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## 733 10th and G, NW, US

### Case Study 87

733 10th and G is a mixed-use development in central Washington DC that was designed to LEED Core and Shell Gold certification and involved the first carbon footprint study of its kind in the US.

### Aspects of Sustainability

This project highlights the following:

#### Green Aspects

Energy  
Carbon  
Materials  
Water  
Local Impacts

#### Social Aspects

Human Resources  
Corporate Community Involvement  
Business Ethics  
Health and Safety



### Project Introduction

The 733 10th and G development was Skanska Commercial Development's first project in the US. The Class A office building is situated in the heart of Washington's sought after East End submarket just five blocks from the White House. The building includes a distinctive free-standing glass curtain-wall structure that rests on a two-story brick base that is home to the First Congregational United Church of Christ, as well as the office lobby and retail space.

The US\$ 85 million project completed core & shell construction in September 2011. The 17,550 m<sup>2</sup> (171,053 sf) building provides approximately 15,300 m<sup>2</sup> of high quality office space on eight floors, including both single and multi tenant floors. Each office level typically includes 37 windowed offices, 5 interior offices, 5 conference rooms and a reception. The Church, which was fitted out as part of the project, covers an area of 2,180 m<sup>2</sup>, and the building also includes 360 m<sup>2</sup> of ground floor retail and restaurant space, a 490 m<sup>2</sup>

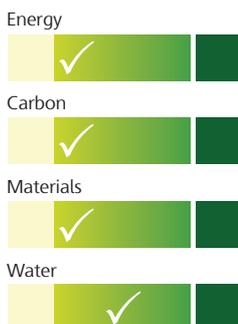
tenant-only roof terrace and a 270 m<sup>2</sup> fitness center. The main two-story lobby has a glazed canopy and wood finishes, and the building has 138 tenant car parking spaces on four below grade levels.

733 10th and G was designed to meet LEED Gold certification (LEED New Construction Core and Shell 2.0 rating system). LEED is a voluntary U.S. Green Building Council (USGBC) certification process intended to encourage and guide the construction of more sustainable and energy efficient buildings. Skanska also measured the carbon footprint of the development, which was first study of its kind in the US even though not yet required by LEED.

### Contributing Toward Sustainable Development

The 733 10th and G development has been designed to promote energy and water efficiency, healthy office environments, and functional and flexible office spaces. The building also has

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green roofing, high solar reflectance paving and contributes toward sustainable urban development. During construction, Skanska conducted a pioneering carbon footprinting study, which will be used to develop low-carbon projects in the future. The project also incorporated fly ash concrete, thorough waste management and the use of regional construction materials.

## Green Aspects

### Energy

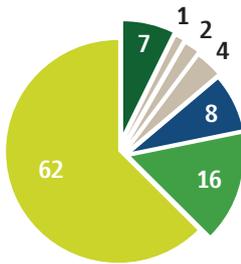
#### Energy efficiency

733 10th & G is equipped with several energy saving features, which reduce the building's energy use by around 15 percent below the ASHRAE baseline for the building (90.1-2004). The building annually uses 187 kWh/m<sup>2</sup> of energy in total for heating, cooling, ventilation and electricity use and was designed to be Environmental Protection Agency (EPA) Energy Star rated. Skanska also

utilized the EPA Portfolio Manager energy management tool, which tracks energy and water consumption, and is able to benchmark, assess objectives over time and identify opportunities for savings.

Efficient mechanical systems include Variable Air Volume (VAV) heating, cooling and air conditioning (HVAC) systems, which are serviced by a water-cooled air-handling unit on each floor with variable frequency drives for VAV control. The building is also equipped with a waterside economizer, which allows the use of "free cooling" from outdoor air when possible to provide cooling and avoid the use of mechanical chillers. The tower portion of the building (floors 5 to 10) is equipped with low-E insulating glass, which has a winter U-value of 0.3, a summer U-value of 0.26 and a Shading Coefficient of 0.27. Glazing on floors 1 to 4 has a shading coefficient of 0.44, as the levels are partially covered by the tower and did not require the same thermal performance as the tower glazing.





## Embodied Carbon Emissions

- Concrete works – 62%
- Metals – 16%
- Personnel travel – 8%
- Curtain wall – 4%
- Demolition & Excavation – 2%
- Finish materials – 1%
- Other – 7%

## Carbon

### Carbon footprinting

Skanska conducted a study to measure the carbon footprint of the project, which built on Skanska UK's carbon footprinting experience and carbon material data. The study tracked the project's embodied carbon, which is the carbon emitted during the manufacturing and delivery of the construction materials and the construction process itself. The total embodied carbon footprint of the project amounted to 6,338 tonnes CO<sub>2</sub>, with the concrete works responsible for 62 percent of the footprint.

Skanska created monthly reports and shared the knowledge gained throughout the process with project partners. All construction project partners were involved in the carbon footprinting of the project, which was new for the entire team. Skanska ensured all partners understood what was required and worked with them to gather the information required for the study.

The study provided Skanska with a US benchmark, which can be used to guide, analyze and improve the carbon performance of future projects. It also provided Skanska with an opportunity to enhance its experience of reducing the carbon footprints of buildings prior to the anticipated market shift toward carbon reduction and future legislative requirements.

## Materials

### Environmentally responsible materials

Materials that had low environmental impacts included the use of 360 tonnes of slag in concrete,

which was primarily used in the foundation work and accounted for around 8 percent of the total cementitious mass used on the project. Slag is a byproduct from iron blast furnaces, and its use in concrete allows an industrial waste product to be reused and avoids the environmental impacts associated with disposal. The use of slag also reduces the quantity of Portland cement, which decreases the embodied energy and carbon of the cement, and the use of virgin materials.

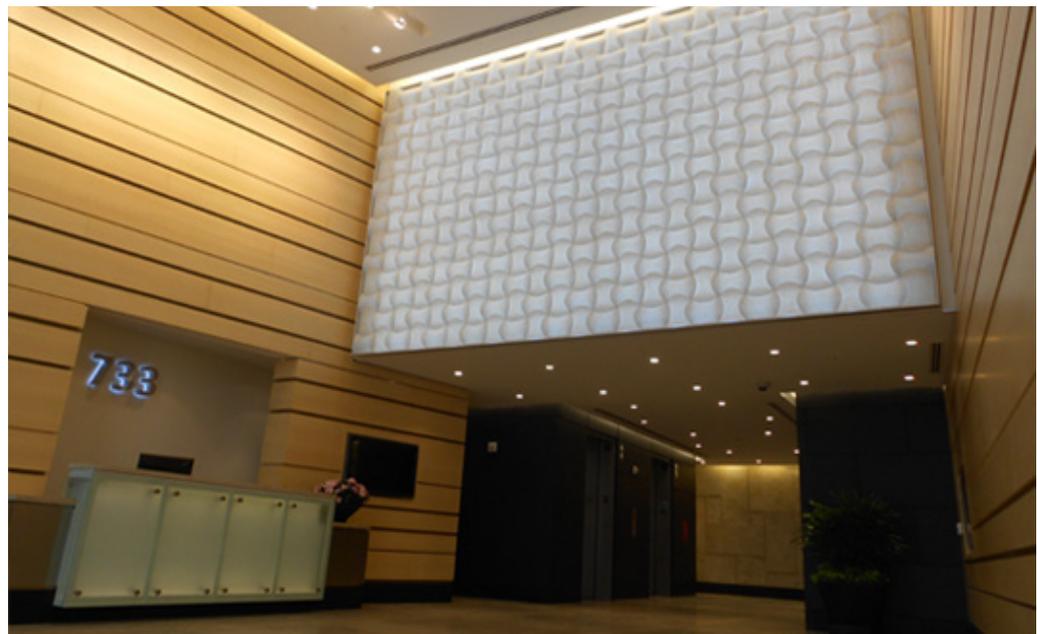
### Waste management during construction

During construction, 87 percent of the construction waste was diverted from landfill through recycling. Prior to the construction of the project, the old Church was demolished and 64 percent of the demolition materials were diverted from landfill. Eight Crape Myrtle trees from the site were relocated and some of the old Church furnishings, such as the pews and a stained glass window, were given away during an open day prior to demolition.

## Water

### Water efficiency

The building uses 40 percent less water than the baseline for the building. Bathrooms have water efficient fixtures, such as low-flow taps and waterless urinals, which save 1.9 litres per flush. Sedum vegetation and street trees are the only vegetation on the site. The plantings are drought resistant and will only be irrigated during the first two years until they are properly established.



## Other Environmental Impacts

### Green roofing

The 733 10th and G building has a sedum green roof, which covers an area of 570 m<sup>2</sup>. The green roofing can provide urban habitats for birds and insects, and filters airborne pollution. The roof also reduces stormwater runoff by capturing rainwater and allowing rainwater to slowly filter into the city's stormwater drains.

### Reducing the urban heat island effect

The roofing pavers reduce the urban heat island effect by reflecting solar radiation and releasing absorbed heat. The paving used has a Solar Reflectance Index of 87, whereby 100 represents total reflectance. The green roofing also helps to reduce the urban heat island effect in central Washington DC.

### Reducing light pollution

Automatic timers switch off non-emergency interior and exterior lighting after 23:00 to reduce light pollution. Light pollution can cause adverse human health impacts and disrupt urban ecosystems.

## Social Aspects

### Project partner involvement

The First Congregational United Church of Christ was originally located on the site, and as part of the project Skanska built a modern place of worship into part of the first and second floors of the building that fulfilled their requirements. During construction, the congregation and its social programs continued at First Trinity Lutheran Church at the corner of 4th and E Streets.

### Occupational health and safety

The Lost Time Accident Rate was 10.06 per million hours worked. The relatively high accident rate was largely due to a contractor incurring two minor Lost Time Injuries in the initial two weeks of the project. Skanska immediately suspended the contractor's operations on the project and held meetings with their principles to review the incidents and implement necessary corrective action to avoid further accidents occurring.

### Healthy office environments

An indoor air quality plan was created for the project as part of the LEED certification. The plan identified potential sources of contamination during construction, how contaminants might move through the building and how contaminants

could be controlled. Weekly indoor air quality inspections and progress meetings ensured that any indoor air quality issues during construction were quickly resolved.

The building is equipped with CO<sub>2</sub> sensors to optimize the rate of fresh air ventilation and ensure good indoor air quality in the office spaces, and a carbon monoxide ventilation control system is installed in the underground garage. The adhesives, sealants, carpets, paints and other coatings used during the project are no or low-VOC (Volatile Organic Compounds) substances. The building's curtain wall and column-free window line allows floor to ceiling glazing, which allows natural daylight to penetrate the building. Individual space thermal controls also allow building occupants to control their environment to promote comfort.

### Functional and flexible office design

The modern office space is designed to be functional in order to satisfy all the requirements of present day tenants, and flexible to meet the needs of tenants in the future. The office floors consist of an outer ring of column-free window line offices and conference rooms, with an inner ring of interior offices, meeting rooms and common spaces. The unique floor plan maximizes floor plate efficiency, and allows 37 windowed offices on each level, including 5 corner executive offices. The office spaces can also be customized to suit each particular tenant. The office floors can be easily converted to accommodate single or multi-tenant floor plans, and allow great flexibility in adapting to the changing requirements of tenants.

### Raising awareness of more sustainable buildings

A Green Building Tenant Handbook, which is intended to guide tenants to reduce their environmental impacts, has been specifically compiled for the building. In addition, Skanska actively encourages tenants to carry out LEED Commercial Interior (CI) certification projects for their spaces and two tenants are pursuing LEED-CI. Educational signs have been set up at relevant points throughout the building to raise awareness of the building's green features among tenants and visitors. The project also raised awareness of building carbon footprinting among the project team, which involved educating subcontractors through training initiatives.

### Contributing toward sustainable urban development

The project involved the redevelopment of an existing site in the business and cultural centre of

DC. The project therefore did not impact upon natural environments or greenfield land, and maintained a dense, mixed-use urban environment, which reduces the need for commuting. The building is also situated within walking distance of commonly used services and amenities.

### **Promoting more sustainable modes of transport**

The building is located within one block of all five Metro lines and several routes in the city, making it one of the most accessible sites via public transit possible. The building also has secure bicycle storage, preferred parking for hybrid vehicles and street parking spaces for shared-use vehicles.

## **Economic Aspects**

### **Regional construction materials**

Over 30 percent of the project's construction materials were extracted, processed and manufactured regionally, within 800 km of the site. Examples of regionally manufactured materials include steel, concrete, doors, frames and the aluminum storefront.

### **Efficiency savings**

Tenants can make energy and water savings throughout their occupancy, which correspond directly to financial savings. The building uses around 15 percent less energy than the baseline for the building and tenants have individual sub-meters to allow them to monitor their own energy use and make further efficiency improvements. The flexible nature of the building also enables easy modifications to tenant spaces, which minimizes renovation and upgrade costs and the efficient floorplate design allows companies to comfortably utilize a denser workspace design to fit more employees into the same amount of space.



## **Learning From Good Practice**

The pioneering carbon footprint study has provided Skanska with greater experience of carbon footprinting and a US benchmark that can be used to reduce the footprint of future projects.