Sustainable Initiatives for the Renewed Georgia Tech Library

October 6, 2015

Howard S. Wertheimer, FAIA, LEED AP
werth@gatech.edu
Director, Capital Planning & Space Management

www.space.gatech.edu
Georgia Tech circa 1920
Georgia Tech Campus—circa 1997

- 9,500 Undergraduates
- 3,500 Graduate Students
- 4,000 Faculty/Staff
- 7,400,000 GSF

Legend:
- Red: 1800’s
- Blue: 1900’s
- Pink: 1910’s
- Green: 1920’s
- Yellow: 1930’s
- Cyan: 1940’s
- Black: 1950’s
- Purple: 1960’s
- Gray: 1970’s
- Orange: 1980’s
- Green: 1990’s
Plan targets for 2014

- 13,500 Undergraduates
- 8,700 Graduate Students
- 7,600 Faculty/Staff
- 15.6 M GSF
2014 Existing Conditions

13,948 Undergraduates
6,993 Graduate Students
7,365 Faculty/Staff
14.7 M Gross SF
1997 - 2015

- **435,650 gsf** average growth per year
- Faculty/Staff: **161** increase per year
- UG Students: **248** increase per year
- Grad Students: **297** increase per year
- Total Population Growth: **706** per year
Georgia Tech Facility Renovations
Cumulative Sq. Ft. since 1997
Historic Preservation Planning
Landscape Master Plan

Key Concepts:
- Ecological Landscape
- Human Landscape

Goals:
- Develop integrated, ecologically-based landscape and open space systems (storm water management).
- Enhance living, working and learning environment.
- Unify the campus with a distinct sense of place.
- Increase tree canopy - replace aging trees
- Create an Eco-Commons (80 acres)
- Implement ecological performance requirements of 50% reduction of storm water runoff
What is the Campus Landscape?

It is an **ecological landscape** governed by biophysical processes and a **human landscape** governed by the experience and activities of **people**...it’s everything that is rained on...
Historic Landscapes
Eco-Commons
Cistern Master Plan

Clough Commons Cistern:
- 1.4M gallon cistern capacity
- 28 day supply for irrigation
- 28 day supply for toilet flushing
- 30% reduction in stormwater
1.4m Gallon Cistern
- water for toilet flushing,
- irrigation for approximately 13 ac
- water for the Campanile Fountain
- manages stormwater for 22.5 ac
Stormwater Master Plan
Retention

Reclamation

Infiltration
Phase 1 - Construction

Provides 44,500 Cubic Feet of Stormwater Infiltration Volume
• Over 9.5 times the City of Atlanta requirements.
• Provides storage for future development
• Provides flow reductions for projects with insufficient land area to meet city requirements (campus-wide approach)
Stamps Field
3.75 acres synthetic turf
Stamps Field
Infiltration areas

- Drainage Grid
- Infiltration Cell
- To City Sewer
Augmented Reality

Developing Augmented Reality Tour

View from Clough Green Roof
Georgia Tech
Potential Opportunities for Solar Panels

Solar Opportunities
- Potential Sites
- Building Outline
Bicycle Master Plan

- Capital Planning & Space Management
- Parking & Transportation
- Bicycle Infrastructure Improvement Committee (BIIC)
- Dr. Kari Watkins (Civil Engineering)
Sustainable Campus Design

LEED
(Leadership in Energy and Environmental Design)

Platinum • 528,157 gsf
Gold • 1,892,671 gsf
Silver • 509,716 gsf
Certified • 38,750 gsf
Sustainable features **
Certification Pending

Total 2,969,294 gsf
128.5 sf LEED Space/Student
(gsf includes pending certifications)

Stormwater Management
Over 2.26M Gal Storage

Cisterns for Irrigation
Cisterns for Re-use, Irrigation, Infiltration
Infiltration Cells/Bio-Swale/Rain Garden
Photovoltaic (PV)
Total 623 KW
Green Roof
Wind Power

*Buildings currently seeking LEED certification and anticipated to achieve levels as listed.
**Buildings with sustainable features were designed using sustainable practices however did not seek LEED certification.
Sculpture Exhibit – Arts@Tech / Office of the Arts

Overview:
The Georgia Tech campus is home to a 15-piece international exhibition by various artists. The exhibition, on loan to the institute, features a soaring 50-foot steel piece titled *La Tour* by the internationally acclaimed, Chattanooga-based sculptor John Henry, who also is the curator for the exhibition.

EngagedArt is part of Arts@Tech, an initiative to enhance the Georgia Tech community by fostering programs and events spanning the arts spectrum at the intersection of technological innovation and creative expression. The initiative is an outcome of the institute’s Strategic Plan.

The sculpture exhibition is free and open to the public.

About the Exhibition:
Each of the 15 works represents the best of contemporary sculpture by some of its most recognized artists. Made from a variety of materials including steel, aluminum, cast fiberglass, copper, concrete, wood, and rubber tires, the pieces represent a diversity of styles, themes, and technical approaches characterizing our times. The location of each sculpture was chosen to complement Georgia Tech’s lush and open green spaces.

The exhibition’s curator, John Henry, is known for his large-scale public sculptures. Since the early 1970s, he has produced monumental works for museums, cities, and public institutions across the United States, Europe, and Asia.
Tech Green – Northwest Corner
Academic Buildings

G. Wayne Clough Undergraduate Learning Commons (2011) LEED Platinum
Architect: Bohlin Cywinski Jackson, CM: Turner Construction Co., TPB: $93.6M
Academic Buildings

G. Wayne Clough Undergraduate Learning Commons (2011)
Academic Buildings

G. Wayne Clough Undergraduate Learning Commons (2011)
Academic Buildings
Joyce & John Caddell Building

Architect: bldgs  CM: Evergreen Construction; TPB: $3.25M
Academic Buildings

Hinman Renovation Building (2010) LEED Gold
Architects: Lord, Aeck & Sargent and office dA, CM: The Beck Group, TPB: $10.9M
Research Buildings

Carbon-Neutral Energy Solutions (C-NES) Laboratory Building (2012)
LEED Platinum
Design/Builder: HDR/Gilbane Building Co., TPB: $24.7M
Glenn & Towers Student Housing (2015)
Architect: VMDO with Stevens & Wilkinson; Contractor: New South Construction TPB: $41.5M
Engineered Biosystems Building (EBB)

Interdisciplinary Thematic-based Research:
- Cell Therapies
- Chemical Biology
- Computational Biology

Architect: Cooper Carry with Lake Flato, CM: McCarthy; TPB: $113M
Current / Future Projects

- West Campus Dining
- Sustainable Innovation Building
- Student Center
- Library Renewal
- Dalney Street Parking Deck
- 10th Street Streetscape
- Fowler Street Streetscape
- Cadell / COA Annex
- Atlantic Drive
- Tech Square Phase II
- Alumni House / Welcome Center
- Roosevelt Site Student Housing
- DM Smith
- ESM
- Student Center
- Technology Enterprise Park II
- 10th Street Chiller Plant Expansion
- Engineered Biosystems Building I
- Engineered Biosystems Building II & III; EcoCommons
- EH&S
- ESM
Cherry Street/Harrison Square
Sustainable Initiatives for the Renewed Georgia Tech Library
Panel Discussion: October 6, 2015
Georgia Tech Library Renewal: Project Overview
Reimagining the Georgia Tech Library

Vision Statement

A network for discovering and retrieving (living) information.
A “launching pad” for turning information into knowledge, advancing ideas, and experimenting.

Georgia Tech Library will define the technological research library of the 21st century.

We will enable people to explore the past and design the future by bringing together inspirational spaces, curated content, expert guidance, and scholarly communities.

Showcase physical and digital content and activity by and at Tech.

Inspire users to create new scholarship and allude to “what’s next.”

Help people carry out their visions and proactively uncover needs. The Library is not just about its spaces and collections, but is driven by its people and their expertise and knowledge.

Bring people together from across campus to share and collaborate. Connect them to communities around the world.
Price Gilbert / Crosland Tower
The Living Building at Georgia Tech
The Living Building at Georgia Tech

PLACE: Restoring a Healthy Interrelationship with Nature
WATER: Net Zero Water Use
ENERGY: Net Positive Energy Use
HEALTH & HAPPINESS: Optimize Well Being
MATERIALS: Safe for all Species Through Time
EQUITY: Supporting a Just and Equitable World
BEAUTY: Uplifting the Human Spirit
General Development Plan:

1. Demolish Existing Church Building
2. Construct New Police Facility
3. Demolish Existing Police Facility and Small House
4. Construct Parking Structure & Office Building
5. Construct Sustainability Building
6. Construct Eco-Commons
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Georgia Institute of Technology
The Georgia Tech Library Vision
Reimagining the Library for the 21st Century

The Georgia Tech Library will enable people to explore the past and design the future by bringing together inspirational spaces, curated content, expert guidance, and scholarly communities.

Library Renewal Context

- **Data** Trends
- Core **Principles** and Values
- **Preserving and Expanding Access** to the “Universe of Scholarship.”
- **User-Driven** Spaces, Services and Collections
- **Pilot / Prototyping** Library Renewal Program
Georgia Tech Library: Engineered for YOU

https://youtu.be/8Rwj476Q2ek
context: data

Use of physical library buildings is at a record high.
Use of print book collections is at a record low.
Use of library’s digital collections (e-books, e-journals) is very robust.

1,000,000+ “clicks” to library e-books and e-journals.
Global e-book revenue projection: 2008-2018
(Source: PWC)
Seat Count Objectives

Library Seats / Student FTE (%)

GT Peer Institutions (13/20)

- Johns Hopkins – Homewood
- Cornell
- Univ of Michigan (Ann Arbor)
- Texas A & M
- Univ of Washington (Seattle)
- MIT
- NC State
- UT Austin
- Univ of California (Berkeley)
- Carnegie Mellon University
- UCLA
- **Ga Tech**
- Penn State
- Virginia Tech

Seat Count Objectives

Johns Hopkins – Homewood
Seat Count Objectives

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NC State
UT Austin
Univ of California (Berkley)
Ga Tech
Carnegie Mellon University
UCLA
Penn State
Virginia Tech

INCLUDING CLOUGH
Seat Count Objectives

Library Seats / Student FTE (%)

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Carnegie Mellon University
UCLA
Penn State
Virginia Tech

AFTER PROPOSED RENEWAL
context: five laws of library science

1) “Books are for use.”

2) “Every user, his / her book.”

3) “Every book, its user.”

4) “Save the Time of the User.”

5) “The Library is a Changing Organism.”

(S.R. Ranganathan, 1931)

Georgia Tech’s “Five Laws” as adapted for the 21st Century:

Scholarly Resources (e-books, datasets, gadgets, copyright help, research experts) are for use.

Every User, his / her Scholarly Resource at point of need.

Every Scholarly Resource, its User in the format they require.

“Save the Time of the User” by being proactive, creating a great UX, and anticipating user needs.

“The Library (and Librarian) is a Changing Organism.”
core values: preservation and access

Enduring core values for all research libraries include **preservation** of the scholarly record, and **providing access** to that content in a way that “saves the time of the user.”

Library Service Center of Emory University and Georgia Tech:

- Climate-controlled to preserve print book and archival collections for 200+ years.
- **Technology-rich environment suitable for on demand scanning and e-delivery to campus.**
- **Reading room**
- **Modular**
user experience: exploring research behavior

In partnership with brightspot, the library did a deep-dive to gain insight into the unique Georgia Tech research experience. The Library also maintains three advisory boards to provide strategic guidance.

Understanding the UX
- Advisory boards
- Observation / dScout
- Surveys

Campus Engagement
- Social Media
- e-Newsletters
- Library Renewal website

Library Faculty + Staff Insight
- “Reimagining” White Paper
- Open Forums
- Working Groups
The Library maintains three highly engaged advisory boards who provide continual strategic input to the Library’s top leadership. Additionally, Faculty “shepherds” have been appointed to provide specific insight regarding the Library Renewal programmatic design.
library renewal: piloting and prototyping

A core principle for the Library Renewal is making the “invisible” world of e-books, e-journals, librarian expertise, and digital scholarship, highly “visible” to the user.
library renewal: piloting and prototyping

http://renewal.library.gatech.edu
library renewal: piloting and prototyping

Roving Staff

LSC Material Delivery

http://renewal.library.gatech.edu
Buildings For: People Books
BOOK SPACE

PEOPLE PLACE
transforming space for people

EXISTING

FUTURE

DIFERENCE

<table>
<thead>
<tr>
<th>Category</th>
<th>Difference</th>
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<tbody>
<tr>
<td>Experiential Learning</td>
<td>32%</td>
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<tr>
<td>Stacks</td>
<td>-38%</td>
</tr>
<tr>
<td>Staff</td>
<td>Faculty</td>
</tr>
<tr>
<td>Food Service</td>
<td>1%</td>
</tr>
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</table>
CT LOBBY RISERS – wood wrapped risers
Energy Model Evolution

Annual Energy Use Intensity [kBtu/sf]

*Existing Building data is measured, not modeled
ENERGY USE PER PERSON
(Btu/sf/person)

BEFORE RENEWAL
96.8
AFTER RENEWAL
17.8
Program and design aligned with GT Strategic Plan, Landscape Plan and Sustainability Plan
Design led by innovative process of piloting new services and spaces to predict the future
Create new services for students and faculty
Doubled seat count
Create porosity of library buildings and connect interior spaces to campus
Replaced books with people
Integrated learning technology infrastructure for evolving future needs
Increase population by 100%
Removed brick walls and replaced with windows for daylight and views
Reduced energy use by 60%
Sustainable Initiatives for the Renewed Georgia Tech Library
Panel Discussion: October 6, 2015
Georgia Tech Library Renewal: Project Overview
Georgia Tech Library Renewal: Project Overview

A comprehensive renewal of existing buildings for a change in use and for long-term flexibility.

The Georgia Tech Library will enable people to explore the past and design the future by bringing together inspirational spaces, curated content, expert guidance, and scholarly communities.
ASSET  

RENEWAL
Global Connectivity

IMPACT OF UNITED STATES BUILDINGS ON RESOURCES

40% PRIMARY ENERGY USE

72% ELECTRICITY CONSUMPTION

39% CO² EMISSIONS

13.6% POTABLE WATER CONSUMPTION

SOURCE: (All Data Courtesy Of The USGBC)
* ENVIRONMENTAL INFORMATION ADMINISTRATION 2008
** US GEOLOGICAL SURVEY (2006)
Library Renewal Sustainability Strategy: Long Life, Loose Fit and High-Performance Integrated Design (HPID)

A collaborative design approach that interweaves all aspects of a building, site and building systems to produce architecture that is **environmentally responsible over the life of the building**, functionally appropriate, responsive to locale, and beautiful.
Layers of Design

A Holistic Process That Involves The Rigorous & Scientific Examination of Design Issues

- Neighborhood + Site
- Solar Orientation
- Daylighting
- Lighting Controls
- Envelope Design + Detailing
- Efficient Heating + Cooling Systems
- Flexible Workplace Controls
- Connection with Nature
Layers of Design

- Internal Security
- Public/Private Realm
- External Security
- Site
- Community Context
- Shared Spaces
- Vehicle Access / Parking
- Movement Systems
- Circulation
- Function
- Plumbing
- Mechanical
- Structure
- Sustainability
- Environmental issues
- Landscape
- Building Envelope
- Lighting
- Workplace Flexibility Furniture Systems
- Electrical/Data/Communications
Layers of Design
Environmental psychology researchers at the University of Michigan have confirmed what may have been long-suspected: spending time in a natural setting is good for the brain (at least its ability to retain important information). Study subjects learned better after a walk in nature than after a walk in a dense urban setting.
Historic Building Re-Use / Revitalization

1953

1970

1977

2011
Crosland Tower (view from the Grove)
Crosland Tower (view from the Grove)
Crosland Tower Grove Level Reading Room
Crosland Tower: Daylighting and Solar Control
Crosland Tower: Typical Illumination Levels / September 21 12:00pm, Sunny Skies
02: DAYLIGHT STRATEGIES

1. diffuse northern daylight
2. light tubes
3. daylight harvesting sunscreen
4. light sensors
5. daylight responsive artificial lighting
6. interior glazing transmits daylight
7. exterior view throughout

Sunscreen Conditions

summer  winter
SUN SHADE SYSTEM
WHITE POWDERCOAT
ALUMINUM

SOLARBAN 72 CLEAR IN YKK
SSG CURTAIN WALL SYSTEM

BACK PAINTED SPANDREL
GLASS

SOLARBAN 72 WITH WHITE
CERAMIC FRIT

TAKTL CONCRETE RAINSCREEN PANEL

Crosland Tower: South Curtainwall and Louvers
This animation shows direct sun patterns as they would occur throughout the year, showing sun patterns at 15 minute increments on the 21st of each month.

Key Details:

1) Significant direct beam passes through the east and west facing glass of the southern portion of the tower, particularly on level 07.

2) The louver layout leaves an exposure gap between the head of glass and the highest louver for each module.

3) In the summer months, direct sun enters the north reading rooms in the early morning and late afternoon.
<table>
<thead>
<tr>
<th>Previous Façade Scheme</th>
<th>Current Façade Scheme</th>
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</thead>
</table>

Crosland Tower: Annual Direct Sun Penetration Patterns (with Louvers)
Crosland Tower PV and Terrace

- PHOTOVOLTAIC PANEL SHADE STRUCTURE
- STEEL STRUCTURE
- PEDESTAL PAVER SYSTEM
- BENCH AND RAISED VEGETATED ROOF
- STAINLESS STEEL CABLE RAIL
- METAL COPING
- WHITE POWDERCOAT ALUMINUM SUN SHADE SYSTEM
- EXISTING BRICK TO REMAIN
Energy Model Evolution

**EUI** Annual Energy Use Intensity [kBtu/sf]

<table>
<thead>
<tr>
<th></th>
<th>[ASHRAE 90.1]</th>
<th>[12/23/14 REPORT]</th>
<th>[02/02/15 UPDATE]</th>
<th>[CURRENT DESIGN]</th>
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<tbody>
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<td>[<em>EXISTING BUILDING</em>]</td>
<td>121</td>
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<td></td>
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<td></td>
<td>42</td>
</tr>
</tbody>
</table>

- **Plug Loads**
- **Lighting**
- **Heating**
- **Hot Water**
- **Cooling**
- **Pumps**
- **Fans**

*Existing Building data is measured, not modeled*
ENERGY USE PER PERSON
(Btu/sf/person)

96.8
BEFORE RENEWAL

17.8
AFTER RENEWAL
Discussion