2016 Excellence Award entry
Recycling System

2016 SWANA EXCELLENCE AWARDS

RECYCLING SYSTEM

Southern Nevada Recycling Center
Serving Southern Nevada, including Clark County and the cities of North Las Vegas, Las Vegas and Henderson

Entrant: Republic Services  Title: Southern Nevada Recycling Center
Contact: Tracy Skenandore, tskenandore@republicservices.com / 702.599.5502
Jurisdiction: Southern Nevada  Population: Approximately Two Million
Budget: $35 Million, fully funded by Republic Services
Executive Summary
Republic Services’ Southern Nevada Recycling Center serves the cities of North Las Vegas, Las Vegas, Henderson, as well as Clark County. In addition to processing recyclables for 550,000 households in these communities, the state-of-the-art facility was planned and designed in support of the recycling programs offered to the 42 million visitors welcomed to Las Vegas annually.

The 110,000 square foot facility features advanced recycling technologies capable of processing two million pounds of recyclable material per day, or 70 tons per hour. Technologies employed at the Center include five optical sorters, touch screen control systems and tablet-based capabilities.

The Center was designed with sustainability as a priority, with more than 75 percent of the building made from recycled or remanufactured steel, and 1,776 rooftop solar panels and automatic low-flow water fixtures. The facility also features an innovative and inviting Learning Center that and incorporates sustainability in every facet of the design.
1. Design and Planning of Recycling System

The design and planning of the Southern Nevada Recycling Center was in response to the ambitious goals of the Southern Nevada community to increase recycling for a more sustainable future. In addition to providing the infrastructure and processing capacity necessary to accommodate the conversion of additional Clark County Nevada households to All-in-One Recycling™, the system was designed to support the innovative recycling programs that are gaining momentum on the Las Vegas Strip and throughout the region. Site development was completed in only 12 months, from the groundbreaking in November 2014 to the grand opening at the end of 2015.

The increased volume generated through the expanded residential All-in-One Recycling™ program, as well as the recyclables collected from residential and commercial customers throughout the region, exceeded capacity at the existing 88,000 square foot Recycling Center. Originally, the plan was to expand the existing recycling system. However, the extended down-time this scope of expansion would require made this approach impractical, as the material would have to be trucked out of state to provide interim processing capacity. Republic determined that it would be in the best interest of the community to continue operations at the existing site and build a new 70-ton per hour state-of-the-art recycling center adjacent to the existing facility. This allowed Republic to continue meeting the existing recycling needs of the community and customers while building the infrastructure required to support the growing demands for increased capacity.
The project site presented several challenges. It is crisscrossed by several storm channels which complicated the site layout that was required to accommodate them. In addition, geotechnical investigation revealed poor soil conditions that required extensive over-excavation to ensure proper building support conditions. Related to the storm channels, there is also a mapped FEMA flood zone on the site, which limited where the improvements could be made. These challenges presented obstacles that were overcome with teamwork and an eye toward the final site functionality.

A facility of the ambition and scope of this project required extensive planning to ensure it met the region’s current and future needs. The resulting Southern Nevada Recycling Center, which is a 110,000 square foot facility adjacent to the existing facility, is known as the “the largest and smartest residential recycling center in North America.” The Recycling Center features dual 35-ton per hour sorting lines and can use one or both of the sorting lines at any one time. Operators can bypass certain parts of the system when running different material types. Scales throughout the system calculate the weight of incoming material and shaft speeds and screen angles can be modified based on that information. This operational flexibility allows the system to adapt as the composition of the recycling stream continues to evolve and has the capability of processing not only residential, commercial, but even industrial streams.

**Recycling by the Numbers**
- The facility processes up to 70 tons per hour.
- **2 Million** pounds of materials are processed through the facility per day.
- Recyclables can travel up to 1 mile in 2.5 minutes.
- The facility can process the contents of a fully loaded truck in 3 minutes.
A unique aspect of the planning approach was that the building was designed as an extension of the processing equipment. The equipment manufacturer, CP Group, developed the 70-ton per hour system and Cambridge Construction designed the building from that template. The plant features a 42’ tall eave that allowed the equipment, specifically the screens and optical sorters, to be placed and oriented for optimum efficiency. In addition, the bale storage and tipping areas were both designed to be expanded in the future.

**Learning Center**

The facility also features a Learning Center and observation deck, which was planned and designed to offer visitors a rare, 360-degree view of the recycling process.
2. Use of Equipment/Systems and Technologies
The Southern Nevada Recycling Center features equipment capable of sorting 70 tons per hour. Nearly 550,000 households in Southern Nevada now send their All-in-One Recycling™ materials to the facility. Commercial customers send materials in either dual-streams or All-in-One Recycling™ streams, depending on the customer.

The state-of-the-art facility features industry-leading technology, including the CP Glass Cleanup Trommel, which is equipment that is being introduced for the first time worldwide. This system, created by the CP Group, uses advanced technologies and principles of engineering and physics to increase glass recovery. The system passes materials through a trommel screen, removing glass fines, which are tiny particles, as well as other small debris.

The materials continue through a rotating drum designed to agitate its contents. At one end of the drum, a large vacuum extracts any non-glass items. Meanwhile, denser material – clean glass – exits the drum at the other end, where it flows into a container and awaits additional processing. Through this first-of-its-kind technology, the system will allow increased levels of glass recovery, which is significant due to the large quantities generated by the Southern Nevada region’s hotels and casinos.
In addition, the recycling system features two OCC screens™, two scalping screens, four NEWScreens™ and two CPScreens™ separating 2D from 3D material. These screens ensure maximum separation efficiency and provide other flexible sorting capabilities for Republic Services as the ton evolves.

The system also includes five MSS CIRRUS® optical sorters that make material separation decisions in milliseconds, maximizing the recovery of all containers, including PET, HDPE, and aseptic containers/cartons. The first CIRRUS® optical sorter negatively separates any remaining fiber materials or particles to maximize recovery of all grades of plastic, including PET, HDPE and cartons. The remaining optical sorters recover plastics. With this equipment, the Recycling Center processes material very quickly. In fact, in less than 30 minutes, the system can process as much recycling as 150 households will generate in a year.

Another advantage of the system is the highly automated data acquisition system control technology. Key features include five touch-screen Human Machine Interface (HMI) control panels, as well as two wireless control panels, Supervisory Control, Data Acquisition monitoring, and remote access to continually monitor operations for optimal performance.
Users are able to monitor production and set screens, adjust sorters and change motor speeds from a tablet, anywhere in the facility. There are also sets of pre-programmed equipment settings, or “recipes,” that can be selected based on the material being processed. The application of this technology makes Southern Nevada Recycling Center the most intelligent facility in North America.

**Recycling System Equipment**

Individual components selected for the state-of-the-art processing system are shown and described below:

- **Drum Feeder**: Provides uniform material flow to the downstream pre-sort line.
- **Film Vacuum System**: Collects and transports plastic film.
- **Screw Compactor**: Compacts all collected film into long tubes.
- **OCCScreen™**: Removes and recovers large OCC from other materials.
- **Glass Breaker Screen**: Breaks and separates glass and other small materials.
- **Glass Clean-Up Trommel**: Separates glass from fines.
- **Scalping Screen**: Separates material by size and shape.
- **NEWScreen™**: Sorts 2D large and medium fiber from 3D containers.
- **Cirrus® Optical Sorter**: Sorts and recovers mixed plastics cartons.
- **CPScreen™**: Sorts 2D small fiber from 3D containers.
- **Drum Magnet**: Separates and recovers steel from other materials.
- **Eddy Current Separator**: Separates and recovers aluminum.
- **Fiber Bunker**: Holds sorted fiber before baling.
- **Live Floor Silo**: Holds sorted containers before baling and uses screw augers.
- **Vibratory Feeder**: Spreads out material to “feed” the optical sorter.
- **Advanced MRF Office Interface System**: System-wide data acquisition and control solutions.
3. Regulatory Compliance

Republic Services is deeply committed to being a good neighbor to the communities it serves, and part of being a good neighbor means strong regulatory compliance. Sustainability is a critical component of Republic Services regulatory compliance practices.

At the Southern Nevada Recycling Center, sustainability was a priority throughout the design and construction. More than 75 percent of the 110,000 square foot building was made from recycled or remanufactured steel. There are 1,776 rooftop solar energy panels that are expected to generate enough renewable energy to fulfill 15 percent of the building's power requirements. Inside the building, automatic low-flow water fixtures will reduce consumption by more than 20 percent.

Republic is committed to protecting and preserving natural resources and educating current and future generations on environmental compliance. This commitment to quality of life and regional prosperity could not be more evident than at the Southern Nevada Recycling Center.

The Southern Nevada Recycling Center complies with all environmental laws and regulations. The facility is permitted through the Southern Nevada Health District, with Permit Number PR0035182. The facility has not received any regulatory citations or notices of violation.

We’re using sunshine to reduce our carbon footprint.

Sunshine abounds in Southern Nevada. This building features a photovoltaic rooftop solar energy system comprised of 1,776 panels (315 watts) to harness the renewable resource. The system generates 933,162 kilowatts of energy per year, which constitutes more than 15 percent of the building's power consumption.

Over the next 30 years, this building’s solar energy system will offset greenhouse gas emissions equal to:

- 1.8 million gallons of oil used
- 38 million miles driven by local motorists
- 21 million gallons of water used
- 77,189 pounds of smog released
4. Worker Health and Safety

The success of the recycling system is directly correlated to the success of the employees that make it work. To that end, many approaches were taken to improve their working environment. Worker health and safety was a major consideration in the planning and design of the facility. The system was designed to exceed American and international standards for safety, including OSHA and NFPA compliance. Whether the system is running at full process or in a reduced capacity, all safety circuits throughout the facility remain active. The Southern Nevada Recycling Center employs 160 full-time employees on three shifts, with one shift devoted to maintenance. Since its opening, and at the time of this application submittal, zero injuries have occurred at the Southern Nevada Recycling Center.

Building Safety Design Features

Numerous features enhance safety of the facility, including a 10’ band of translucent panels at the eave and over 40 skylights improve indoor lighting levels. LED high bay lights supplement the daylighting when skies are overcast or when operating at night. Elevated lighting levels help improve safety and well-being.

Additional features include:

- Dual-bag house dust suppression system, including collection hoods at dust generation points in the system, removes particulates from the air, and improves the quality of indoor air for employees.

- Misting system for employee comfort uses finely atomized water droplets that cause evaporative cooling to lower temperatures. Several 12’ diameter high-volume low-speed fans help circulate air to improve worker comfort.
• Comfortable break room and locker room facilities for the facility staff, and an elevated walkway that links the employee amenity areas to the equipment, which prevents employees being on the floor, vulnerable to vehicle impact.

**Processing System Safety Design Features**

Numerous design elements were included in the system to facilitate and enhance operational safety. The system uses Miller Temporary Anchorage Connectors, which wrap around I-beams and other structures for supporting workers. Crossbars above the rotors are dimensioned to hold one person each and provide valid anchor points for lanyards. All disc drives on each screen have brake motors with locking hand release levers. Brakes are activated when the power goes off, locking rotors. Rotors cannot turn when maintenance personnel are walking or standing on them.

The system design also allows easy access to maintenance areas and includes safeguards built in to protect workers such as trap key systems, hydraulic platforms, and lanyard connections. All sorters are on the same platform level for safety and operator supervision. Additionally, a single emergency stop system provides 100% equipment control while maintaining maximum uptime. Intelligent controls know exactly when and where an e-stop is triggered, allowing quick identification and correction to resume production.

The facility also features trapped key interlocking, which utilizes locks and keys for sequential control of equipment and machinery to ensure safe operation. Trapped key interlocks are used to ensure safe access to potentially live equipment in the plant. A safe sequence of operations is enabled through transfer of keys that are either trapped or released in a predetermined order. For example, a key is used to isolate a power source (circuit breaker or supply valve), this key is then released and can then be used to gain access through a gate or door to a high risk area by inserting it into an access lock. The key will then remain trapped until the gate or door is closed, ensuring that the gate or door cannot be closed and the initial key released until this personnel or safety key is returned. Access doors contain a keylock system. The power is shut off when the access doors are opened. With the double key system, the machine cannot be started while the doors are unlocked.
The area behind the access doors of the CPScreen and NEWScreen gets closed by a fold-down service platform, from where the rotors are accessible. The floor is moved by hydraulic cylinders, and can only be unfolded when the screen is in its lowest position. This system eliminates the risk of falling during maintenance and cleaning, and in so doing, provides built-in fall protection so that harnesses are not required.

**Safety Training**
Safety is Republic's highest priority and therefore, a strict policy of safety protocols has been created with supporting infrastructure, where employees are trained to think, choose, and work within a training framework designed for safety. Employees are trained on the first day of employment on key safety topics, then receive refresher training on these topics during monthly safety meetings. Employees also participate in Republic Services' Focus 6 program which trains employees on the skills to avoid the six most serious types of losses in the industry.

**Safety Training Topics**
- Personal Protective Equipment
- Lock Out Tag Out
- Confined Space
- Hazardous Communications
- Blood Borne Pathogens
- Emergency Evacuation
- Hearing Conservation
- Fire Extinguishers
- Heat Stress
- Electrical Safety
- Fall Protection
- Machine Guarding
- Drug & Alcohol Awareness
5. Performance, Economics and Cost-Effectiveness

The Southern Nevada Recycling Center dual line processing system has proven capable of operating at its anticipated production rate of 70 tons per hour. The system has been performance tested by a third party expert and has met and exceeded the high Republic Services standards.

The system achieves 98 percent purity requirements on container grades and newspaper, achieves 95 percent purity requirement for fiber content of mixed paper, achieves over 92 percent glass content purity on a requirement of 90 percent. The system has also exceeded expectations in reliability, with an average uptime of 92 percent as compared to an industry average goal of 90 percent.

In addition to the numerous performance capabilities and operational goals achieved by the system, the versatility of the line and ability to accommodate the expanding volume of recyclables in the region was a critical deliverable realized as a result of the planning, construction and operation of the facility.

Additionally, the system has achieved economic milestones:

- The initial investment in the facility was as planned and construction was completed within budget.
- The facility is anticipated to reach profitability sooner than expected.

While these are welcome achievements, the anticipated payoff associated with the versatility of the processing line will be even stronger. Republic Services is committed to providing the recycling infrastructure needed to support the growing demand for
recycling services among the municipalities in the Southern Nevada area. The time and resources invested in this project will continue to pay off as the recycling system is able to cost-effectively adapt to provide residential, commercial and even industrial processing capabilities. Through this system, Southern Nevada Recycling Center is poised and ready to offer the surrounding communities, as well as sustainability-focused businesses and municipalities including Zappos, MGM International, McCarran International Airport, CDW, Clark County School District, University of Nevada Las Vegas, Las Vegas Convention & Visitors Authority, City of North Las Vegas and the City of Henderson, with the capacity and diversion results they seek.

**MGM Resorts**
MGM Resorts recycle approximately 56,000 tons annually, or the weight equivalent to 3,700 yellow school buses. By partnering with Republic Services, we have achieved an impressive 47 percent diversion rate.

**Las Vegas Convention Center**
The Las Vegas Convention Center welcomes more than 1.2 million people and hosts 50 conventions and trade shows per year. Working with Republic Services, we recycle an average of 5,000 tons of paper, plastic, metals and cardboard each year.

**City of Henderson**
Our community’s response to recycling has been remarkable. Working with Republic Services, the City of Henderson introduced a citywide single-stream recycling program in 2012. Over the next year, recycling participation in Henderson exceeded 90 percent, and we improved our diversion rate by 500 percent.
Public Acceptance, Appearance and Aesthetics

The Southern Nevada Recycling Center was designed to serve the region both by doubling the processing capacity for recyclables, and by creating an inviting facility to be used to engage the community in outreach and education. Outside the building, the natural landscape was preserved, for both an aesthetic and environmental benefit. The architecture of the building was engineered using recycled and repurposed materials, and features various elements of sustainability throughout the facility. More than 75 percent of the 110,000 square foot building was made from recycled or remanufactured steel.

High solar reflectance index roof materials were installed to minimize heat retention in the building. There are 1,776 solar energy panels on the roof that are expected to generate enough renewable energy to fulfill 15 percent of the building’s power requirements. Inside the building, automatic low-flow water fixtures will reduce consumption by more than 20 percent.

Within the Learning Center, sustainability was incorporated into every facet of the displays and design. Developing an interactive and inviting site where visitors would feel welcome and engage in meaningful and memorable experiences was a priority throughout the facility planning process. The learning center provides visitors with a view of the recycling process from an observation deck, as well as videos, displays and information on recycling. Visitors can learn about what can be recycled and how materials are repurposed and remanufactured to make new products.
The Learning Center is free and open to the public for guests of all ages. It is available for private meeting reservations for customers, community organizations and business groups. Field trip reservations are available for youth groups, school groups, scout groups, business groups, and customers.

**Interactive Truck Experience**
Visitors enjoy a hands-on experience inside the cab of an actual recycling truck.

The Learning Center offers visitors a rare, first-hand view of the recycling process and features a variety of customer recycling stories. These customers are moving the needle in recycling across Southern Nevada including Zappos, MGM International, McCarran International Airport, CDW, Clark County School District, University of Nevada Las Vegas, Las Vegas Convention & Visitors Authority, Las Vegas Convention Center, City of North Las Vegas and the City of Henderson.

**City of North Las Vegas**

“The City of North Las Vegas is proud to be the home of the nation’s largest residential recycling complex. We take tremendous pride in the facility and in the contributions it will make to both the economy and the environment. And we commend Republic Services for creating a Learning Center that will inspire many new recyclers, both young and old.”

-Mayor John J. Lee