1

SS

Alternative Transportation: Bus Stop, Bike Racks, No Additional Parking

To reduce pollution and land development impacts related to automobile use, NDSU Downtown has:

- A new bus route and stop
- Two sets of bike racks and interior showers for building occupants
- No new additional parking in relation to previous development

2

SS

Erosion and Sedimentation Control

To control erosion to reduce negative impacts on water and air quality, the Contractor was required to follow Environmental Protection Agency (EPA) standards including permanent seeding and planting, dust control, silt fences, and storm drain inlet protection. This kept debris from leaving the site due to surface water erosion and entering the storm sewer systems.

3

SS

Site Selection

NDSU Downtown did not develop on previously undeveloped sites which were:

- Prime farmland
- Land which is within the 100-year flood plain
- Habitat for any endangered species
- Land within 100 feet of wetland
- Land which was public parkland

4

SS

ID

Development Density, Reduced Site Disturbance, Heat Island Effect -- Non-roof

- Reuse of an existing developed site helps meet the LEED minimum development density for the site of 60,000 square feet per acre
- Local zoning requires 0% open space for downtown, the site however has 45% of it's site as open space
- To reduce heat island effect, the open space is 47% light-colored concrete with a light reflectance level of 0.35 which meets LEED Requirements

5

SS

Light Pollution Reduction

The Illuminating Engineering Society of North America (IESNA) foot-candle requirements were met by:

- Perimeter lighting provided by 400W halide pole-mounted fixtures
- Pedestrian lighting is fully shielded with louvers
- Building lighting are cut-off style halide lamp fixtures
- All lighting is controlled by photo cells (automatically turn on at night) and time clocks for flexibility

6

WE

Water Efficient Landscaping

An automatic irrigation system was designed with a mix of low-flow drip irrigation for the shrub planting beds and an efficient, triangulated head to head coverage sprinkler system for the lawn. Plantings were selected for their hardiness, xeriscape characteristics, and reduced maintenance requirements. Protection from both wind and sun are created by the building.

7

EQ

Indoor Chemical and Pollutant Source Control

To minimize cross-contamination of regularly occupied areas the following strategies were used: entryway mats are regularly cleaned and replaced, structural deck to deck partitions and exhaust systems are implemented where chemical use occurs, and chemical waste plumbing has been provided where chemical concentrate mixing occurs. Chemical use areas include Photography Room, Print Making Studio, and Janitorial Rooms.

8

MR

ID

Construction Waste Management - Freight Elevator Gates

Existing building materials were salvaged on site and reused in creative and utilitarian ways (which qualifies for Building Reuse Credits in some instances). The buiding's original freight elevator was dismantled and the wood entrance gates were reused as part of the dropped ceiling in the Conference Room.

9

MR

ID

Construction Waste Management - Wallpaper

A part of the building's history, a portion of the original building's many wallpaper layers were left in tact. In this case, layers of wall-paper is left uncovered and framed by new construction. Though minimal, this material is spared from demolition and becoming land fill material.

10

EQ

Low-Emitting Materials - Carpet

The Conference Room carpet meets requirements from the Carpet and Rug Institute Green Label Testing Program. Tested for chemical emissions by an independent laboratory using the most up-to-date, dynamic environmental chamber technology, the selected carpet passes the total VOC emission limit for carpet of .5 mg/m2/hr. The carpet was supplied from Blue Ridge Industries, a member of the United States Green Building Council, and a carpet line whose products all pass CRI Green Label certification.

11

MR ID

Construction Waste Management - Steel Trusses

Existing steel trusses from the building became a cost saving and creative way to reuse materials by forming the new ceiling above the gallery. Construction waste management tactics like this led to an Innovation in Design credit by exceeding the LEED requirements of diverting 25%, and 75% of materials from the landfill, with an overall outcome of 95% of demolition materials being recycled.

12

MR

Building Reuse- Columns, Beams & Joists

Nearly all structural wood columns and beams were left in tact and can be seen throughout the building. All existing wood joist framing which was removed to accommodate remodeling changes such as stairways and mechanical shafts was salvaged and re-installed into the new completed building. An example of this can be seen in the canopy structure of the Conference Room.

13

EQ

Low-Emitting Materials - Paint

Throughout the building interior paints were used with VOC levels well below the Green Seal Standard of 150 g/L VOC content limit. A VOC Budget was developed to assess all types of paints used and their various VOC emission amounts. The eventual Design Case total VOC was less than the Baseline Case total VOC.

14

EQ

Daylight & Views - Views for 90% of Spaces

Low occupancy rooms were not part of the LEED calculations, though they were often designed to receive shared daylight from adjacent spaces. Many of the hallways receive natural daylight because of the use of glass transoms, glass sidelights in door frames, and glass in the doors themselves. This also offers a visual connection between adjacent spaces.

15

MR

Building Reuse- Floors

All of the original maple wood strip flooring was retained and refinished except for a small amount of damaged flooring (about 2500 square feet) that had become deteriorated due to water damage caused by a roof leak. At some areas the wood strip flooring had become warped from moisture and freeze / thaw conditions. The wood strips required removal, cleaning, re-installation and refinishing.

16

Building Reuse - Windows

Existing double-hung windows at the north, west and south elevations were retained and repaired in place. Many windows at the east elevation were missing in part or whole. The few remaining window components at this side of the building were removed, salvaged and re-installed to supplement missing window parts at the other three sides of the building. A few remaining sashes were integrated into new interior walls at fourth floor.

MR

17

MR

ID

Local/Regional Materials - 20% Manufactured Regionally

Incorporation of local materials saves energy by minimizing the need to transport material great distances and supports the local economy. LEED required a minimum 20% of the total material costs (from 45% of the total construction costs) to be products manufactured/fabricated within a 500 mile radius. At NDSU Downtown a total of 52% of the total material costs came from products manufactured/fabricated locally.

18

MR

Construction Waste Management - Freight Elevator Walls

Existing building materials that no longer function as their original intended use were salvaged on site and reused creatively where possible. An original freight elevator was taken apart, and it's cab walls were reused as part of the wall assembly for the Faculty Prep Room. Glass block was also salvaged and reused. This helps lessen the demand for extraction of virgin materials and helps reduce waste.

19

MR

Building Reuse - Walls

To retain cultural resources and extend the life cycle of existing building stock, the main interior masonry bearing wall was kept in-tact except for two linteled openings per floor needed to connect the two building halves. Brick from these openings were salvaged and also used at the exterior east elevation to fill non-original openings, and at many interior locations to replace deteriorated or missing brick.

20

EQ

Daylight & Views - Views for 90% of Spaces

Creatively and efficiently designed floor plans take advantage of existing window areas for views. To provide a connection between indoor spaces with the outdoor environment, 94% of the regularly occupied rooms have a direct line of sight to the outside. Spaces not included in the calculations consist of those with low occupancy use.

21

EA

Thermal Comfort

Compliance was met with ASHRAE Standard 55-1992, Addenda 1995 for thermal comfort standards to provide a more comfortable teaching and learning environment. Classrooms, labs and offices have met the required standard temperature and humidity control range by method of high quality efficient air handling units, fan coil units and variable air volume boxes specified by the Mechanical Engineers.

22

EA

Optimize Energy Performance - Wall & Roof Insulation

NDSU Downtown's wall insulation has a higher U-value for the steel framed walls than required by ASHRAE 90.1-1999, a standard guideline required by LEED. This was done by adding R-7 insulation board and R-10 batt insulation to the steel framed wall. The assembly U-value for fenestration for the new roof and insulation also succeeds the value allowed by ASHRAE 90.1-1999. This is done by adding R-7 insulation board.

23

EA

Optimize Energy Performance - Glazing & Lighting

To reduce the environmental impacts associated with excessive energy use, select window glazing met the high efficiency assembly U-value for the fenestration as allowed by ASHRAE 90.1-1999. High efficient T5 & T8 fluorescent lighting was used throughout the building, and maximum lighting power densities and design lighting values met ASHRAE 90.1-1999 standards as required by LEED.

24

EA

Ozone Protection

The United States is a major contributor of ozone depleting emissions. LEED has made it a prerequisite to not use CFC (chlorofluocarbon) base refrigerants and has encouraged the use of non-HCFC (hydrochlorofluocarbon) based refrigerants. To minimize ozone depletion the building refrigeration equipment uses refrigerant R407C; a non-HCFC based refrigerant.

25

EA

Optimize Energy Performance - Variable Frequency Drives

To minimize the building energy load, all air handling units, hot water and chilled water pumps, energy recovery wheel, and select exhaust fans were installed with variable frequency drives (a system for controlling the rotational speed of an alternating current electric motor by controlling the frequency of the electrical power supplied to the motor). Fans smaller than 25 hp have variable frequency drives and backward-incline airfoil fans, succeeding the requirements of ASHRAE 90.1-1999.

26

Optimize Energy Performance - Hot Water Boilers & Heaters

There are three high efficient gas fired hot water boilers with an efficiency of 84% versus 80% allowed by ASHRAE 90.1-1999. There are two efficient gas fired hot water heaters with an efficiency of 83% versus 80% allowed by ASHRAE 90.1-1999.

EA

27

EA

Optimize Energy Performance - Energy Recovery Wheel

Dedicated outdoor air units provide fresh air to the fan coil units. The exhaust and relief air stream passes through a passive desiccant energy wheel to maximize the energy efficiency. The energy recovery wheel is capable of both sensible and latent heat recovery.

28

EA

Optimize Energy Performance - Air-side Economizer

With an air-side economizer, extra outside air is brought in instead of running refrigeration equipment to cool the mix of return air and minimum outdoor air. The economizer uses an integrated enthalpy control versus an integrated dry-bulb control. Enthalpy controls are more efficient because they consider the work required to dehumidify the outdoor air. (Enthalpy is a measure of the total heat in the air, made by measuring both the dry bulb temperature and the relative humidity.)

29

MR

Storage & Collection of Recyclables

To reduce waste generated by the building a recycling program was integrated into the design. Individual offices have waste recycling receptacles, recycling bins are sprinkled throughout the building, and a designated room near the loading dock is designated for storage and recycling. The recycling room meets the 225 s.f. minimum as listed in the LEED Reference Guide for commercial buildings with the overall square footage between 50,000 and 100,000 s.f.

30

ID

Innovation in Design: Environmental Sustainable Program

By reading this, you are participating in an Innovation and Design LEED credit for NDSU Downtown. The purpose of the signage and building tour is to educate building users and visitors about sustainable design and specifically how aspects of sustainable design is used in this building. Visit the U.S. Green Building Council's website at www.usgbc.com for more information.