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Corona Train Maintenance Facility, USA

Case Study 28

Aspects of Sustainability

This project highlights the following:

Social Aspects

Human Resources
Corporate Community Involvement
Business Ethics
Health and Safety

Environmental Aspects

Energy and Climate
Materials
Ecosystems
Local Impacts

Economic Aspects

Project Selection
Supply Chain
Value Added

The Corona train maintenance facility in New York City, USA, was redeveloped to improve functionality and the working environment at the facility, and in accordance with the Leadership in Energy and Environmental Design (LEED) certification to maximise sustainability during construction and throughout the life cycle of the building.



Project Introduction

The Corona train maintenance facility in Queens, New York City, is used to repair and maintain New York City Transit's (NYCT) 412 passenger car fleet on the No. 7 subway line. The facility underwent an extensive redevelopment between December 2002 and September 2006 to replace structures that were originally constructed in the 1920s. The 1920s facility was antiquated, inadequate for modern passenger cars and was unsafe by modern standards.

NYCT awarded Skanska USA Civil the US\$168 million design-build contract to redevelop and modernise the facility. The redevelopment included the design and construction of a 12,300m² facility with a maintenance workshop, office space,

employee facilities, a passenger car washer facility, a signal relay building and two circuit-breaker houses. The new facility is 2,800m² larger than the old yard and better equipped to maintain the fleet of passenger cars more effectively. The design-build approach, whereby the design and construction phases overlap, resulted in approximate savings of US\$25 million and reduced the project schedule by over one year.

The new facility supports NYCT's sustainability goals and was the first railcar maintenance facility in the U.S.A. to receive LEED certification. The LEED certification was used to measure environmental performance and maximise sustainability during construction and throughout the life cycle of the facility.

Contributing Towards Sustainable Development

The old yard was an unsafe and unhealthy working environment by modern standards, and was inadequate for NYCT's needs. The new facility has improved the working environment and functionality of the facility, and was constructed in consideration of local stakeholders, the economy and environment. Good stakeholder relations were maintained throughout the project and disturbance to NYCT subway and bus operations, and site neighbours was minimised. Local employment and suppliers were prioritised during construction and the redeveloped facility has enhanced the urban environment. During construction environmentally friendly building materials were used, waste recycled, and impacts on soil, groundwater and air quality were minimised. The facility exceeds energy and water efficiency standards, pre-treats and recycles wastewater, has been designed to reduce the urban heat island effect, and generates a proportion of its own energy on-site from photovoltaic roof panels and fuel cell technology.

Social Aspects

Minimised disturbance to NYCT operations

To streamline the project, the facility was operational during the redevelopment, which demanded good communication and coordination with NYCT, and the construction of temporary equipment. The facility also shares part of the site with the Casey Stengel Bus Yard and Skanska maintained good relations with the NYCT Bus Division by giving advanced notice of works and by being considerate to their needs. A temporary car washer was constructed while the old washer was rebuilt, which improved site access and provided the NYCT with a simple car washer that used detergent and disposed of it legally into the sewer system.

Minimising public disturbance

The facility neighbours the US Tennis Centre and Shea Stadium, and during day baseball games and the two-week US Open tennis tournament, crews worked through lunch and avoided noisy activities as a courtesy to the neighbouring events. Throughout the construction noise disturbance was monitored and minimised where possible, by using equipment such as sound deadening hammers during pile driving operations.

Improved working environment

The old yard was an unsafe and unhealthy environment for workers, with outdated equipment, asbestos and flaking lead paint. The new facility has been designed to promote a healthier and productive environment for the 200 employees by optimising daylight, creating fresh air ventilation, minimising unhealthy emissions and maximising safety. The use of natural light is optimised during the day by the window arrangement and open-planned design, and windows are shaded to reduce excessive glare and heat from the sun. At night, coloured wall lighting is also used to create a pleasant indoor working environment. A state-of-the-art natural ventilation system has been designed with louvers on the base and roof of the building to cool the facility by circulating air, and to create a comfortable fresh air environment. The indoor environmental quality has been maximised by the use of low Volatile Organic Compound (VOC) materials, products and furnishings, and is safeguarded by a carbon dioxide monitoring system in accordance with the LEED standards. Safety at the new facility has also been improved following the installation of state-of-the-art equipment.

Sustainability education

As part of the LEED certification Skanska provided information for a new section of the NYCT website that was created to inform the public about the sustainability features of the facility. NYCT has also held public tours of the facility, to raise awareness of the special design features.

Occupational safety

Despite the risks of working in an operational facility, the project had a good safety record and there were no serious site accidents involving construction workers or NYCT personnel. Good communication was maintained between project managers and operational staff and all site visitors undertook special safety 'track training'.

Urban improvement

The old yard was an unsightly blot on the landscape. The new facility is modern and clean, and has improved the urban landscape for local people, visitors to local sporting events and transit passengers on the Long Island Rail Road.

Improved functionality of the facility

The new facility is better designed with more service space and is equipped with state of the art equipment, which has reduced maintenance and repair times and has resulted in noticeably cleaner



passenger cars along the number 7 subway route. The facility is better designed with wider service aisles between tracks and sufficient ceiling height for an overhead crane, which facilitates moving material and equipment. The facility is also equipped to support car modification programmes and to more effectively service modern models of passenger cars.

Promoting sustainable transport

New employee facilities include bicycle storage and showers, which were used by approximately 6% of the workforce when the new facility first opened. Parking space has also been prioritised for car pool users, which amount to approximately 5% of the facility workforce.

Economic Aspects

Local construction employment

During the peak of construction there were over 250 workers on site. Local union labour was used and approximately 95% of construction personnel were from the New York City metropolitan area.

Local suppliers and materials

Local materials and suppliers were prioritised for the project and most were from the New York City area. 24% of the total building materials were manufactured with raw materials that were harvested, extracted or recovered within 800km of the project site.

Energy efficiency savings

Through energy efficiency measures and renewable sources of energy NYCT will save over US\$200,000 in annual energy costs. Photovoltaic panels and the

fuel cell installed on the roof will reduce the energy purchased from the city power grid, particularly during peak times.

Community charitable contributions

As a gesture of goodwill, Skanska installed a new sidewalk and planted trees around the traffic circle in front of the parks department office close to the redeveloped facility. The works were valued at approximately US\$50,000.

Environmental Aspects

Environmentally friendly building materials

Building materials with low embodied energy and high-recycled content were prioritised during construction. Low embodied energy materials consume less energy than conventional materials to extract, process and transport them to site. 13% of the construction materials were manufactured using recycled materials.

Recycling

As part of the waste management plan, materials were sorted and 6,511 tons was recycled, equivalent to 68% of site generated construction waste.

Minimising impacts on soil and groundwater

The new facility structures were constructed on deep-pile foundations to reduce the amount of excavation and soil disruption during construction. The elevated foundations also reduced disturbance to groundwater and runoff, and the risk of finding or disturbing contaminated soils, which is a concern for any railcar facility greater than 20 years old.

Air quality

Diesel powered construction equipment was retrofitted with emission control devices and ultra-low sulphur fuel was used to reduce emissions. Idling time for active construction vehicles was controlled and air quality was also monitored, especially during hazardous construction activities.

Reducing dust during construction

Dust was reduced during construction by covering the air conditioning ducts and using specially designed air handlers to limit the amount of dust stirred up on the site. A street sweeper was also used to clean the yard parking lot everyday, construction vehicle tires were washed before leaving the site and water was used to reduce dust during demolition operations.

Energy efficiency

Energy efficiency measures have resulted in the facility outperforming the New York State Energy Conservation Construction Code by 36%. Measures include, natural lighting, high efficiency lighting with occupancy sensors & daylight harvesting controls, improved fenestration, natural ventilation and exhaust heat recovery.

Clean on-site energy generation

The facility is equipped with photovoltaic roof panels, heat recovery units and a fuel cell. The photovoltaic roof panels generate approximately 100kW of power and provide over 5% of the facility's electricity needs. The 8 heat recovery units generate heat during cool weather and ventilate the workshop floor. The 200kW fuel cell is fuelled by natural gas and provides the facility with a continuous source of power to fuel the facility's hot water system, equivalent to 2,800 barrels of oil per year.

Reducing the heat island effect

Non-coloured concrete has been used to pave non-roof surfaces and the roof is covered with a highly reflective white roofing membrane to reduce the urban heat island effect. The membrane material also improves the insulation of the facility.

Water efficiency

The facility has a rainwater collection and storage system and a grey water recycling system. The systems meet over half the facility's annual water requirements and are expected to save approximately 9.3 million litres of potable water per year.

Water pollution

Effluent from passenger car washing is pre-treated on-site before being discharged into the city water system. The old car washer was in a state of disrepair and was not able to use detergent due to the risk of groundwater contamination.

Energy grants

A climate change rebate grant for US\$200,000 was awarded for the fuel cell and photovoltaic solar panels, which have been fitted to the roof of the facility.

Learning From Good Practice

The LEED certification and stakeholder communication were vital components of the project that guided sustainability performance and avoided complications during the project. The LEED certification was a useful checklist to guide and drive some of the sustainability design and construction features. The project took place in a shared-site operational facility, and good communication and cooperation with both the NYCT Subway and Bus Divisions was key to the success of the project. Skanska has been a preferred NYCT constructor since the early 1990s, and this project has helped to solidify that position.