Tacoma Solid Waste Management Recovery & Transfer Center
Tacoma, Washington
The innovative, sustainable Tacoma Solid Waste Management Recovery and Transfer Center has vastly improved the handling of solid waste in the city of Tacoma.

Located at the 190-acre Tacoma Landfill, the new $26 million, 83,590-square-foot facility is one of the largest clear-span buildings in the state of Washington. The facility handles 165,000 tons of garbage per year and is designed for peak loads of 1,400 tons.

The new center increases operational efficiency, minimizes operating and maintenance costs, improves safety, reflects state-of-the-art design, provides flexibility to meet future needs, and increases capacity to meet future waste and traffic patterns. The new system consolidates the functions of multiple transfer sites into a single building, eliminating multiple handling of materials.

The facility was awarded LEED Gold certification by the U.S. Green Building Council. Sustainable features include natural ventilation, daylighting and lighting controls, solar panels, harvested rainwater for use in toilets and water-efficient landscaping.
1. DESIGN OF THE FACILITY
A New Strategy Calls for a New Facility

The October 2010 opening of the Tacoma Solid Waste Management Recovery and Transfer Center brought to reality the city’s vision of a modern solid waste system that recovers more materials with greater efficiency.

The Tacoma Landfill site began operation as a municipal landfill in the early 1960s. The site began serving as the center of the city of Tacoma’s solid waste utility in the 1970s, with the construction of an office building, fleet maintenance facility and resource recovery facility for the production of refuse derived fuel. The resource recovery facility operated off and on from the late 1970s until the late 1990s, producing refuse derived fuel used to generate electricity at one of the city’s steam plants. The resource recovery facility was expanded in 1989 to improve the processing line, and at the same time a gravity load public receiving building was constructed at the site. Public recycling and household hazardous waste (HHW) facilities were added in 1994, and the scalehouses were upgraded in 1998.

In the late 1990s, the city’s steam plant reached a critical point. Originally built in the 1930s to burn coal for supplemental power, the steam plant sat largely unused until it was resurrected to burn a mix of coal, wood waste and refuse derived fuel in 1977. Due to age, the city realized that major upgrades to the steam plant’s emissions systems would be required to meet heightened air quality requirements. In addition, it was determined that further improvements to the quality and quantity of refuse derived fuel would need to be achieved at the landfill resource recovery facility for the steam plant to remain economically viable. An upgrade to the resource recovery system was designed, and partners were sought to take on the required renovations and operations of the steam plant. After multiple failed attempts, the city finally abandoned the steam plant and resource recovery facility due to financing challenges and public concerns about air emissions.

For 25 years, the city’s strategy for reduction of the volumes of waste placed in landfills centered on the resource recovery facility and production of refuse derived fuel. After the closure of the steam plant, the city needed a new strategy.

The monies budgeted for the resource recovery facility upgrade were now shifted to the development of the facility as a transfer station. The facility had actually been operating in large part as a transfer station already, due to the unreliability of the resource
recovery facility and the steam plant. Waste was received from the public at the public receiving buildings, where customers unloaded directly into the top of trailers. The trailers unloaded at the compactor building, a 15,000-square-foot building with an AMFAB-Harris compactor purchased in 1991. Collection vehicles unloaded at the compactor building as well, where front-end loaders lifted the waste into the compactor, which then loaded a long-haul trailer. The facilities and equipment were all nearing the end of their useful lives and required frequent maintenance.

Integrated Team Develops Bold Design Goals
The steam plant and the resource recovery facility provided a backdrop for the new Tacoma Solid Waste Management Recovery and Transfer Center project. The city’s engineering staff and Solid Waste Management Division (Solid Waste Management) developed a set of goals for the project, including:

- Improving operational efficiency
- Improving employee and customer safety
- Providing a state-of-the-art facility with current technology and design features
- Reducing operational and maintenance costs
- Providing flexibility for the future
- Increasing capacity
- Utilizing sustainable design features

A design team was selected through a competitive request for qualifications selection process. The design team consisted of:

- HDR – Civil, Mechanical, and Electrical
- JR Miller and Associates – Architectural and Structural
- AHBL – Site Structural
- HWA GeoSciences Inc. – Geotechnical

The approach for completing the programming/planning phase of the project involved two steps. First, the city and members of the design team toured several transfer stations and recycling facilities throughout the Pacific Northwest. Solid Waste Management staff members were able to gain insights from different operators of which features they liked and which features they disliked. The second step was a series of workshops to develop alternate schemes, or site layouts. Notes from the tours were summarized and used in the workshops.

Through evaluation of the conceptual options, the design team determined that the budget allocated for the project was not enough to build the facility needed to best meet the project goals. A phased approach to the project was proposed, with the design allowing for an initial phase to be built with the available budget, and a second phase designed to be added on when additional budget could be procured.

Design Concept Helps Tacoma Meet Its Goals
The winning layout incorporated many design concepts tailored to meet the project’s goals.

Operational Efficiency – The new facility consolidated operations into a central building, eliminating double- and triple-handling of materials to get materials from the location where they are received to the location where they are processed. This centralization reduces the amount of equipment needed at multiple locations, as well as the number of solid waste workers required to staff those locations.

The new facility also is positioned to create a more direct route in and out of the facility. The city decided to create a new entrance road for city collection vehicles. This design element separated collection trucks from self-haul traffic and provided a dedicated scale for city collection vehicles. A large sliding hangar door provides maximum visibility for drivers to enter the station, unload and exit with minimum interference of other traffic. The tipping floor and unloading area allow for vehicles to dump near the loadout ports without any lifting, thus improving efficiency by reducing the time required to push waste into compactors.
Tacoma Solid Waste Management Recovery & Transfer Center  
Tacoma, Washington

**Improved Safety** – The new layout eliminates a number of confusing intersections at the pre-existing facilities. It also effectively separates the public self-haul traffic from the city’s collection truck traffic. The flat tipping floor eliminates the fall hazard for public unloading at the old public receiving building top-load stations. The new facility includes full fire sprinkler protection. Sensors monitor carbon dioxide and carbon monoxide levels inside the facility and trigger the exhaust fans if low-level set points are detected. The extensive use of daylighting also improves safety at the facility.

**State-of-the-Art Design** – The facility includes a misting system that provides dust control. Bird wires and bird spikes are designed to discourage seagulls from roosting on the building and scavenging from the waste. A top-load bay for loading directly into a trailer through the floor is equipped with axle scales to monitor the weight of the trailer while it is being loaded.

**Reduced Maintenance** – Aging buildings and equipment were replaced in the new facilities, reducing frequency of maintenance. The original compactor building used a sacrificial asphalt pavement wearing floor that required resurfacing multiple times per year. The new facility provides a high-strength concrete wearing floor. Front loaders operate with rubber bucket edges to preserve tipping floor life. Two new SSI compactors were installed in the new facility, providing redundancy for operations to continue if one compactor requires maintenance. Access for compactor cleaning and maintenance is provided in the design.

**Flexibility** – The facility was designed to allow for future expansion to the west. The large floor and multiple doorways allow operations to be changed based on traffic volumes or new processes. There is space on the new tipping floor to allow manual or mechanized sorting for recovery of materials from the waste stream.

**Sizing for Increased Capacity** – The facility was sized based on projections of population and economic growth for a 20-year horizon. Facility sizing also took into account the number of unloading stalls required at peak traffic volumes, as well as the volume required to provide emergency storage of the waste stream for up to one week. Additional fire protection was added to allow high pile storage of piles higher than 12 feet.

**Sustainable Design Elements** – The project includes several sustainable design elements, including:

- Extensive daylighting and lighting controls to reduce electrical usage for lighting
- Reuse of captured rainwater for use as greywater in toilet facilities
- Natural ventilation
- A small photovoltaic array that can be expanded in the future
- Use of local and recycled materials in the project

The project targeted a LEED Silver certification through the U.S. Green Building Council, but received LEED Gold certification.

**System Features Innovative and Unique Features**

**Design Accounts for Changing Operations**

The one certainty about solid waste transfer operations is that they will change. The city of Tacoma recognizes that it must be implementing new and innovative ways to reduce the volumes of waste sent to the landfill. When new waste streams are identified to be diverted, diversion can occur at the curbside or on the tipping floor of the transfer station. All these changes to
increase diversion of waste from the landfill can require changes to operations, such as changes to the routing of traffic in the building, segregation of waste streams on the tipping floor or addition of sorting lines or other technologies. To allow for the ever-changing nature of waste streams and how they are handled, the city of Tacoma’s design team endeavored to design a facility with as much flexibility as possible.

The large, open tipping floor allows operations to accommodate many waste streams. With no grade separations or permanent walls separating traffic from equipment, the operation of the floor can be configured differently to accommodate changes in traffic from weekdays to weekends, or to manage seasonal changes in the volumes of yard waste. The floor is large enough to allow areas to be designated to segregate certain types of loads, or to add a small sort line or other processing operations. The large tipping floor allows Solid Waste Management to add sorting equipment to recover recyclable materials as necessary.

The tipping building has large hangar doors at the west side and oversized roll-up doors at the north side, the northeast corner and the southeast corner. Multiple doors, coupled with the open floor, allow for traffic to be routed in a variety of configurations.

Finally, the facility has three load-out ports. Two compactors and a gravity top-load trailer bay are equally spaced along the south push walls. The multiple load-out bays provide the flexibility to load out multiple waste streams that go to different destinations concurrently. The top-load option can efficiently handle materials that are not suitable for the compactors.

2. ENVIRONMENTAL CONTROLS AND REGULATORY COMPLIANCE
LEED Gold Certification Demonstrates Commitment to the Environment

Stewardship of the environment is a core value of Solid Waste Management. The recovery and transfer station demonstrates the city’s commitment to the environment in many ways.

The city nominated the project for LEED certification, targeting a Silver rating. The application for LEED was submitted to the U.S. Green Building Council in May 2012. The project was awarded LEED Gold certification in July 2012. Notable elements contributing to the LEED Gold certification are:

- 40 percent energy cost savings, with an improved thermal envelope, reduced interior and exterior lighting power density, daylighting controls and on-site solar panels
- 32 percent of building materials manufactured using recycled materials
- 97 percent (more than 15,000 tons) of construction waste diverted from the landfill, including concrete, asphalt, steel, non-ferrous metals, wood, gypsum debris and commingled recyclable materials
- 51 percent reduction of water use by collecting and reusing roof rainwater for use in toilets, using low-flow plumbing fixtures and water-efficient landscaping
- 2 percent glazing factor (interior illumination) in 99.66 percent of all regularly-occupied spaces, using skylights, translucent panels and glazing in doors
- Indoor environmental quality using increased ventilation of occupied spaces and low-emitting adhesives, sealants, paints, coating, carpet systems and composite wood materials

Facility Improves Environmental Quality, Resource Conservation and Benefits to Human Health

The building is designed with ample translucent wall panels and domed roof skylights to provide extensive daylighting. The lighting on the tipping floor area is controlled by a light sensor that allows the three-level lighting system to be adjusted down when adequate natural light is present. The use of natural light not only saves energy, but also is shown to be safer and a better work atmosphere for employees.
Water conservation was a key resource conservation consideration. Rain water is collected from a portion of the roof and stored in an 1,100-gallon tank for use at the facility’s toilets. Landscaping also utilizes native plants that require very little irrigation.

The building is highly energy-efficient, achieving 40 percent less energy use than a similar building built to the requirements of the standard energy code. Energy efficiency is achieved with a natural ventilation mode that turns on automatically based on wind speed and direction. Efficient heat pumps serve the conditioned space. A small array of photovoltaic panels on the south side of the roof provide some solar power to the building, and the entire 75,000-square-foot roof has been designed to bear the load of additional solar panels to allow future expansion of the solar system.

The building’s construction incorporated a high percentage of recycled and local materials. U.S. Forest Stewardship Council-certified wood was used in the cabinetry in the conditioned space. Low volatile organic compounds (VOC) sealants, adhesives, paint and carpet were used to help provide a cleaner, healthier environment for employees. In addition, air quality in the building is monitored by multiple carbon dioxide and carbon monoxide monitors, which activate an alarm in the event of high-level readings.

Environmental Controls Provide Compliance and Protection
In addition to the sustainable design elements, the building and site provide environmental controls to mitigate the impacts inherent with handling solid waste. The building is enclosed, minimizing noise and odor impacts on neighbors. The enclosed building also contains the litter and debris, and daily sweeping of the site roads and the perimeter fences provide additional assurance that no litter will escape the site. A nine-zone misting system above the tipping floor diffuses ambient dust.

The building is located in the middle of a large site, providing several hundred feet of buffer space between the operations and the closest neighbors. Bird wires on the roofs and bird spikes on other exposed flat areas are part of a bird control plan to address vector birds on the site.

The new recovery and transfer center building is situated in the middle of a 190-acre landfill that began operating in the 1960s. The original landfill was not lined, and concerns with groundwater contamination triggered a U.S. Environmental Protection Agency Superfund cleanup process to address these impacts in the 1980s and 1990s. The groundwater contamination was remediated with a groundwater extraction and treatment system (GETS) that consists of a network of pumps that captured and treated the contaminated plume. Additionally, a double geomembrane landfill cap system was installed over the entire unlined landfill area to prevent rainwater from infiltrating into the refuse to cause more contamination.

Finally, an active landfill gas collection system was installed. A gas-to-energy facility converted some of the landfill gas into electricity until 2003, when the decline in quality and quantity of the gas made the operation of the CAT engines being used no longer feasible. The remaining landfill gas is now flared. The remediation efforts have been successful, and after the closure of the last active portion of the landfill – scheduled for this year – the site will begin the process of delisting from the Superfund list.
New Facility Integrates into Local Solid Waste Management System

The Tacoma Solid Waste Management Recovery and Transfer Center is located at the landfill site, which is the base of all of Solid Waste Management’s operations. The site serves city residents, commercial haulers and city collection vehicles, and receives recyclables, residential and commercial wastes, yard wastes and HHW.

In the first year of operation, Solid Waste Management has experimented with floor sorting operations to recover materials from select loads. To date, it has recovered about 1,000 tons of wood, metal and corrugated cardboard.

The city is purchasing equipment to segregate loads to help recover more materials. In the future, a processing line could be installed if sufficient quantities of recyclable materials can be recovered.

EnviroHouse Educates On-Site Visitors

After entering the site, customers can stop at the EnviroHouse, a permanent model home serving as an educational exhibit providing examples of sustainable building materials, products and appliances. The EnviroHouse also demonstrates environmentally friendly practices such as reuse of rainwater with a rain barrel and home composting techniques.

Public Recycling Center Accepts Wide Variety of Materials

The next stop is the public recycling center, where self-haul customers – including businesses with small truckloads – can drop off materials free of charge. The recycling center also houses a mobile Goodwill donation center that accepts reusable items such as clothing, toys and furniture.

The recycling center now accepts clean and dry #6 Styrofoam blocks for recycling. Solid Waste Management’s new recycling machine chops, heats and presses the Styrofoam into 40-pound blocks. The blocks can then be recycled into products such as plastic TV and computer casings.

HHW Facility Removes Waste that is Harmful to the Environment, Human Health

Past the recycling center, customers can drive through the HHW facility, which provides residents with an alternative to disposing of hazardous waste in the garbage, down drains or into the ground. The HHW facility also receives all items free of charge.

Items Accepted at the Recycling Center

- Mixed paper
- Newspaper
- Magazines and catalogs
- Phone books
- Corrugated cardboard
- Plastic-coated food boxes and cartons
- Plastic bags (grocery, department store, dry cleaning)
- Bubble wrap
- Pop, water and juice bottles
- Clear plastic bottles or jugs
- Colored plastic bottles or jugs
- Uncolored plastic bottles or jugs
- Plastic tubs, jars, and trays
- Tin and aerosol cans
- Aluminum cans, foil and trays
- Clear glass bottles and jars
- Brown, green, blue and red glass bottles and jars
- Packing peanuts
- #6 Styrofoam blocks
- Scrap metal
- Inkjet/laser printer toner cartridges (empty)
- Batteries
- Cell phones, batteries, chargers

The HHW facility offers residents an environmentally friendly alternative for disposing of hazardous waste.
HHW items accepted at the facility include:

- Acids and caustics
- Antifreeze
- Automotive products
- Batteries (car, button, household)
- Flammable liquids
- Fluorescent bulbs
- Gas and fuel
- Glues
- Household cleaners
- Hypodermic needles or syringes (sealed inside rigid container)
- Insecticides
- Mercury thermometers/thermostats
- Motor oil
- Oil-based paints
- Pool chemicals
- Solvents
- Yard and garden chemicals

Scales Lead Customers to the Recovery and Transfer Center

After the HHW facility, customers cross over the scales. Three manned scales are available for inbound and outbound traffic. From the scales, vehicles are directed to the recovery and transfer center, where further separation is possible. Designated areas receive yard waste, metal, tires and other special waste streams. Wastes are dumped directly onto a flat floor, and site checkers are trained to identify hazardous materials on the floor for removal from the waste stream. The large tipping floor is sized to allow for recovery of materials that can be diverted outside of the waste stream. Operations can remove large recoverable items with a grapple or other equipment. The city is continuing to develop plans to improve the volumes of materials diverted from the landfill through this recovery process.

Awards Recognize Facility and Employee

The American Public Works Association recognized the Tacoma Solid Waste Management Recovery and Transfer Center with a 2013 Public Works Projects of the Year Award. The award is given for excellence in the management and administration of public works projects by recognizing the alliance between the managing agency, engineer and contractor who successfully completed a public works project through collaboration.

The Washington State Recycling Association recognized Mark Tveit, a recycling center employee, with the 2012 Individual Recycler of the Year Award for his efforts to increase recycling at the facility, including championing the development of a Styrofoam recycling program at the facility.

3. PROGRAM PLANNING

Accelerated Planning Process Calls for Collaboration

The planning process for an upgrade to the solid waste transfer station began in 2008 with the selection of the design team, led by HDR. HDR provided civil, electrical and mechanical engineering, as well as facilitating the planning phase of design. The design team also included JR Miller and Associates (JRMA) providing architectural and structural design, AHBL providing site structural design and HWA Geosciences providing geotechnical support. Because of the long-standing uncertainty about the future of the steam plant and resource recovery upgrade, facility maintenance had been delayed to a point where new facilities were needed as quickly as possible – before serious safety issues or failed equipment ended the use of the current facilities. Therefore, an accelerated planning and design process was necessary to provide a quick delivery time. To accomplish the accelerated design process, several planning exercises were conducted concurrently. These efforts included:

- A collaborative workshop process to determine programming and an optimal location on the existing site
- Tours of existing Pacific Northwest transfer station facilities
- A siting study to determine the optimal site for the facility within the city, including evaluation of future rail intermodal yard siting
- A planning-level evaluation of alternative waste conversion technologies
- A sustainable return on investment (SROI) model to evaluate and compare different options based on a triple bottom line cost-benefit analysis considering economic, social and environmental factors
The planning process began with design team members touring 10 operating transfer station facilities in the region, ranging from Portland to Seattle. In addition to the facility tours set up by JRMA, HDR met with all of the different operations groups that would utilize the new facility to gather feedback on what has been effective in the past and to identify needs for the new facility. Team members conducted several tours of the existing site to evaluate the existing conditions and facilities.

The design team developed a series of conceptual design options using the information from the tours and user feedback in conjunction with the project goals that had already been developed. The design team and the project stakeholders reviewed and further developed the preferred conceptual design options over the course of four workshops spread over six months. The conceptual designs were reviewed and ranked, considering how effective each option fulfilled the project goals, the construction cost of the option and the feasibility of phasing the project. Each conceptual option was depicted on a site plan, showing the orientation of the building and the traffic routing. In addition, sketches of the proposed floor plans showed possible operational configurations for the tipping floor and load-out of trailers. A conceptual-level cost estimate was developed for comparative purposes. While some elements of the conceptual design were site-specific, the city felt that if a different site was determined favorable by the siting study being conducted concurrently, the programming developed by the planning workshops could be transferred to the new site with a relatively small increase to the design cost.

Workshop Process Proves Effective

The workshop process proved to be a very effective tool in the development of the planning and programming for the new facility for multiple reasons:

- It gave the city the opportunity to evaluate a wide range of possibilities of where the facility could be sited, the size of the facility and the potential traffic routing on the site.
- All of Solid Waste Management’s stakeholders were given the opportunity to provide input and ideas during the development of the conceptual design.
- The selected conceptual design contained elements of several of the earlier concepts that may not have been discovered without the iterative review process.

During the workshop phase, the HDR team presented the possibility that the city might have to build a much larger project to meet its needs. A financial model was prepared to consider the life cycle cost of building a larger station. The financial analysis showed that the city would greatly benefit from building a larger station because it enabled it to consolidate all material handling into one complex and provided the space needed to recover and recycle materials – thus avoiding transport and disposal expenses. The city requested and was approved for additional capital for the facility.

After the workshops were completed and a conceptual design was selected, the design team developed a basis of design memorandum to document the planning phase and the assumptions determined for the project design. This document was used as a reminder of the project intent and to keep the design consistent with the project goals.

City Evaluates Intermodal Alternatives

A siting study for a rail intermodal transfer station site was initiated by the city with CH2MHiill in 2005, but was not completed. This effort identified the functional requirements and design criteria for an intermodal yard for the city. This siting study was revisited and expanded to evaluate operations costs of several scenarios by which rail haul could be managed by the city. Site availability, delivery schedule and policy concerns were reviewed.
This study concluded that:

1. There was not an ideal site within the target areas that provided adequate size, vehicle and rail access to site a full intermodal transfer station.
2. There was not a clear economic advantage to building a new transfer station at a location with rail access but separate from the Tacoma Landfill site.

The study found that it would be comparable to operate a transfer station at the landfill and haul containers by truck to a rail yard if rail haul became economically favorable. Based on this study, the city elected to continue with development of the new facility at the existing Tacoma Landfill site.

**Facility Designed for Future Conversion Technologies**

Alternative waste conversion technologies are beginning to establish a foothold in the solid waste management industry in North America. Since the city was preparing to make a significant investment in its solid waste handling infrastructure, it conducted an evaluation of these technologies to determine whether it was appropriate to look at development of new technology as part of the infrastructure improvements. The evaluation included a review of available literature as well as tours of municipal solid waste composting facilities in Edmonton, Ontario, a waste-to-energy plant in Spokane, Washington, and dirty material recovery facilities in Los Angeles. The city determined there were not currently any waste conversion technologies with demonstrated commercial-scale operations that were a good fit with the Tacoma waste stream.

This evaluation resulted in a recommendation that the new facilities be designed with the flexibility for future expansion to incorporate a conversion technology at such time that it became technically and economically viable.

To evaluate the costs and benefits of various options for development of the new facility, an SROI model was developed with the help of HDR. The model utilizes @Risk software to simulate a variety of outcomes in an Excel spreadsheet. The model provides a business case analysis to evaluate the financial, social and environmental benefits of the proposed capital investments. The financial analysis included operations and maintenance costs as well as revenues generated by sale of recovered materials and avoided disposal costs. Social benefits included increased better customer service in reduced queuing times and ease of use. A primary environmental benefit was the avoided greenhouse gas generation.

The model was used to evaluate the payback period for various phased construction options, as well as payback for some of the alternative waste conversion technologies researched. In addition, the SROI model helped evaluate the payback for the various alternative conversion technologies that were researched. The SROI confirmed that it was not favorable to invest in alternative conversion technologies at this time.

**Proper Planning Delivers on Tight Budget, Aggressive Schedule**

The initial budget for the project was relatively small because it had originally been intended for an upgrade to the existing resource recovery facilities. It became clear through the workshop process that the facility improvements required to meet the goals of the project could not be constructed with the limited budget available. Therefore, the team developed the concept designs with the intention of construction occurring in phases. The SROI model results showed that constructing the full build-out initially had a better payback than phasing construction. This result led to the city reprioritizing the solid waste capital improvements project budgets to allow for construction of the full facility in a single construction.

The planning phase began in March 2008 and was completed in eight months, finishing in November 2008. The design phase, including 30 percent, 60 percent, 90 percent and 100 percent design review submittals, was completed in 16 months, with the project going to bid in March 2010. The design phase included a value engineering study at 30 percent and 60 percent design, extensive peer review and constructability reviews at 90 percent design, and completion of the building permit and environmental permit review. The entire project delivery time...
from inception to completion was four years, including a five-month bidding and award period and 16-month construction duration. This schedule was made possible by the fact that the existing landfill site was utilized and the planning exercises and studies were fast-tracked and completed concurrently.

Plan Calls for Minimizing Downtime During Operations

Solid Waste Management has maintained an active landfill cell at the site since the closure of the surrounding filled landfill. This cell, called the Central Area, has provided a backup plan to allow for disposal of refuse even in the event that the transfer facilities were closed or if the county landfill that typically receives waste hauled from the transfer facilities was closed or otherwise inaccessible. The Central Area also provides space to receive waste in the event of an emergency or natural disaster such as an earthquake. With the impending closure of the Central Area required by permit by 2014, the new recovery and transfer center was designed to provide similar contingencies in the event of emergency or shutdowns.

Firstly, the new tipping floor is large enough to store up to a week's worth of refuse in the event of a strike or another factor that prevents waste from being hauled to the county disposal site. The building sprinkler system was also enlarged to allow for pile storage higher than 12 feet, maximizing the storage capacity. The use of daylighting in the facility also allows for operations when the facility is without power.

The backup generators provide a second contingency. A permanent 400-kilowatt diesel standby generator maintains all power in the facility except for the two compactors, allowing the facility to be operated with the gravity top-load bay even during extended power outages. In addition, a generator connection cabinet that can be switched to either of the two compactors can be powered by a portable generator connected to the connection cabinet when needed, allowing the operation of one compactor during a power outage at the site.

The multiple load-out bays also allow for the facility to operate at partial capacity during maintenance activities. It is anticipated that the concrete tipping floor will need to be resurfaced over time. The floor can be repaired in sections, staging the operations to utilize the other bays while repair activities block access to one bay. Similarly, maintenance of the compactors can be staggered to always keep at least one compactor available.

4. PERFORMANCE, ECONOMICS, AND COST-EFFECTIVENESS

New Facility Streamlines Operations

The existing facilities required handling waste multiple times, had many confusing and potentially dangerous traffic intersections, and required equipment and staff to be spread between multiple buildings. The new recovery and transfer center is designed to improve operational efficiency and performance in the following ways:

- A centralized, single location for receiving waste reduces handling materials multiple times in multiple buildings.
- Staffing and equipment is reduced by co-locating many operations in one building.
- Improved traffic routes and a more efficient unloading area for public self-haul vehicles reduce transaction times and queues.
- Two compactors, backup generators and a top-load bay reduce operational down-time.

Solid Waste Management’s mission is to provide solid waste handling and disposal services to the citizens of Tacoma. The new recovery and transfer center and the associated facilities at the Tacoma Landfill site provide a one-stop destination for any residential waste disposal needs. The improved layout and modern design of the facilities provide easy navigation for customers. Solid Waste Management’s customer service staff is located in the administration building on the site, if additional services or questions require personal attention.

Design and Construction Delivered Within Budget

The design and construction of the new facility was constructed on schedule and within budget. The overall project costs for the recovery and transfer station compare favorably with other similarly sized transfer stations in the region.
The facility began partial operation in October 2011, while the final site work on the project was being completed and opened to full usage in January 2012.

The HDR team designed a plan to use the slab and piles of the existing refuse derived fuel receiving building. About 24,000 square feet of existing slab and piles were incorporated into the new 78,000-square-foot slab design, saving about $1 million.

The pre-engineered metal building erected by CHG Building Systems Inc. included an open-web design of the truss beam frames to provide the most cost-effective design for the large clear span of the building. The design also allowed for HVAC ducts, wiring, sprinkler systems and conduits to be incorporated through the trusses. By managing the erection of the entire metal building package – including superstructure, framing, custom metal siding, roofing and daylighting – CHG Building Systems was able to coordinate all of these components, helping to meet the construction schedule.

One of the benefits of the new facility is providing space for recovery of recyclable materials from the waste stream that can be diverted from the landfill. In its first year of operation, wood, metal, and cardboard has been collected from the waste stream. The city is investigating potential markets for additional material streams that might be diverted in the future from the landfill, including mattresses and asphalt shingles.

Facility Operates Efficiently, Within Budget
Operational costs have been reduced by consolidating the operations that previously occurred in multiple buildings into one location. As a result, fewer site checkers and equipment operators are required to staff the facility. Also, the old facilities required more of the waste stream to be handled multiple times to be moved from one facility to another by conveyors or on-site yard tractors before the material was compacted. The more consolidated facility has eliminated the conveyor systems and reduced the load on the on-site yard tractors.

The new facility also provides better access to the compactors for the transfer trailers. The old facilities required trailers to be backed down a very steep grade to get to the compactors. This operation took longer to move trailers and also required more maintenance on the trailers due to the excessive strains on the trailers from turning and backing on a steep grade.

Maintenance costs have been reduced with the installation of new compactor equipment, because the old compactor required frequent and major rebuilds to keep it running due to its age.

Additionally, the old resource recovery facility required materials to be sent through a complicated configuration of conveyors to get to a compactor. This equipment required ongoing cleaning and maintenance. This has been replaced with a direct top load through the floor into the compactors, so dust and debris around the compactors are limited to the areas around the compactor chute and the interface between the compactors and the trailers. The compactors in the old facility were in the same area as the tipping floor, so previously dust and debris could more easily collect on and around the compactors, requiring more extensive manual cleaning efforts in spaces with poor accessibility. The amount of cleaning required in the new facility has been reduced, and better access around the equipment makes cleaning easier. Also, the concrete tipping floor and use of rubber bucket edge protectors on the wheel loaders eliminates the cost of frequent replacement of a sacrificial asphalt tipping floor surface that was in the old facility.

After a period of increasing operations and maintenance expenditures between 2009 and 2011, Solid Waste Management experienced a slight decrease in expenditures in 2012 with the opening of the new facility. Some of the potential decreases in expenses have been reinvested in utilizing existing staff levels to help recover greater quantities of recyclable materials from the waste stream.

Efforts Divert More Waste, Earn Greater Revenue
As Solid Waste Management staff develops better practices for diverting materials and customers become more aware of the opportunity to separate materials that can be removed from waste, greater tonnages of materials are being recovered.

These materials generate additional revenues for Solid Waste Management from the direct value received for the materials from the recycling vendors, as well as in the form of savings by eliminating hauling costs and tipping fees required for materials
that are taken to the landfill for disposal. In addition to the metal and paper, clean wood wastes, such as unpainted dimensional lumber and pallets, have been recovered from the waste stream.

Wood Waste Becomes Fuel, Mulch
In 2012, over 350 tons of wood waste were ground to wood chips and sent to Simpson Kraft Tacoma to be used as hog fuel in its co-generation plant that generates electricity and steam to be used for process heating in its manufacturing facility located in the Tacoma Tideflats. Additional wood chips from salvaged wood waste have been used for wood chip mulch in landscaping applications by various city departments.

Special Processing Needed for Certain Waste Streams
Refrigerators and tires are also diverted from the general waste stream for special processing. Solid Waste Management also is investigating mattresses, carpets and roofing materials for possible recycling.

New Plant Provides New Uses for Recovered Asphalt
The Tacoma Public Works Street Operations Division is adding equipment to enable it to incorporate recycled asphalt grindings and recycled asphalt shingles into the asphalt paving mix used for street repairs in Tacoma. This will provide a new use for recovered asphalt shingles salvaged at the recovery and transfer center. In addition to diverting this material from the landfill, this also will reduce the amounts of virgin aggregates and asphalt oil binder required to be used at the asphalt plant.

In fact, asphalt for the 1,250-foot street leading into the Tacoma Landfill was made using re-crushed asphalt and roofing shingles. Parts of the sidewalk, curb, trench backfill and conduit crossings were also constructed with re-crushed asphalt, but also contain concrete waste and fly ash, a by-product of the smelting process.

HHW Diversion Grows in Tacoma
Solid Waste Management sends many hazardous products it collects to recyclers, helping reduce the costs of the hazardous waste diversion program and returning the materials to the marketplace for reuse as a raw material or fuel. The tonnage of HHW materials collected has continued to grow.

### Household Hazardous Waste Diverted/Recycled (in tonnage)

<table>
<thead>
<tr>
<th>Year</th>
<th>Do-It-Yourself</th>
<th>DIY &amp; Fleet</th>
</tr>
</thead>
<tbody>
<tr>
<td>2006</td>
<td>382.14</td>
<td>434.77</td>
</tr>
<tr>
<td>2007</td>
<td>389.00</td>
<td>450.33</td>
</tr>
<tr>
<td>2008</td>
<td>358.41</td>
<td>405.67</td>
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<tr>
<td>2009</td>
<td>409.66</td>
<td>431.72</td>
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<tr>
<td>2010</td>
<td>419.51</td>
<td>483.96</td>
</tr>
<tr>
<td>2011</td>
<td>406.41</td>
<td>465.19</td>
</tr>
<tr>
<td>2012</td>
<td>395.10</td>
<td>463.34</td>
</tr>
</tbody>
</table>

5. UTILIZATION OF EQUIPMENT/ SYSTEMS AND TECHNOLOGIES
The recovery and transfer center utilizes a range of vehicles for processing and hauling waste, as well as several types of state-of-the-art equipment to support the operations.

Safety and Efficiency Inform Vehicle Selection
Solid Waste Management operates three 2005 Komatsu WA 380-5s, two of which soon will be replaced by 2013 Caterpillar wheel loaders that have been ordered – a CAT 966K and a CAT 950K. These new machines meet stringent EPA Tier 4i emission standards and offer decreased fuel consumption, improved operator visibility and other safety improvements.

Solid Waste Management has placed an order to add a tracked material handler. The division specified a machine with similar characteristics to a Sennebogen 821R HD-E, including an
Tacoma Solid Waste Management Recovery & Transfer Center
Tacoma, Washington

Elevating cab to allow the operator the required visibility to recognize material of value in the waste pile. The machine will give the operator the ability to sort through waste with a trash sorting grapple similar to the Rotobec recycling grapple. This new machine will also meet EPA Tier 4i emission standards.

To supplement the recovery efforts, the city also deploys a John Deere 326D capable of retrieving valuable materials from the pile. This skid steer meets the EPA Tier 4i emission standards as well. The machine is also used with a sweeper attachment to keep the floor clean and clear in the areas of public access.

In addition to meeting EPA Tier 4i emission standards, all of the equipment is capable of being operated with B20 biodiesel. A high level of operator visibility and safety – along with balancing efficient productivity while minimizing environmental impacts – drove the selection of equipment.

The city operates approximately forty 53-foot open-top refuse trailers with walking floors. All of the semi-tractors used to carry the trailers operate with B20 biodiesel as well.

Equipment Allows Redundancy and Remote Troubleshooting

The new recovery and transfer center utilized two SSI Model 4500-SPH preload compactors for compaction of waste prior to loading into transfer trailers. The new compactors replace equipment that was more than 20 years old and had been rebuilt multiple times. The compactors can be connected via modem to allow remote troubleshooting by the manufacturer’s support staff. The redundancy of two compactors offers redundancy so that operations continue during maintenance.

The gravity top-load bay is equipped with two Emery Winslow axle scales to monitor the weight of the trailer and load during loading. The scale scoreboards are mounted above the top load bay push walls, and indicate the rear axle weights, front landing gear weight and total, which enables the operator to avoid overweight axles during loading. These scales utilize hydraulic load cells, which are not affected by exposure to liquids or debris that might interrupt operations of an electric load cell scale.

Facility Features Dust Reduction Misting System and Closed Captioned Television Monitoring System

The tipping floor is equipped with a Fogco dust reduction misting system with nine independent zones spaced over the three load-out bays and the tipping floor. The misting system can be operated by a timer, or turned on manually at a remote control panel at the tipping floor. The misting system is configured so it can also be fitted with an odor control system in the future, if deemed necessary.

The tipping floor is monitored by a closed captioned television camera network with 10 cameras. The video can be viewed remotely on a monitor in the building’s office, and the footage is also recorded on a DVR so it can be reviewed at a later date. Video of the tipping floor can be used to review accidents and to assess the efficiency of operations.

6. WORKER HEALTH AND SAFETY

In 2012, the Tacoma Solid Waste Management Recovery & Transfer Center had a total recordable injury and illness rate of 4.74 per 100 workers, as measured by metrics used by the Bureau of Labor Statistics. This is below the 2011 national average of 5.4 for material recovery facilities as well as the 4.8 rate for landfills.

Safety Incorporated into Facility Design

Several design elements were incorporated into the new facility to improve health and safety for customers and staff. Site design attempted to minimize the traffic crossings and isolate city collection truck traffic from small private self-haul vehicles. Additionally, self-haul unloading areas that required waste to be thrown over a barrier into the top of
a trailer below have been replaced with unloading areas where waste is dumped from vehicles directly onto the ground on grade with the vehicle.

The facility is equipped with an automatic fire sprinkler and fire alarm system. Three emergency shower and eyewash (ESEW) stations are located on the tipping floor, and at the load-out level and the maintenance staff work areas. ESEWs are supplied with tepid water that is recirculated to conserve energy and maintain tepid water temperature at the fixtures.

Some specific design features that enhance safety include:

- Carbon dioxide monitors and opening vents/louvers improve the air quality.
- The automatic misting system keeps down dust exposure in dry conditions.
- Numerous skylights improve visibility in various light conditions.
- Four truck access entryways contribute to the flexibility of building use, allowing supervisors to tailor traffic flow to safely accommodate different operations as the need arises. This flexibility ensures continuous separation of large commercial vehicles and smaller self-haul vehicles while allowing changes to operating processes and flow.
- First aid stations and an automated external defibrillator are located in the building.
- A remotely operated gate that covers the top-load bay when not in use is designed to eliminate fall hazards for nearby workers.
- The recovery and transfer center provides shelter for employees that previously were subject to outdoor elements.

### Topics Covered in Monthly Safety Meetings
- Asbestos Awareness
- Avoiding Slips Trips & Falls
- Backing Accident Prevention
- Bloodborne Pathogens Exposure Control Plan
- Continuity of Operations
- Driver's Vehicle Inspection Report
- Emergency Management Plan
- Explosives Awareness Training
- Fire Extinguisher Training
- Forktruck Safety
- Grinder Operations Safety
- HazCom Training
- Hearing Conservation
- High Visibility Apparel
- MRSA Awareness
- Personal Emergency Preparedness
- Personal Protective Equipment
- Radiation Awareness Protection
- Response to potentially hazardous Materials
- Riding Outside of Vehicles Safely
- Route Safety
- Safely Dealing with Downed Power Lines
- Safely Securing Loads
- Skid Steer Loader Operation
- Spotting for Vehicles
- Sprain Prevention
- Winter Driving
- Working Safely with Chemicals
- Workplace Violence Prevention

### Regular Safety Training Informs Employees on a Variety of Topics

Safety meetings and training occur on a monthly basis. Members of each work group attend a monthly safety meeting with their peers. Safety meetings highlight a specific training topic designed to educate, inform and raise awareness of potential hazards or relevant standards. Meetings also provide a forum to address operational concerns, employee suggestions or upcoming changes.

### Construction of Facility Boasts Excellent Safety Record

During construction of the Tacoma Solid Waste Management Recovery and Transfer Center, the project safety performance was excellent. The OSHA Incident Rate for the project was below the 2010 industry-wide average for construction contractors (4.0). A total of 76,819 labor hours were recorded on the job, with no safety incidents encountered that resulted in lost work days. The prime contractor, JE Dunn Construction Company, addressed safety concerns in weekly progress meetings with the city and regular safety meetings with its workers to ensure the safety of all workers, owner representatives and bystanders.

The project site posed some unique safety issues that were successfully addressed during construction through good planning, coordination and execution by the contractor and the city. Several areas of site and utility work required excavation of old landfilled refuse. The contractor provided 40-hour HAZWOPER trained workers and developed a work plan that minimized the direct exposure to the risks presented by working around refuse to complete this work without incident. Additionally, Solid Waste Management’s operations continued on and around the site throughout construction, requiring coordination between the contractor and division staff to identify and avoid potential traffic conflicts and allow both operations to complete their respective tasks. The weather challenges of working through a winter also could have created a safety issue, but no incidents occurred as a result of poor weather.
7. PUBLIC ACCEPTANCE, APPEARANCE AND AESTHETICS

Modern Architecture and Native Landscaping Present an Appealing Face to the Facilities

Solid Waste Management takes great pride in presenting an aesthetically pleasing face to the community it serves. The areas around the public facilities are landscaped with native plants. The two primary buildings on the site, the recovery and transfer building and the administration and shop building, were designed with the same architectural motifs to maintain a campus feel. While the new buildings are buffered from neighbors by several hundred feet, they are visible from the nearby highway. The buildings were designed with an appealing appearance in mind, replacing the old mustard yellow shed-style metal buildings with modern office/warehouse-style appearance utilizing custom metal siding, window openings and translucent panels. The sloped roofs are hidden by architectural parapets, and the buildings’ large elevations are broken up utilizing colors and accent lines.

Throughout the development of the new facilities and as a general practice, Solid Waste Management staff have endeavored to maintain good communication with their neighbors. Neighbors were informed of plans for the new facilities with regular updates through the mail.

City Keeps Facility and Fleet Well-Maintained, Clean

The facilities and grounds are maintained with regular sweeping of streets, litter pickup and cleaning of structures. The entrance to the site is landscaped with native plants and maintained by the city grounds crews.

The truck fleet is maintained by the city’s Fleet Maintenance Division, which has a truck maintenance shop on site that was upgraded in 2011 to expand the number of vehicle bays and provide new HVAC, lighting, and fluid distribution and storage systems.

The vehicles on site, which include the collection truck fleet, are maintained in clean condition with regular trips through a high-pressure, touchless truck wash facility located on site. The fleet is painted forest green and displays the city’s logo.

EnviroHouse Offers Engaging On-Site Education

Located near the entrance to the site, the EnviroHouse exhibit is a permanent model home showcasing green building and natural landscape ideas, materials and techniques to create a healthy home and planet. The exhibit champions the benefits of sustainable living and building practices to homeowners, builders, suppliers, landscapers, real estate agents and the general public, highlighting readily available products for new and existing homes and yards. The EnviroHouse also presents displays about the environmental remediation of the site.

The EnviroHouse offers visitors a way to see and touch a wide variety of green building and sustainable living products. Whether visitors are planning a full remodel or simply need to replace an old appliance, the EnviroHouse features more than 150 “green” interior, exterior and landscape ideas, including:

- Recycled-content carpet, countertops, furniture and tile
- Water-saving showerhead display
- Recycled-content sidewalk and decking
- Non-toxic paint and natural bulletin boards
- Synthetic turf, natural grasses, native plants and recycled-content mulch
- Cork and bamboo flooring
- Weather-controlled irrigation system
- Energy-efficient windows, lighting and appliances
- Insulation options using recycled or organic products
- Solar electricity
- Composting systems for food, yard and pet waste
Solid Waste Management Offers Additional Education Programs

In addition, Solid Waste Management helps to fund the city’s EnviroChallenger program, based at the landfill site. The EnviroChallenger program provides free educational programs on protecting the environment in local schools and at community events. With a mixture of science, social responsibility and fun, all lessons include supplies and support state standardized test objectives.

Additionally, Solid Waste Management offers free home and garden workshops to Tacoma and Pierce County residents.

Workshop topics include:

- Backyard Chickens – how to raise chickens in the city.
- Natural Daylight – the basics of natural daylighting, plus a demonstration on how to self-install the Solatube system.
- Prune Like the Pros – how to prune like the pros and prevent costly errors, defects, high maintenance and unsightly trees.
- Design for Sustainability – landscape design solutions that are practical, healthy and environmentally friendly.
- Start Your Garden Now – planning steps and reliable garden resources for early spring gardens.

What Makes the EnviroHouse Green?

With more than 150 green products and materials in the EnviroHouse, this is just a partial list of its many green features.

Energy Efficient
- ENERGY STAR appliances that use 10-50% less energy and water than standard models.
- Fluorescent bulbs that consume 75% less energy and last 10 times longer than incandescent bulbs
- Skylight that increases light output and block UV transmission
- Low E, argon windows that reduce heat loss and block UV rays
- Insulation made from soy-based products, recycled wood fiber and other natural products that are free of toxic chemicals and gases
- High efficiency heating and cooling systems and water heater
- Solar panels that generate renewable energy from the sun

Water Efficient
- High-efficient, pressure assist toilet that reduces water use by 30%
- Faucet aerators and low-flow showerheads that cut water use in half
- Water efficient dishwasher and clothes washer that use up to 50% less water than standard models

Healthy Indoor Air
- Zero-VOC paint that contains no ammonia and almost no odor
- Marmoluem flooring made from natural materials; 100% solvent-free adhesives
- Insulation made from soy-based products, recycled wood fiber and other natural products that are free of toxic chemicals and gases
- Zero-VOC peel and stick carpet tiles
- Low-VOC, chlorine-free wall covering containing no plasticizers or stabilizers
- Low-emitting wood chairs, formaldehyde-free chair foam and fabric
- Electric heaters that produce no fumes or water vapor

Low-Impact Site Development / Natural Landscape
- Water-efficient irrigation system that uses low-evaporation spray heads and drip irrigation that applies water to the root zone, avoiding wasteful runoff
- Irrigation controller applies water according to the local weather
- Rain barrels to capture and reuse rain water
- Native/adaptable plants that provide cleaner air, prevent erosion and flooding and improve water quality
- Compost that helps make landscaping more weed resistant, reducing the need for chemical fertilizers and pesticides that can make their way into nearby waters
- Synthetic turf made from recycled tires; drought-tolerant buffalo grass

Sustainable, Reused Materials
- Lap siding made of cement, sand and wood fibers; 50-year warranty
- Euroslate rubber roofing, 50-year warranty
- Bamboo flooring, a rapidly renewable resource
- Bulletin boards made of natural materials and backing with no harmful by-products or carcinogens
- Lumber, window casings, baseboards and sheet material made with FSC-certified wood
- Table made of Ecowheat, a sustainable alternative to wood
- Decking made from recycled plastic
- Drywall made from recycled gypsum and paper
- Countertop made from recycled paper
- Ceramic and glass tile made from recycled glass
- Sidewalk made from 100% recycled tires
- Salvaged, reused sinks from Habitat for Humanity
- Salvaged landscape pavers
SUPPLEMENTAL MATERIALS
Supplemental Materials

Garbage
(253) 591-5543
8 a.m. - 5 p.m., Monday-Friday (Closed all major government holidays)
E-mail: solidwaste@cityoftacoma.org
Web: www.cityoftacoma.org/garbage

Yard/Food Waste
(253) 591-5543
8 a.m. - 5 p.m., Monday-Friday (Closed all major government holidays)
E-mail: solidwaste@cityoftacoma.org
Web: www.cityoftacoma.org/yardwaste

Curbside Recycling
(253) 591-5543
8 a.m. - 5 p.m., Monday-Friday (Closed all major government holidays)
E-mail: solidwaste@cityoftacoma.org
Web: www.cityoftacoma.org/recycle

Recycling Center
3510 S. Mullen St. (Tacoma Landfill)
8 a.m. - 6 p.m., every day (Closed: New Year's Day, Fourth of July, Thanksgiving Day and Christmas Day)
www.cityoftacoma.org/recycle

The Recycling Center, located at the Tacoma Landfill, accepts all of the same recyclables that are accepted for curbside collection, as well as packing peanuts, styrofoam blocks, cell phones, batteries and printer cartridges. Unlike the commingled curbside collection, you must separate your items at the Recycling Center. Tacoma and Pierce County residents may use the Recycling Center at no charge.

Reduce before you recycle
Did you know? More than 50% of junk mail is discarded — unopened, still sealed — totalizing more than 4 million tons of waste each year nationwide (EPA). Locally, paper and cardboard comprise the largest amount — 9% — of Tacoma’s waste stream.

What can you do? While there are many benefits to recycling paper and cardboard, go a step further and reduce the amount of paper you produce in the first place. Start by reducing your junk mail.

Learn more at www.cityoftacoma.org/junkmail, or call (253) 591-5843.

viroHouse
311 E 10th St. (Tacoma Landfill)
Monday - Friday, 10 a.m. - 3 p.m.
Saturday, 11 a.m. - 5 p.m.
novirohouse.org

viroHouse is a permanent living green building and natural habitat, materials and techniques to create a healthy environment. The EnviroHouse offers a unique opportunity to see and touch a variety of sustainable living products. For those who want to reduce or just want some eco-friendly items, the EnviroHouse features many green products, including sustainable furniture, carpet, countertops, flooring and roofing materials, dispensers for paper, and natural bulletin boards.

Eco-friendly carpet
Natural grasses and native plants
Solar panelled irrigation system

Green Buildings

Reduce, Reuse, Recycle
Tacoma Landfill Recovery & Transfer Center

Features and Benefits

State-of-the-art design
- Misting system provides dust control.
- Bird wires and bird spikes discourage seagulls from roosting and scavenging.
- Top-load bay equipped with axle scales to monitor the weight of trailers while being loaded.

Sustainable design elements
- Daylighting and lighting controls reduce electrical usage.
- Captured rainwater used to flush toilets.
- Natural ventilation.
- Linked solar panels that can be expanded in the future.
- Local and recycled materials.

Operations efficiency
- Consolidation into a central building eliminates double- and triple-handling of materials.
- Centralization reduces the amount of equipment and number of employees needed.
- Sited to create a more direct route in and out of the facility.
- Waste is pushed directly into loadout holes without any lifting, increasing loading efficiency.

Improved safety
- Layout separates public self-haul traffic from the City’s collection truck traffic.
- Flat tipping floor eliminates the fall hazard for public unloading.
- Full fire sprinkler protection.
- Sensors monitor CO₂ and CO in the air and trigger exhaust fans if low-level set points are detected.

By the numbers ...

- 75,000-square-foot main building
- 165,000 tons of garbage handled at transfer center (average/year)
- Designed for peak of 1,400 tons &1,100 vehicles (per weekday)
Reduce maintenance
- Aging buildings and equipment replaced, reducing frequency of maintenance.
- High-strength concrete wearing floor; front loaders operate with rubber bucket edges to preserve tip floor life.
- Two SSI compactors provide redundancy, allowing operations to continue if one compactor requires maintenance.
- Access for cleaning and maintenance.

Flexibility
- Designed to allow for future expansion.
- Large floor and multiple doorways allow operations to be changed based on traffic volumes or new processes.
- Space allowance for manual or mechanized sorting for recovery of materials from the waste stream.

Sizing for increased capacity
- Size based on projections of population and economic growth for a 20-year horizon.
- Sizing also took into account the number of unloading stalls required at peak traffic volume, and the volume required to provide emergency storage of the waste stream for up to one week.
- Additional fire protection allows pile storage higher than 12 feet.
Tacoma opens $27M transfer station

By JOURNAL STAFF

Tacoma Landfill's $27 million Recovery and Transfer Center recently had a grand opening. The project is at the 190-acre landfill on South Mullen Street, off Highway 16.

J.R. Miller & Associates of Brea, Calif., designed the station and JE Dunn Construction Co. was the general contractor.

The main building is 79,000 square feet. It includes a 75,000-square-foot main floor, offices and a 7,800-square-foot lower level with compactors and trailers.

The station will handle about 165,000 tons of garbage per year and is designed for peak loads of 1,400 tons on weekdays.

There are a number of sustainable features. Natural ventilation, daylighting and lighting controls reduce energy use and rainwater is used to flush toilets.

The new station consolidates the functions of multiple transfer sites into a single building. Previously, all Tacoma's garbage and yard waste went to the landfill and was then was taken to one of four different buildings before being placed in trailers or compacted. Having one building eliminates double and triple handling of materials, and reduces the amount of equipment and employees needed.

Waste is pushed directly into loadout holes without any lifting, increasing efficiency.

The structure is designed to improve safety. Previously, traffic moved across the site as waste was taken to different buildings. Now commercial haulers go to one side of the station, while residential haulers go to the other. The station has full fire sprinkler protection and sensors that monitor carbon in the air, triggering exhaust systems. A flat tipping floor eliminates fall hazards for people unloading waste.

State-of-the-art features include a misting system for dust control, bird wires and bird spikes to discourage seagulls from roosting on the structure and a top-load bay with axle scales to monitor the weight of trailers while being loaded.

The station’s size is based on projections of population and growth over a 20-year horizon. It is designed for expansion, with a large floor and multiple doorways that allow operations to be changed based on traffic volumes and new processes.

Comment on this story

* Comments are published and readable immediately upon submission. If you want to submit a comment that you don’t want published, send it to our staff with the “Letters” submission form.
* HTML, including style tags and hyperlinks, will be automatically removed.
* Comments are not edited. They are either displayed in their entirety or not displayed at all. Comments judged to be inappropriate for the DJC audience will be removed.

Re: Tacoma opens $27M transfer station

Name
CATHERINE TAYLOR

Email address ctaylor@cityoftacoma.org (Not published with comment)
Tacoma center earns LEED Gold

Jul 20, 2012 - 02:24 PM

The City of Tacoma Recovery and Transfer Center has been awarded the second highest rating of Gold in the Leadership in Energy and Environmental Design by the U.S. Green Building Council.

The project had originally pursued a rating of Silver, but was elevated to Gold status due to its additional green building practices.

Approximately 165,000 tons of garbage is received by the Recovery and Transfer Center each year. By utilizing the following sustainable design concepts, the center will save 40 percent in energy costs with the building's improved thermal envelope, reduced interior and exterior lighting power, and daylighting controls and solar panels. It will also reduce water consumption by 51 percent by collecting and reusing roof rainwater for flushing toilets, and using low-flow plumbing fixtures and water-efficient landscaping.

In addition, 97 percent of the construction waste from building the facility was diverted from the landfill, 32 percent of the building materials utilized were manufactured using recycled materials, and the indoor air quality of the facility was improved by increasing ventilation of occupied spaces and use of low-emitting adhesives, sealants, paints, carpet and more.

Local general contractor JE Dunn Construction built the 75,000-square-foot facility for the city of Tacoma with design partner HDR Engineering and architecture and structural engineering partner JR Miller and Associates. The project was completed a month ahead of schedule.
City of Tacoma Builds New Waste Recovery Center

Consolidation, collaboration and value engineering enabled construction of one of the largest—and most eco-friendly—bolted, clear-span buildings in the Northwest to be built a month ahead of schedule. It also allowed an existing landfill to keep operating while the new $16.7-million, 83,590-sq-ft Recovery and Transfer Center was built.

The Varco Pruden metal building uses a clear-span, open-web design with a roof built in 25-ft x 135-ft sections, each weighing 56,000 lb. The sections were assembled on the ground, hoisted onto the frame lines using two cranes and assembled in place. This allowed for quality control in the factory and enhanced safety.

The open-web design of the truss-beam frames also allowed for HVAC ducts, wiring, sprinklers and lighting to be incorporated through the trusses, a move that saved money and allowed the use of enhanced skylights for more daylighting and energy savings. It was originally targeting LEED Silver certification, but the U.S. Green Building Council awarded the project a LEED-Gold rating. It scored high in the recycled materials, indoor air quality and construction waste management categories.

Instead of breaking out building structure, skin and roof scopes, general contractor JE Dunn Construction Co., Bellevue, Wash., worked with one subcontractor to package these items, which allowed for more coordination and less error. Greg Jasper, JE Dunn senior project manager, says early collaboration allowed integration of the mechanical, electrical and plumbing shop drawings with the structure. That ensured that all weight limits, roof openings and layout coordination were completed early. "This helped expedite the final approval and fabrication process," Jasper says.

Receiving the large steel trusses on-site, crews phased work for easier staging and pre-assembly. "This allowed the structure to flow from end to end with minimal waiting between scopes of work and trades," Jasper says. He credits the phased steel work with helping to deliver the project 40 days early.

Crews demolished an existing waste-transfer building, excavated and removed buried refuse and then constructed a new 75,000-sq-ft transfer station, which can handle 165,000 tons of garbage a year.

While saving time, JE Dunn crews also helped small subcontractors gain valuable experience. The City of Tacoma contract included a 10% target for hiring the area's historically underutilized businesses. Jasper says that JE Dunn ended up hiring 15% HUB firms. However, several smaller HUB contractors had less capital and cash flow, making it difficult for them to wait for a typical billing cycle. To ease the strain, JE Dunn paid for materials as soon as they landed at the jobsite.

One HUB contractor took on work significantly larger and more difficult than anything it had done in the past, Jasper says, which required JE Dunn to "dedicate many of our company's resources to mentor the contractor in many ways. We worked closely with them to ensure complete submittal packages, certified payroll requirements, jobsite safety planning and documentation; quality control; daily, weekly and long-lead schedule planning; manpower resourcing; and change management."
One of the largest bolted, clear span buildings in Washington, the City of Tacoma Recovery and Transfer Center is located at the Tacoma Landfill. The 83,590-square-foot structure serves as a space to receive, sort and transfer municipal solid waste with an area to separate and recover recyclable materials from the waste stream.

In developing the center, project goals included improving operational efficiency, minimizing operating and maintenance costs, improving safety, meeting current design standards and regulations, providing operational flexibility to meet future needs and increasing facility capacity to meet future waste and traffic projections. Designed by JR Miller & Associates, Brea, Calif., the facility is comprised of a pre-engineered metal building from Varco Pruden Buildings, Memphis, Tenn. JE Dunn Construction Co., Seattle, served as the general contractor, and HDR, Omaha, Neb., served as the engineer. Prior to erection, Renton, Wash.-based North Pacific Industrial Coatings coated the steel with a high-performance coating system.

Erected by CHG Building Systems Inc., Renton, the open web design of the truss beam frames allowed for HVAC ducts, wiring, sprinkler systems and lighting to be incorporated through the trusses. The open web provides enhanced light dispersal for better visibility. The building also features prismatic strip skylights for daylighting and energy savings. The roof was built in 25- by 135-foot sections weighing 56,000 pounds each that were assembled on the ground. The sections were hoisted onto the frame lines using two cranes and assembled in place saving time and increasing safety. There were no time loss incidents in the 19,805 man hours of construction. The project was completed on-time and under the owners’ original budgets.

Varco Pruden Buildings,
www.vp.com