INTRODUCTION

Lebow College of Business, Philadelphia, Pennsylvania is a 13 story, 177,500 ft² building.

Lebow College of Business is described as follows:

the project will require demolition of the former 6 story 74,148 sq ft Matheson Hall. the new basement elevation will be deeper than present, the existing caissons will need to be removed. the use group of the new 13 story building will be Assembly group A3 and business Group B. Occupancy Category III with fire rating to achieve 3 hr for all structural elements supporting floors, roof and walls above grade.

The client is Drexel University. The architect is Robert A.M. Stern Architects and Voith & Mactavish. The mechanical engineer is Dimitri J. Ververelli Inc, the electrical engineer is Dimitri J. Ververelli Inc and the structural engineer is Keast & Hood Co.

Percentage of points achieved by Lebow College of Business for each module:

<table>
<thead>
<tr>
<th>Module</th>
<th>Percentage Score</th>
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</thead>
<tbody>
<tr>
<td>Management</td>
<td>100%</td>
</tr>
<tr>
<td>Site</td>
<td>86%</td>
</tr>
<tr>
<td>Energy</td>
<td>57%</td>
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<tr>
<td>Water</td>
<td>53%</td>
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<tr>
<td>Resources</td>
<td>34%</td>
</tr>
<tr>
<td>Emissions</td>
<td>100%</td>
</tr>
<tr>
<td>Indoor Environment</td>
<td>92%</td>
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Summary of Your Achievement: Lebow College of Business achieved an overall rating of 70%.

To find out how the performance of Lebow College of Business compares to other buildings that have been assessed, and to obtain certification, the data must be verified by a licensed engineer or architect who has undergone the Green Globes training and certification.

PROJECT MANAGEMENT POLICIES AND PRACTICES

This section evaluates the extent to which an integrated design process and a team approach...
are being used to generate design solutions that will meet the needs identified in previous stages, as well as the purchasing policy and the commissioning plan.

Lebow College of Business achieved a score of 100% on the Green Globes™ rating scale for its integrated design process, integration of environmental purchasing and commissioning plan.

Integrated design process

Summary of Your Achievements
An integrated design process is being used for site selection and the building design concept.
The design process uses a team approach.
Green design facilitation is being used to support green integration.

Integration of environmental purchasing

Summary of Your Achievements
Environmental purchasing, including the procurement of energy-efficient equipment is being addressed.

Commissioning plan - documentation

Summary of Your Achievements
The Designer has produced a Schematic Design Report which includes Design Intents, Basis of Design, Design criteria, an O&M Report and budget, and a description of the service contracts that will be needed.
Basis of Design documentation is being prepared.
The Designer has established design criteria to meet the functional and operational requirements of the building.

SITE Rating Earned: 86%

This section evaluates design strategies for optimal use of the site based on information gathered during the Predesign - Site Analysis Stage, and in response to the requirements set out at the Predesign - Project Initiation Stage and further outlined in the Predesign - Programming Stage.

Lebow College of Business achieved a score of 86% on the Green Globes™ rating scale for site design and measures to minimize the impact of the building on the site and/or the site enhancement.

Analysis of development area
Summary of Your Achievements

The site analysis data for topography, geology, soils, water features, drainage, vegetation as well as previous land use, are being applied to the development of the site plan.
The site is an existing serviced site.
The site has been verified as not being a wetland or a wildlife corridor.

Development of strategies to minimize ecological impact

Summary of Your Achievements

The Schematic Design proposes the integration of native planting and landscape naturalization.
There are strategies to avoid creating heat islands.
The design proposes exterior lighting that avoids glare, light trespass and night sky glow.

Opportunities for improvement

Develop design strategies that minimize the disturbance of undeveloped areas of the site. Minimize the area of the site for the building, parking, and access roads, and locate new buildings on previously disturbed parts of the site. Preserve significant trees and natural slopes to maintain the existing direction of groundwater flow. Prepare a drainage and erosion control plan. Map all the existing site vegetation.

Integration and enhancement of watershed features

Summary of Your Achievements

Site grading will be used to increase infiltration, reduce run-off and divert water from the building.
The design proposes that rainwater be captured from impervious areas for groundwater recharge and reuse in the building.

Strategies to enhance site ecology

Summary of Your Achievements

There are plans to remediate the contaminated site.
There are strategies to enhance the site’s natural features.

ENERGY Rating Earned: 57%

This section evaluates strategies that are being considered to reduce the energy consumption of the building. The proposed solutions should be developed using an integrated design process that considers a wide range of factors such as the site’s...
microclimate, space optimization, the integration of energy-efficient systems and transportation.

Building systems such as HVAC, lighting and heating of water use large amounts of energy. Energy is an important environmental parameter because it relates directly to climate change and global warming as well as a variety of air emissions. These include sulfur dioxide and oxides of nitrogen, which produce acid rain; as well as hydrocarbons and airborne particles. There is also a direct relationship between energy savings and cost savings.

Lebow College of Business achieved a score of 57% on the Green Globes™ rating scale for energy efficiency. This represents the weighted integration of the sub-scores for: modeling and simulation of the building energy performance, energy demand minimization strategies, integration of energy-efficient systems, integration of renewable energy sources, and planning energy-efficient transportation.

Modeling and simulation of building energy performance; establishing an energy target.

Lebow College of Business achieved a sub-score of 0% for its energy consumption, because the information needed is not complete.

It was not possible to obtain energy use and cost target information from the Energy Star® Target Finder because building type “Other” was specified. To obtain target information from the Target Finder the building type must be set to one of the primary space types defined by the Target Finder (in the Basic Information section) and then answers required for the building type specified must be provided in the Energy section.

Opportunities for improvement

Perform a preliminary energy simulation. Develop feasible combinations of strategies to achieve levels of performance (i.e. 30%, 40% and 50%) better than those of a building that meets the ASHRAE 90.1 energy code. Determine initial and operating costs related to each strategy. Based on annual energy use calculations, compare various strategies. Confirm that the design is projected to meet or exceed a energy consumption target.

To ensure achievement of the targets, carry out an energy analysis during the design process and after occupancy.

Energy demand minimization strategies

The use of energy in buildings impacts on the environment through the consumption of non-renewable resources and by contributing to global pollution through greenhouse gas emissions. The reduction of this impact and improved comfort conditions start with the
space planning of the building and consideration of microclimatic conditions. The *ASHRAE* 90.1-2004 standard sets out the design requirements for improving the energy performance of buildings, focusing on both the building envelope and the building systems and equipment.

Lebow College of Business achieved a sub-score of 84% based on a review of space optimization, response to microclimate and topography, daylighting and design features of the building envelope that would be expected to affect the building's energy use and hence its carbon dioxide emissions.

**Summary of Your Achievements**

- **Space optimization**
  - The design proposes the optimization of space use to maximize energy efficiency.

- **Response to microclimate and topography**
  - The design proposes that spaces and openings be configured to optimize passive solar gains.

- **Daylighting**
  - The building will be located and oriented to maximize opportunities for daylighting.
  - The window sizing and placement are being designed to optimize energy-savings and maximize daylighting.
  - Design strategies are being implemented to maximize daylight for upper floors.
  - Design strategies are being implemented to bring light deeper into occupied spaces, provide uniform lighting and prevent glare.
  - The design proposes that window glazing be used to optimize energy-savings and daylighting.
  - The design proposes that shading devices are to be integrated to minimize overheating and glare.

- **Integration of lighting controls**
  - Integration of lighting controls is proposed in the design.

- **Optimization of building envelope**
  - The design proposes that glazing with a low U-factor be used.
  - The design explores material selection strategies to respond to ambient conditions, including wind, precipitation and other environmental forces, which would meet or exceed the performance requirements of the *Model National Energy Code for Buildings*.
  - Measures are being proposed to prevent groundwater or driven rain from penetrating into the building.
  - The design proposes a continuous air barrier.

- **Energy metering**
Opportunities for improvement

Response to microclimate and topography

Perform wind and snow control studies for areas where this could be a problem. Develop a site plan showing possible strategies to minimize the exposure to wind and the accumulation of snow.

Develop a building form that, site permitting, can benefit from natural or hybrid ventilation to provide natural cooling during the time of the year when outdoor air is cooler than indoor air. Evaluate the potential for an open floor plan. Consider room depth and height ratios.

Optimization of building envelope

Develop combinations of strategies that use the principles of thermal massing, passive solar-heating and control, and a suitable ratio of volume to surface area/glazing. Consider integrating an interior/exterior buffer zone such as an atrium, courtyard or vestibules.

Integration of energy-efficient systems

Building systems such as HVAC, lighting and heating of water use large amounts of energy. The ASHRAE 90.1 standard focuses on improving the energy consumption performance of commercial buildings based on both the building envelope and the building systems and equipment.

Lebow College of Business achieved a sub-score of 91% based on a review of individual design features of the building services that would be expected to affect the building’s energy use and hence its carbon dioxide emissions.

Summary of Your Achievements

The design proposes the integration of the following lighting features:
- high efficiency lamps
- luminaires with electronic ballasts
- task lighting where suitable
- appropriate personal lighting controls

High efficiency chillers will be used.

The design proposes the integration of the following:
- variable speed drives on variable air volume distribution systems
- energy-efficient motors

The integration of building automation systems (BAS) is proposed.
The design provides for the integration of hot water saving devices.
Strategies are being developed to integrate high efficiency elevators in the building and/or to minimize the need for overall elevator usage.
Other energy-saving systems or measures are proposed, described thus:

heat recovery and desiccant dehumidifier, chilled beams, variable water flow systems, economizer cooling maybe.

Opportunities for improvement
Consider the integration of heat pumps into the building.

Integration of renewable energy sources

Renewable energy sources are those that produce electricity or thermal energy without depleting resources or producing greenhouse gas. They include solar, wind, water, earth and biomass power, and energy from waste.

Lebow College of Business received a sub-score of 0% for integration of renewable energy sources.

Opportunities for improvement
Explore strategies to integrate, where appropriate, the following renewable energy systems into the design:

• Solar-heating systems
• High efficiency, low emissions biomass combustion systems
• Wind energy systems
• Photovoltaics (PV)

Investigate the scope and amount of renewable energy that can be supplied either directly or indirectly to the buildings.

Planning energy-efficient transportation

A daily journey totaling as little as 5 miles by car can, over one year, emit as much CO₂ as that emitted to provide heat, light and power for a person in an office.

Lebow College of Business received a sub-score of 81% for facilitating alternatives to automobile commuting.
Summary of Your Achievements

Public transport
The site design will integrate the following features to reduce automotive commuting:
- good access to public transport
- features promoting shared vehicle transport (car-pooling)

Cycling facilities
The design proposes secure, sheltered and accessible bicycle storage.

Opportunities for improvement

Cycling facilities
Integrate changing facilities for tenants and staff near the circulation route to the bicycle storage area.

**WATER** Rating Earned: **53%**

This section calls for the development of strategies to conserve treated water and minimize the need for off-site treatment of water.

Lebow College of Business achieved 53% on the Green Globes™ rating scale for water consumption and measures to minimize water use.

Meeting a water performance target

Opportunities for improvement

Estimate the water usage targets for the building based on the integration of water-conserving features and strategies.

Water conserving strategies

Summary of Your Achievements

Strategies to minimize consumption of potable water
The design proposes sub-metering of water consumption.

The following water fixtures are being considered:
- water-saving devices or proximity detectors on urinals
- low flush toilets (less than 1.6 gallons/flush)
- water-saving fixtures on faucets (2.0 gallons/minute) and showerheads (2.4 gallons/minute)
- other water-saving appliances

Strategies to minimize water for cooling towers
Air-cooled towers or dessicant cooling are being considered.
If a cooling tower is to be used, water-conserving features will be included in the Schematic Design.

Strategies to minimize water for irrigation
The design addresses the principles of xeriscaping with integration of native, drought-resistant species into the landscape.

Strategies to reduce off-site treatment of water
A separate system for the supply of graywater is being considered.

Opportunities for improvement

Strategies to minimize water for irrigation

If a rainwater catchment system is to be integrated, consider the required volume, based on regional rainfall data and plant requirements. Evaluate the availability of potential storage areas on the site (basins, cisterns, ponds, etc.).

Evaluate the site and building for opportunities for graywater reclamation and non-potable water uses (i.e. irrigation, toilets, etc.). Research and analyze systems early in the design process to ensure successful and effective design solutions. Evaluate requirements for permits and/or variances. Graywater collection and irrigation systems must be considered early in the design process, since they will affect landscaping design and the size and placement of mechanical spaces.

Strategies to reduce off-site treatment of water

Where appropriate, develop design strategies and select appropriate systems based on the facility’s program, occupants and site, for alternative waste treatment such as manufactured bio-filters, peat moss drain fields, wetlands, consolidated systems or composting toilets. For wetland systems, identify design requirements based on users, the facility’s capacity, the pollutants to be removed from the water, the area and detention time necessary for thorough treatment, vegetation and aquatic life survival requirements, and aesthetics.

RESOURCES, BUILDING MATERIALS AND SOLID WASTE

This section evaluates strategies and design approaches, material selection and construction systems that use fewer resources, or enable materials to be reused or recycled. The design of facilities for storing recyclable waste is also considered.

Lebow College of Business achieved a score of 34% on the Green Globes™ rating scale for managing resources through waste reduction and site stewardship.
Integration of systems and materials with low environmental impact

Opportunities for improvement

Conduct a preliminary research and evaluation of building materials generically, such as concrete, steel, and wood. Explore the environmental effects of different design options or material mixes.

Strategies to minimize the use of non-renewable resources

Summary of Your Achievements

The Schematic Design recommends the incorporation of building materials that contain recycled content.

The utilization of locally manufactured materials is proposed for the project.

The design stipulates that tropical hardwoods be avoided and solid lumber and timber panel products originate from certified or sustainable sources.

Opportunities for improvement

Research local sources to assess the availability of construction & demolition (C&D) waste for use in the project. Avoid products that contain hazardous materials or that do not meet current performance standards.

Strategies to reuse parts of the existing building

Opportunities for improvement

Identify existing walls, floors and other structures that could be reused and develop design strategies that incorporate them. Prepare a demolition waste management plan for materials and equipment that will not be reused in the renovation, such as framing lumber, hardwood flooring, carpet, doors, windows, cabinets, hardware, plumbing fixtures, lighting fixtures, ductwork, wiring, and piping. Contact local demolition companies to determine which items have value for resale or reuse.

Design strategies for building durability, adaptability and disassembly

Summary of Your Achievements

Design features to facilitate building adaptability are being considered.

The design proposes the incorporation of durable, low-maintenance building materials and components, particularly in areas likely to experience high levels of wear and tear.

Opportunities for improvement

Explore systems that are fastened in such a way as to facilitate disassembly, thereby avoiding their destruction and allowing the components to be reused when the building is demolished.

Strategies to reuse and recycle demolition waste
EMISSIONS, EFFLUENTS AND OTHER IMPACTS Rating Earned: 100%

This section evaluates strategies to avoid or minimize air emissions, ozone-depleting substances, effluents, pesticides, and hazardous materials. Note that it is assumed that halon-containing materials will not be introduced into the building.

Lebow College of Business achieved 100% on the Green Globes™ rating scale for emissions, effluents and other environmental impacts.

Strategies to minimize air emissions

Strategies to avoid ozone-depleting refrigerants

Opportunities for improvement

Where fluorocarbon-based refrigerants must be used, select those with the lowest ozone-depleting potential (ODP) and global warming potential (GWP) during the equipment lifecycle. In retro-fits, complete a comprehensive CFC phase-out conversion. Consider replacing the existing ozone-depleting system with a substitute. Where applicable, preference should be given to chilled water precincts, as opposed to split and packaged systems and unitary self-contained units. These are easier to maintain and monitor for leaks.
Design measures will be taken to prevent sewer contamination. There will be measures to prevent stormwater run-off from the roof from entering public utilities.

Pollution reduction strategies

Summary of Your Achievements

Compliant storage tanks
Storage tanks will comply with federal guidelines and local requirements.

Strategies to control other pollutants (PCBs, asbestos, radon)
Any PCBs and asbestos present in the building will be removed and/or will meet applicable regulatory requirements.

Design measures are being taken to prevent the accumulation and penetration of harmful chemicals and gases (such as radon) into the building.

Strategies for integrated pest management
There are design features to promote integrated pest management.

Strategies for proper storage and control of hazardous materials
The design provides proper storage of hazardous materials.

**INDOOR ENVIRONMENT** Rating Earned: **92%**

This section evaluates the strategies that are being used to ensure that the indoor environment is healthy and comfortable, in terms of providing a high level of indoor air quality, effective lighting, thermal comfort and suitable acoustic conditions.

Lebow College of Business achieved 92% on the Green Globes™ rating scale for indoor environment and the measures to provide healthy, productive and comfortable environment.

Strategies for effective ventilation

Summary of Your Achievements

The design proposes that air intakes be positioned so that they are far from sources of pollution and prevent recirculation. The openings will be protected.


A strategy for effectively delivering ventilation is being developed.

The design proposes a CO$_2$ monitoring system to ensure that levels do not exceed 800 ppm.

The intended control systems will allow ventilation rates to be adjusted to meet
varying needs throughout the building. The design provides for easy access for cleaning and inspecting air filters.

Opportunities for improvement
Investigate and evaluate available technologies for personal environmental controls and integrate the selected option into the design.

Strategies for the source control of indoor pollutants
Summary of Your Achievements
There are design measures for controlling moisture build-up in the building and to prevent the growth of mold.
The air-handling units will be easily accessible for regular maintenance and drainage.
The design and proposed placement of the wet cooling towers will help to avoid the risk of *Legionella*.
The hot water design will help to avoid the occurrence of *Legionella*.
The design proposes local exhausts for areas where contaminants are likely to be centrally generated.

Strategies to optimize lighting
Summary of Your Achievements
Daylighting
The lighting is being designed using an integrated, sequenced approach.
The orientation and visual access of the building are being considered in terms of daylighting potential.
The heights and depths of the perimeter spaces are being designed to optimize daylighting.

Lighting design
The design proposes electronic ballasts fitted to luminaires.
Measures to minimize glare will be integrated.
The proposed lighting concept follows the guidelines outlined in the *IESNA Lighting Handbook for Lighting Levels* with regards to the selection of lighting levels for specific tasks.
The design proposes suitable task lighting.
The local lighting controls will be adjustable to meet requirements relating to room occupancy, circulation space, and daylighting.
Calculate the percentage of the floor plan that would receive the most direct daylight based on various floor plan design options.

For critical spaces, calculate the daylight factor for different times of the year for clear-sky and overcast conditions. Use various energy-efficient lighting and daylighting design strategies to maximize the daylight where necessary. Aim for an average daylight factor of 5%, in 80% of work areas, for a well day-lit work place. For a partially day-lit workplace or a living/dining area in a typical dwelling unit, aim for at least 2%.

Strategies for thermal comfort
Summary of Your Achievements
Based on thermal evaluation for critical spaces the thermal conditions will meet ASHRAE 55-2004.

Strategies for acoustic comfort
Summary of Your Achievements
The design plan includes strategies to zone acoustically sensitive occupancies far from undesirable external noise sources.
Design strategies are being developed to control noise transmission from the site through the building envelope.
There are design measures to achieve desired vibration control and prevent noise transmission throughout the building.
There are design measures, such as zoning or isolating certain spaces, to achieve the required acoustic privacy and minimize the potential for occupancy-related acoustic problems.
Design strategies exist to achieve reverberation control/acoustic absorbency, consistent with speech intelligibility requirements.
The design proposes measures to mitigate acoustic problems associated with noise and vibrations from mechanical equipment and plumbing systems.