request. King County makes this facility available for learning about sustainable features of the facility; efficient handling of waste and recyclables; low noise/odor operations and processing. King County has had education tours for SWANA and WSRA (Washington State Recycling Association) highlighting the features of the station providing a foundation for knowledge of others in our community.

7.4 Is the facility a good neighbor?

The old transfer station was open-sided. Neighbors and customers were concerned about noise, odor, dust, and vectors (rodents/birds). During design of the new recycling and transfer station, a holistic approach to site and building design was employed, integrating sustainable design with the necessary functional industrial elements.

7.5 Results of customer intercept, mail or telephone surveys

The division’s Customer Service Unit (CSU) fields customer inquiries that come by telephone and through the website comment form. In 2013, the team responded to more than 34,000 telephone inquiries and 1,300 website e-mail requests. The CSU assists customers with website searches to help them download brochures and access detailed information about programs. They responded to all of the inquiries (approx. 450 call for 2013) that came into the Illegal Dumping Hotline.
**SWANA 2014 Excellence Award – Transfer Station**

**Bow Lake Recycling and Transfer Station**

King County Solid Waste Division

**Supplemental Materials**

**LEED SCORECARD**

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**Bow Lake Recycling and Transfer Station - Tukwila, WA**

**LEED 52-69 PLATINUM**

<table>
<thead>
<tr>
<th>Sustainable Sites</th>
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<tbody>
<tr>
<td>EFSC: Estimation and Sedimentation Control</td>
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<tr>
<td>Site Selection</td>
<td>1</td>
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<tr>
<td>Urban Redevelopment</td>
<td>1</td>
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<tr>
<td>Biomass Recycling</td>
<td>1</td>
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<tr>
<td>4.2 Alternative Transportation, Bulk Storage &amp; Changing Rooms</td>
<td>1</td>
</tr>
<tr>
<td>4.5 Alternative Transportation, Alternative Fuel Refueling Stations</td>
<td>1</td>
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<tr>
<td>4.4 Alternative Transportation, Parking Capacity</td>
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<tr>
<td>5.1 Reduced Site Disturbance, Protection of Rare Habitats</td>
<td>1</td>
</tr>
<tr>
<td>5.2 Reduced Site Disturbance, Development Footprint</td>
<td>1</td>
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<tr>
<td>6.1 Stormwater Management, Rate or Quantity</td>
<td>1</td>
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<tr>
<td>6.2 Stormwater Management, Treatment</td>
<td>1</td>
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<tr>
<td>7.1 Reclamation, Retention &amp; Design Post-land Reduction</td>
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<tr>
<td>8 Light Pollution Reduction</td>
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<thead>
<tr>
<th>Water Efficiency</th>
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<tbody>
<tr>
<td>1.1 Water Efficient Landscaping, Reduce by 50%</td>
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<tr>
<td>1.2 Water Efficient Landscaping, No Potable Use or No Irrigation</td>
<td>1</td>
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<tr>
<td>1.3 Innovative Water Management</td>
<td>1</td>
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<tr>
<td>1.4 Use Water Reduction, 10% Reduction</td>
<td>1</td>
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<tr>
<td>1.5 Use Water Reduction, 20% Reduction</td>
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<tr>
<th>Energy &amp; Atmosphere</th>
<th>11</th>
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<tbody>
<tr>
<td>2.1 Fundamental Building Systems Commissioning</td>
<td>1</td>
</tr>
<tr>
<td>2.2 Minimum Energy Performance</td>
<td>1</td>
</tr>
<tr>
<td>2.3 REB in HVAC&amp;R Equipment</td>
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</tr>
<tr>
<td>2.4 HVAC&amp;R Equipment</td>
<td>1</td>
</tr>
<tr>
<td>2.5 Optimize Energy Performance Greater than 42%</td>
<td>10</td>
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<tr>
<td>2.6.2.3 Renewable Energy 2.5%</td>
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<tr>
<td>3 Additional Commissioning</td>
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<tr>
<td>4 Outdoor Air</td>
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<tr>
<td>5 Measurement &amp; Verification</td>
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<td>6 Green Power</td>
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</table>

**Materials & Resources**

| 1 LEED | 1 |
| 1.1 LEED | 1 |
| 1.2 LEED | 1 |
| 1.3 LEED | 1 |
| 1.4 LEED | 1 |
| 1.5 LEED | 1 |

**Indoor Environmental Quality**

<table>
<thead>
<tr>
<th>15</th>
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<tbody>
<tr>
<td>1 Carbon Dioxide (CO2) Monitoring</td>
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<tr>
<td>2 Increased Ventilation Effectiveness</td>
</tr>
<tr>
<td>3 HVAC&amp;R Equipment</td>
</tr>
<tr>
<td>4 HVAC&amp;R Equipment</td>
</tr>
<tr>
<td>5 HVAC&amp;R Equipment</td>
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<tr>
<td>6 HVAC&amp;R Equipment</td>
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<tr>
<td>7 HVAC&amp;R Equipment, ASHRAE 90.1-2004</td>
</tr>
<tr>
<td>8 HVAC&amp;R Equipment</td>
</tr>
<tr>
<td>9 HVAC&amp;R Equipment</td>
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**Innovation & Design Process**

<table>
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<tbody>
<tr>
<td>1 Innovation in Design - Exceptional Performance, Daylighting</td>
</tr>
<tr>
<td>2 Innovation in Design - Solar Collector, Light Control</td>
</tr>
<tr>
<td>3 Innovation in Design - Construction Waste Management</td>
</tr>
<tr>
<td>4 LEED Accredited Professional</td>
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Publication: Environmental Design & Construction (April 2012 Waste Management/Recycling issue)

From “Dump” to LEED Platinum

**King County in Washington State is redefining the solid waste facility**

By: Nori Catabay, King County GreenTools Program

“Waste” for most us means placing things such as bottles, cans, plastic, paper and food in the nearest garbage can or recycling bin. And that’s where the relationship with our trash ends. What we don’t like to think about is that where it goes from there is actually a place, and often that place is a landfill in our neighborhood, our city, our county or our state.
Managing municipal waste is an essential community service that requires an extensive network of haulers and handling facilities. In King County, Washington state’s most populous county, this network manages 800,000 tons of solid waste annually at its regional landfill. Integral parts of this waste management network are the county’s eight transfer station facilities, where garbage haulers, businesses and residents drop off their waste.

Despite their necessity, some communities are resistant to housing transfer station facilities in their backyard. However, King County is proving that through sustainable design and renovation, transfer stations can become an accepted, unobtrusive and even beneficial part of the community and the local environment.

Most of King County’s transfer stations were built in the 1960s and have reached the end of their useful lives. Five years ago, with adoption of a Solid Waste Transfer and Waste Management Plan, King County embarked on a mission to upgrade its aging network of urban area transfer stations to meet current building codes, to improve safety and operational efficiencies, and to accommodate projected future growth in the region. One by one, the oldest stations are being rebuilt to not only operate better, but also to meet the high environmental standards in their buildings, site management and operations.

The first of these renovation projects to be completed was King County’s Shoreline Recycling and Transfer Station, in 2008. “Although the project started with a goal of reaching the U.S. Green Building Council’s LEED-NC Gold certification, it ended up earning all 54 LEED credits it submitted for, and became the first industrial project in the world to earn LEED Platinum,” said Lisa Williams, King County project manager. “It continues to be the only solid waste processing facility awarded this level.”

The Solid Waste Division worked closely on the rebuilding project with the Thornton Creek Alliance, an environmentally-focused community group with high interest in responsible development along salmon-bearing Thornton Creek, which flows through the site.

In 2006, neighbors of the Shoreline Transfer Station had hoped the old facility would close down, not be rebuilt. But with sustainable design as a core objective, King County and the design and construction team set out to change minds and collaboratively build a new facility that exceeded community expectations, offered more recycling services, and actually improved the site’s ecology.

“Water quality tests post-construction show the creek is in better shape now than it was pre-construction,” said DJ Dean, project architect with KPG, Inc. “After completion, the Thornton Creek Alliance actually gave King County an award of commendation for the project.”

The building uses natural daylighting as the primary lighting source, including overhead skylights and translucent, polycarbonate exterior wall panels. A dimming system senses natural light and minimizes electrical consumption by operating fixtures only when needed. As a result, lighting energy costs have been reduced by 50 percent a year in relation to a comparable facility. Energy needs were further reduced through the installation of a 15 kilowatt solar panel array, and an inclined roof that creates a clerestory allowing air to move more efficiently than by using fans. This reduced energy needed for ventilation by 80 percent.

Unlike the old open-air station, the new facility is fully enclosed and parking was provided for industrial vehicles under the building to reduce noise impacts on neighbors. A rainwater harvesting system gathers rain from the roof for use in washing industrial floors and trucks, and to flush high efficiency toilets. This system reduced potable water consumption by 57 percent, saving more than 250,000 gallons each year.
This project’s success is a blueprint for inspiring the other transfer station renovations in King County. Twenty miles south of the Shoreline station, the County is nearing completion of its second LEED-certified station—Bow Lake Recycling & Transfer Station, which is on track for LEED-NC Gold.

Poised on a hillside adjacent I-5 and with sweeping views of Mount Rainier, Bow Lake is the County’s busiest transfer station, operating every day, 24 hours a day, and handling more than a third of the County’s solid waste tonnage. An interim opening of the fully renovated Bow Lake facility is scheduled for this summer, with final completion scheduled for 2013.

“One of our biggest challenges for this project is that the existing station remains fully operational during construction, which is very important to the surrounding community,” said Charlie Conway, lead architect from KPG, Inc.

The new Bow Lake facility will employ pre-load compaction technology where waste from the receiving floor is pushed into chutes, baled and ejected into container-chassis. By loading vehicles to the maximum roadway load limit, the number of vehicles on the road will be reduced by 50 percent, which saves fuel, reduces traffic and minimizes road wear.

Heat from the compactor hydraulic system will be captured and used to heat the administration building in colder months. The compactors will also employ variable frequency drive technology which will significantly reduce energy needs when the compactors are not in full use.

The new Bow Lake facility is expected to reduce energy use by 63 percent in relation to a similar type facility, primarily through the use of daylighting strategies and a light dimming system similar to the Shoreline facility. A 17 kilowatt solar panel array on the roof will return power to the electrical grid.

Visitors to the new station will also find more recycling options. An area that is separate from the general waste receiving area will be devoted to collecting recyclable and compostable material such as wood, metal and yard waste. This station will also be the first to house a material processing and recyclable collection facility in conjunction with waste transfer operations. King County personnel will separate out recyclable materials from the mixed municipal waste and bale materials for shipment to off-site recycling facilities.

Renovations to the Houghton Recycling and Transfer Station in Kirkland were completed to an existing facility in 2011. This project is not eligible for LEED certification because it did not involve building a new facility on site. Instead, architects piloted King County’s new Sustainable Infrastructure Scorecard, which gives design teams a blueprint similar to LEED. The project earned a Gold level on the Scorecard through the implementation of energy- and water-conservation measures, the use of local, recycled and low toxic materials and through upgrades to the stormwater and wastewater management systems.

The Houghton station roof was reinforced and raised by nine feet to accommodate today’s larger waste hauling vehicles, and to meet seismic codes. The project team was able to salvage materials from the existing roof and existing structural supports for a total cost savings of about $300,000. Similar to the Shoreline and Bow Lake projects, Houghton recycled close to 100 percent of its construction and demolition waste along the way. A significant achievement for this project was that station operations continued throughout the roof raising and strengthening reconstruction work. The project also won an APWA Project of the Year award.

Next up for King County is redevelopment of the Factoria Recycling and Transfer Station, which is also expected to achieve LEED-NC Gold certification upon completion in 2016. Like its predecessors, the facility will have the flexibility to accommodate collection and processing of recyclables, and integrate sustainability-themed artwork.

While each of these projects has its own story and challenges, there exists a common thread of striving for environmental and operational excellence. The majority of sustainable building strategies used in these projects to date have resulted in very little capital cost premium, and the strategies that have had a higher upfront cost are expected to be offset by infrastructure and utility cost savings over time.
“King County deserves enormous credit for their responsiveness to the community for these projects,” Conway said.
“They didn’t pursue sustainable building in order to earn credits; they earned credits because they incorporated in features that were important to the community and important for the efficiency of the building and for the health of the environment. They have been genuine in their intentions, and as a result the communities have embraced them wholeheartedly.”

Nori Catabay is a Program Manager in the King County GreenTools Program who leads the internal King County Green Building Team that implements the County’s Green Building and Sustainable Development Ordinance. Learn more about internal King County green building efforts and the GreenTools Program at www.greentools.us.

Profiles of projects:
Shoreline Recycling & Transfer Station
Size: 11 acre site, 76,000 square foot building
Location: Shoreline, Wash.
Date completed: 2008
Project team: Lisa Williams, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Architect: KPG, Inc.
Contractor: Lydig Construction
Commissioning: Ecotone Commissioning

Bow Lake Recycling & Transfer Station
Size: 20 acre site, 83,000 square foot building
Location: Tukwila, Wash.
Date completed: June 2012 (anticipated)
Project team: Tom Creegan, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Design Engineers: SAIC
Architect: KPG, Inc.
Contractor: Lydig Construction

Factoria Recycling & Transfer Station
Size: 9.8 acre site, 93,000 square foot building
Location: Bellevue, Wash.
Date completed: Spring 2016 (anticipated)
Project team: Dwin Ugwoaba, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Architect: J.R. Miller & Associates
Engineers: HDR Engineering
Contractor: TBD Currently in design stage

Houghton Recycling & Transfer Station
Size: 8.4 acre site, 15,144 square foot building
Location: Kirkland, Wash.
Date completed: January 2011
Project team: Francis Gaspay, Project Manager, King County Solid Waste Division
Owner: King County Solid Waste Division
Contractor: PCL Construction Services, Inc.
Engineers: ABKJ/SAIC
County beefs up green building rules with higher standards, new incentives

By JOURNAL STAFF

Low Lake Recycling and Transfer Station in Tukwila is on track for a LEED gold rating. County officials said the $8 million project was on time and $1 million under budget.

King County is stepping up its commitment to green building with a new ordinance approved by the Metropolitan King County Council in October, which takes effect Nov. 30.

Under the ordinance, all county government construction and major renovation projects — including transfer stations, stormwater, roads and bridges — will be required to meet a LEED Platinum rating. Developers will get incentives to build greener projects.

For the past five years, county projects were required to meet LEED Gold standards.

Patti Northrop, project manager for the county's Greenfields program, said the ordinance was developed with input from developers and people from the design, construction and green building industry.

The new policy is intended to help King County meet several long-term targets, including reducing or offsetting 50% of the carbon emissions from government operations by 2020 and reducing or at least offsetting the overall greenhouse gas emissions countywide by 2050. The targets are based on 2005 emissions levels.

The legislation requires that county building projects comply with environmental standards if they can be met within certain cost constraints.

"King County's commitment to green buildings balances two kinds of issues, protecting both the environment and tax dollars, by ensuring project costs aren't substantially increased in order to meet environmental building standards," said Greenfields manager Larry Williams, in a statement.

The 116,000-square-foot building on Othello Road South is being built behind the existing transfer station it will replace. The old station will be maintained until the new one is finished. Crews will then demolish the old station and build a new scale facility in that location. That will allow the transfer station to remain open during construction.

The new transfer station will be similar to one Leelig built three years ago on Shoreline Boulevard. Bow Lake will have translucent wall panels and skylights to bring in as much natural light as possible. It was designed to be LEED Gold plus Shoreline received a platinum certification.

Northrop said the transfer station building should be finished in May 2014 and the new scales in July 2014. The old scales will be demolished after the new scales open. That operation should take about 30 days. The entire project is expected to be finished in December 2014.

Features:
- A modern composting facility
- Sustainable building elements with the goal of meeting LEED Gold rating level and providing high performance
- Refuse compacting capability will increase efficiency of the transfer operation and reduce GHG emissions
- Improved Houghton Recycling and Transfer Station

While this major construction effort took place, the station remained in operation to serve customers.

Features:
- First county project to use pilot Sustainable Infrastructure Scorecard. Achieved Gold rating level and provided thorough credit documentation
- Recycling aluminum, rubber, paper and glass is being offered at the transfer station
- Improving lighting at the site as to not intrude on facility neighbors
- Installation of a sound barrier wall to reduce noise pollution
- Pedestrian pathway improvements to enhance pedestrian safety in the area