IIHCC

Solving problems that exist at, and along, the interdependencies between humans, community, and infrastructure to ultimately improve quality of life.

Vol. 2 No. 5 *June 2019*

What's Inside

Calendar

5/28 | Summer Session I begins
7/04 | Independence Day (University is closed)
7/05 | Summer Session I ends
7/09 | Summer Session II begins
8/15 | Summer Session II ends
8/26 | Fall Semester begins

If you have any questions, comments, or concerns, please contact us:

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For more information about IIHCC, visit our website

CLUSTER HIRE SPOTLIGHT

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Material & Process Design Research

Robotic 3D Felting

Digital Fabrication

Bio-Based Design / Bamboo

Architectural Product Design

How do you see your work contributing to the goals and vision of IIHCC?

People may assume engineering comes from engineers, and design comes from designers, but innovation is never siloed. Transdisciplinary collaboration is at the foundation of the Destination Areas. Our work in the bamboo projects and plastic felting projects is an excellent example of how an organization can leverage diverse teams. These projects include graduate and undergraduate students and diverse faculty from across different disciplines, businesses, institutions and even continents. The variety of approaches within a diverse team rapidly tests different paths towards the goal. When operating effectively, our project teams blur existing boundaries allowing team members to move fluidly through different roles regardless of their position or field.

As a leader, my goal is to challenge the meaning of "Intelligent Infrastructure for Human-Centered Communities." The need for "Human-Centered" design reflects systemic problems that have often resisted narrow problem-solving approaches. Too often in design, humans unconsciously focus on the needs of like-humans instead of broader communities, surrounding ecosystems and the planet earth. As a leader of designers, I try to stay broad—to design for the planet. Bamboo is interesting in its ability to dually serve human needs and replace more harmful or resource-intensive materials. For example, my hope is to develop bamboo derived materials that, in the future, can replace steel in large buildings and vehicles. Most importantly, my goal as a designer and educator, is to inculcate a similar responsibility into the next generation of designers.

What other areas outside of your discipline would you entertain for future research and proposal work?

My research in bamboo fits most easily into the discipline of material science. Specifically, I would like to study the material life cycle in more detail to determine if our projected impact matches reality. Additionally, I am interested in better understanding the structure of the plant, how it grows, how to take it apart and composite it back together to change its performance and form.

Our current research direction has been based on intuition, and I would like to start incorporating more data into that strategic decision making. For example, we would like to start incorporating the impact of transportation into the assessment of environment impact for bamboo materials. The forest that's here [in the United States] is not bamboo. Does that mean bamboo is simply not a responsible material choice in comparison to locally harvested materials? These are questions that I would like to work on answering quantitatively in collaboration with the right colleagues in the near future.

I am interested in solving problems, trying to repair, fix or augment things. A colleague and mentor of mine once observed that I am best when a problem requires the development of a prosthetic. I am interested in system problems requiring holistic solutions. I am interested in opportunities to incorporate biologic system into my work; building on the discoveries I have made growing grasses as a part of a manufacturing process and my study of plant and fungal forms as materials for new products.

CLUSTER HIRE SPOTLIGHT

Benjamin **Rosa**

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How do you see your work contributing to the goals and vision of IIHCC?

When the government procures products and services from outside vendors, one of its main objectives is promoting a marketplace in which smaller, less established businesses can compete with larger firms. Otherwise, lack of competition might lead to few firms competing for most of the government's contracts. My work deals with this issue of equity in public procurement, primarily in the domain of construction projects. There, I focus on how to design a marketplace that results in an equitable distribution of projects across firms.

As an example, in construction procurement, which is usually conducted through competitive bidding, the government can implement a bid discount whereby smaller firms have their bid lowered by a pre-specified percent for comparison purposes yet are paid their full asking price if they win. Higher discount levels make smaller firms more competitive, so I look for the discount that produces an equitable allocation of construction projects between firms. As such, I see my work contributing to IIHCC's embracement of equity in the human condition. By designing markets that ensure every business—regardless of its size or ownership—has a fair opportunity to compete, I view my work as a contribution towards equitable well-being.

What other areas outside of your discipline would you entertain for future research and proposal work?

There are a couple of areas outside of my discipline that I would strongly consider for future research. One that comes to mind is political science. In my research, I can find the perfect bid discount, but enacting it requires political support.

I am, therefore, interested in the political process surrounding the creation and passing of these affirmative action policies. Since much of my work is on construction projects, I believe that collaboration with colleagues in construction management would also be beneficial. In addition to improving the marketplace, better construction practices can also ensure that smaller firms can compete with larger ones.

Market Design

Public Procurement

Equity

Construction Contracting

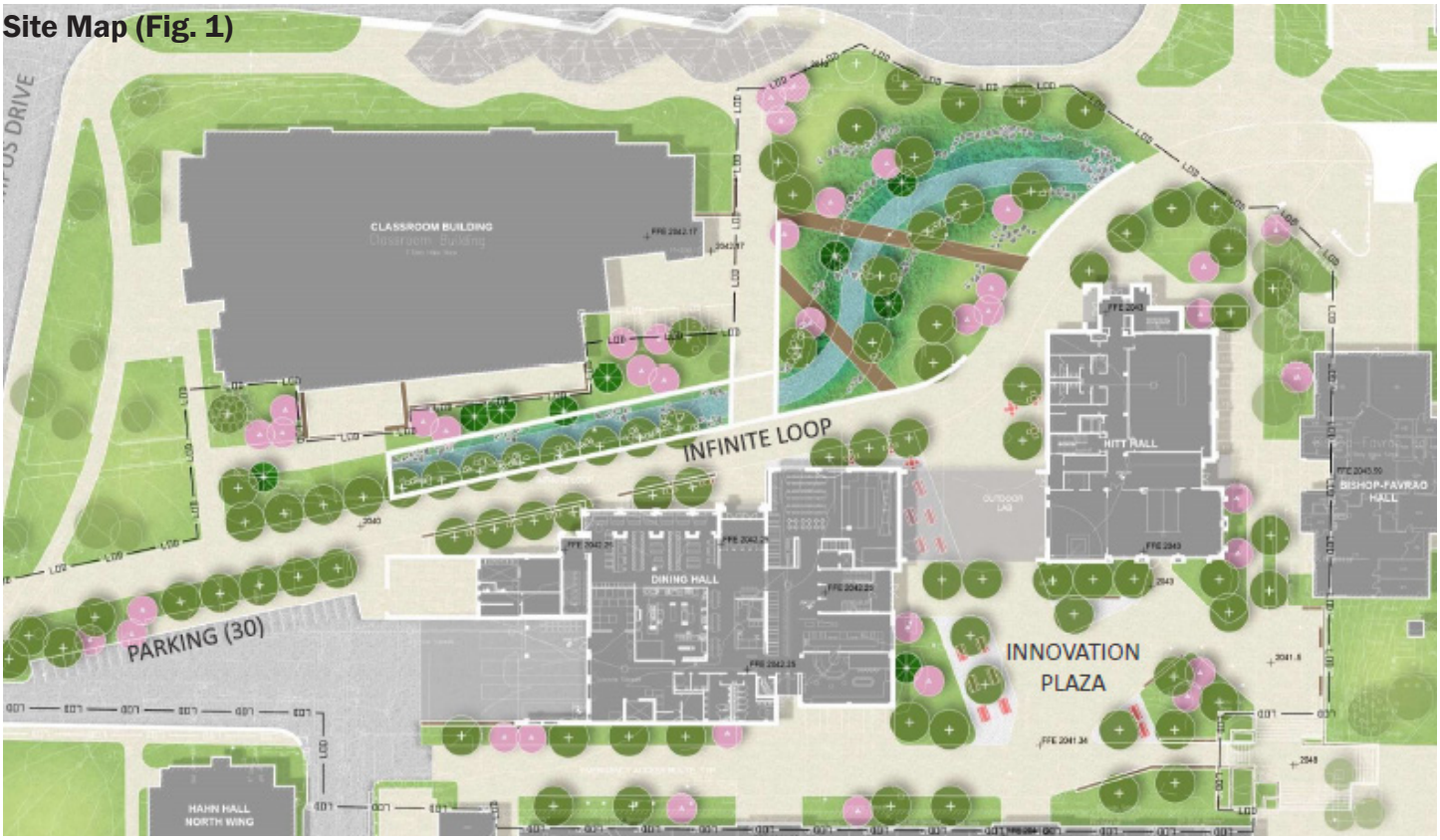
Competitive Bidding

HITT HALL AND INTELLIGENT INFRASTRUCTURE COMPLEX

The Hitt Hall/IIC building project has continued to iterate to remain true to Virginia Tech's Master Plan vision. Through this process, several changes have been made to provide the best experience and value for students, faculty, and staff.

Referring to Fig. 1, the footprint of the buildings in the area between New Classroom Building (NCB), Derring Hall, and Bishop-Favrao Hall remains the same, and particular attention has been paid to the future integrity and health of Stroubles Creek (parallel to the Infinite Loop). The implementation of the Infinite Loop has continued to remain true to the Master Plan and Virginia Tech's goal of an accessible, connected university campus.

Site Map (Fig. 1)



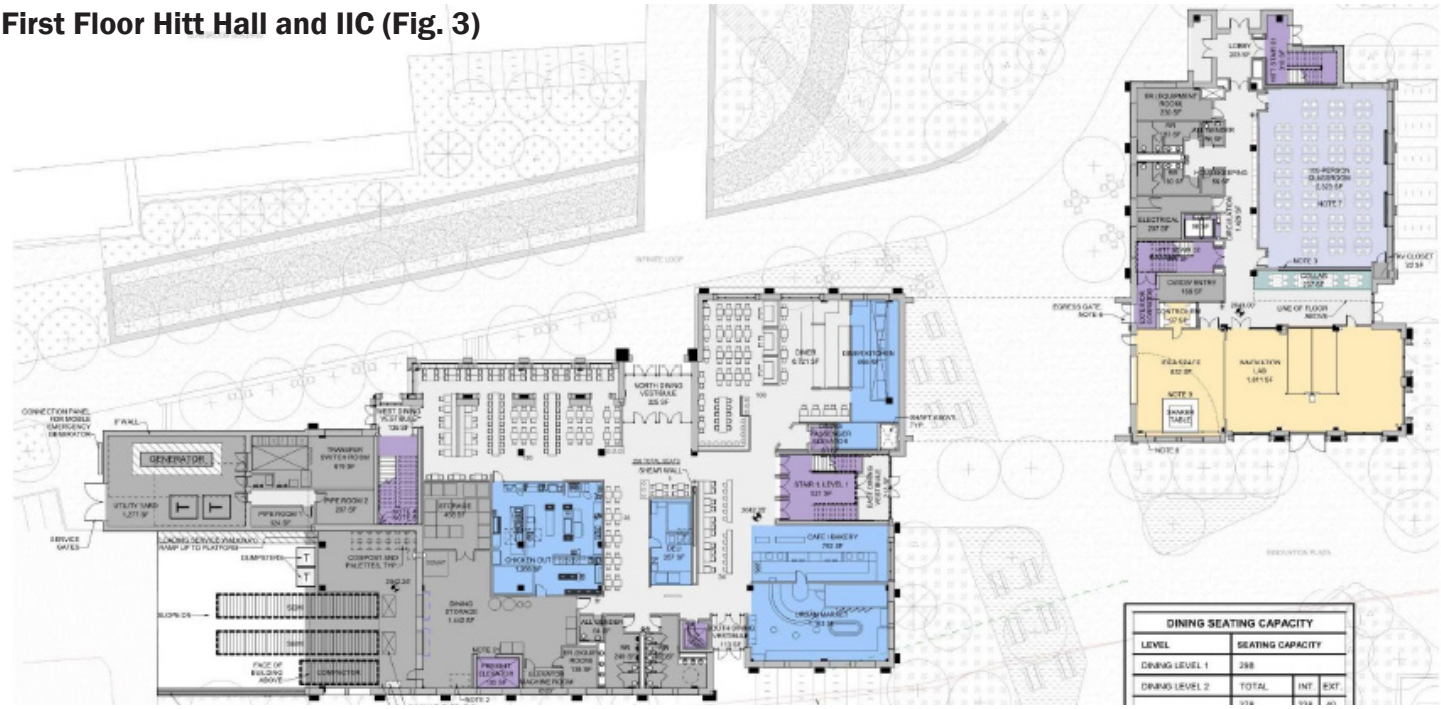
A view from above Derring Hall and Cowgill Hall (Fig. 2) reveals the Innovation Plaza. This open area will provide outdoor space for projects and structures designed within Hitt Hall to be displayed to spur educational interaction and discussion between pedestrians, commonly referred to as accidental collisions.

Southwest Aerial View (Fig. 2)

HITT HALL AND INTELLIGENT INFRASTRUCTURE COMPLEX

Aside from several square footage alterations and a reduction of a central stairwell in the IIC, the first floors of Hitt Hall and IIC (Fig. 3) remain the same. The IDEA Space in Hitt Hall (bottom left corner in yellow) continues to garner interest and discussion due to its potential to be an exemplifier of transdisciplinary research. Current discussions focus on the implementation of infrastructure to house shaker tables for vibrations testing, mount cameras and sensors for photogrammetry, and promote access between the IDEA Space and Hitt Hall's Innovation Lab for collaborative research and immersive educational opportunities for students.

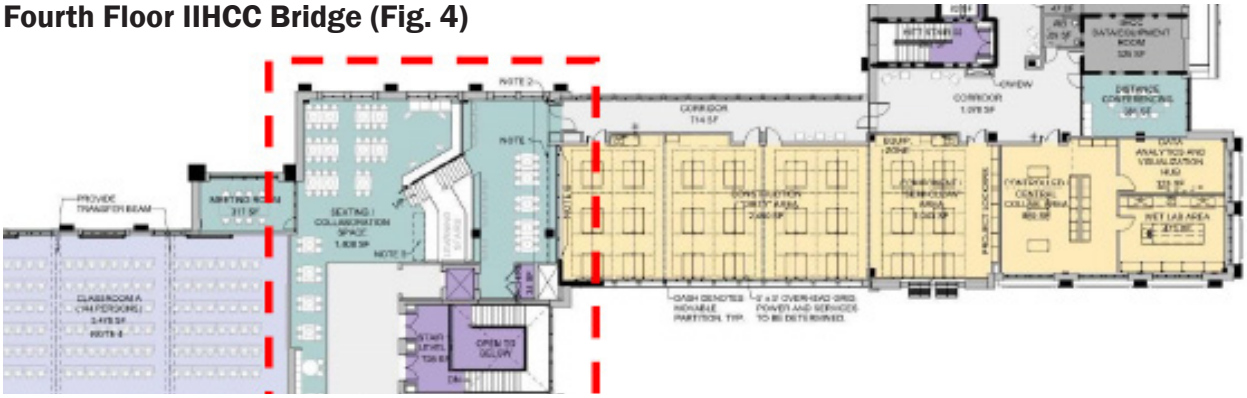
First Floor Hitt Hall and IIC (Fig. 3)



In the IIHCC Bridge (Fig. 4), the IIHCC Space (in yellow) is planned to have it's five areas for transdisciplinary research: Dirty Area, Semi-clean Area, Collab Area, Wet Lab Area, and Data Analytics and Visualization Hub.

- Dirty Area – This area seeks to accommodate research and work pertaining to building, fabrication, and related materials.
- Semi-clean Area – This area seeks to accommodate research and work pertaining to electronics, energy, robotics, and related materials.
- Collab Area – This area seeks to be a central hub or meeting place where research groups can interact, collaborate, and ideate.
- Wet Lab Area – This area seeks to accommodate research requiring the use of specialized equipment like fume hoods, sealed chambers, glove boxes, sinks and chemistry tables, and storage for hazardous materials.
- Data Analytics and Visualization Hub – This area seeks to provide all the tools necessary for researchers to analyze, visualize, and explore data captured during their research.

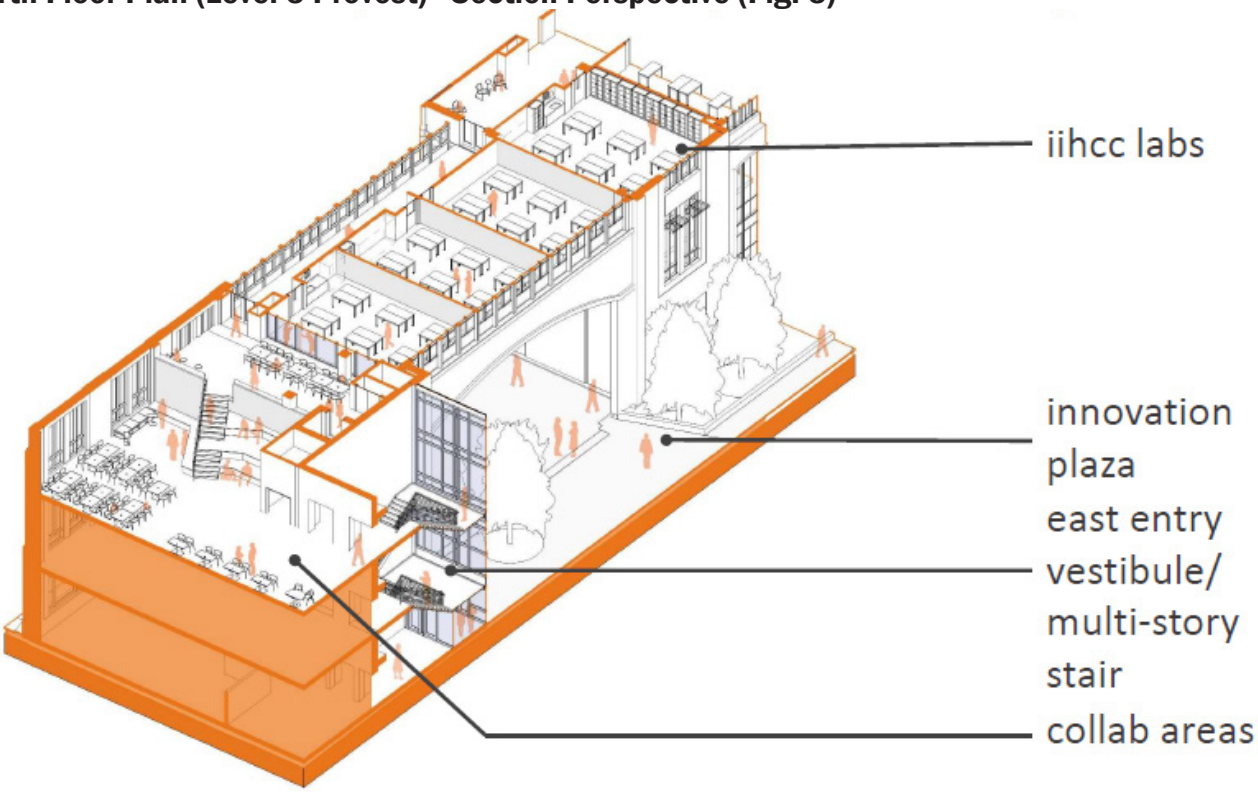
Fourth Floor IIHCC Bridge (Fig. 4)



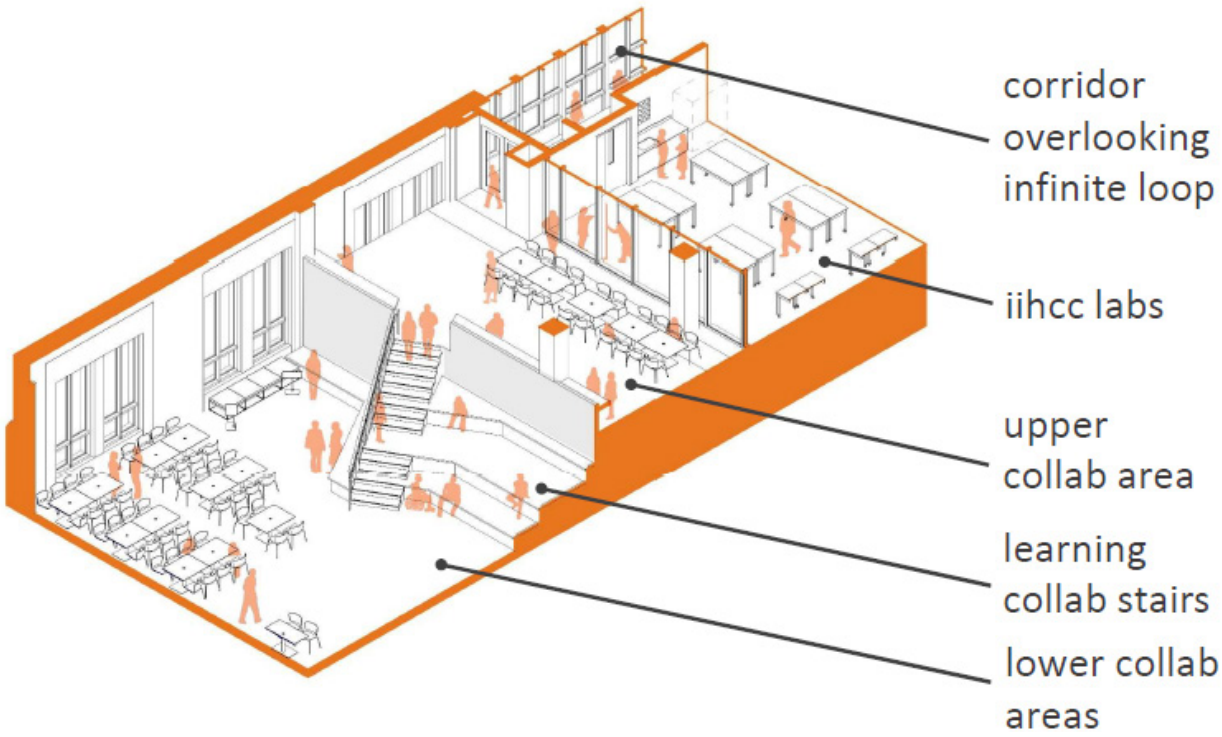
HITT HALL AND INTELLIGENT INFRASTRUCTURE COMPLEX

To accommodate for the elevation change between IIC, Hitt Hall, and the IIHCC Bridge, a proposed stairway (Fig. 5 & 6) has been designed between the IIHCC Bridge and IIC. This stairway area also functions as a collaboration space for students and faculty with chairs and tables available and a sitting area on the stairway. To comply with ADA guidelines, an elevator is available (Fig. 5) to the right of the stairway.

Fourth Floor Plan (Level 3 Provost) - Section Perspective (Fig. 5)



Fourth Floor Plan (Level 3 Provost) - Axon (Fig. 6)



IIHCC TASK FORCE

For each of the five areas of the IIHCC Space (Dirty Area, Semi-clean Area, Collab Area, Wet Lab Area, and Data Analytics and Visualization Hub) as well as the IDEA Space, IIHCC is looking to build a task force of subject matter experts to provide feedback and assistance in the programming of each space for future transdisciplinary research. For more information about these roles and how you can support the Hitt Hall/IIC building initiative, please contact us at IIHCC@vtti.vt.edu.

IIHCC CLIMATE SURVEY NOTICE

This summer, IIHCC will be sending out a climate survey to all those involved with the Destination Area. This survey will be used to identify IIHCC's current strengths as well as areas of improvement for the upcoming school year. Furthermore, this survey will provide an organized, concise outlet for those who wish to share their thoughts. It is imperative to the ongoing success of this Destination Area that members critically assess the Destination Area's work and provide feedback. This feedback will help to determine IIHCC's course for the following year to provide the most value for all those involved. We ask that all involved with IIHCC be aware of the climate survey and complete it upon request.

IIHCC CALL TO ACTION

IIHCC is looking for people to assist in the development of IIHCC initiatives to fullfill the Destination Area's mission and goals. Roles are available in IIHCC working groups, including Curriculum, Human-Centered Communities, Research, and Facilities.

For more information and how you can support the Destination Area and associated Beyond Boundaries initiatives, please contact us at IIHCC@vtti.vt.edu.

IN THE NEWS

New 3D Printing Materials at RAPID + TCT 2019 | At the recent RAPID + TCT 2019 event, businesses from across the additive manufacturing industry came together to present their newest innovations.

African Swine Fever Keeps Spreading in Asia, Threatening Food Security | African Swine Fever (ASF) is sweeping through Asia, affecting over 1 million pigs and causing economic hardship and food shortages.