

## Neuroscience Research Building

### Sustainability Monthly Report

**July 2020**

Project Number: 181478

Construction Manager: McCarthy

Architect: Cannon/Perkins & Will



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## Section 2 - Sustainability

### LEED Version: 4.0/4.1

**LEED Update:** The project team continues to review Sustainability opportunities as we continue with Construction Documents. We are tracking LEED Silver at 58 points.

### Neuroscience Research Building Key Performance Indicators

**Sustainability/LEED Update:**

- PROJECT GOAL: LEED Silver Minimum with a goal of 30% more efficient than ASHRAE 90.1-2010 energy efficiency standard.
- LEED version 4.0/4.1 being utilized.
- Preliminary LEED Checklist highlights status of 58 points --WU Initiative of LEED Silver Minimum.
- Project team working toward a stretch goal of LEED Gold.

Category	Points	Potential Points
Integrative Process	1	----
Location and Transportation	14	1
Sustainable Sites	3	1
Water Efficiency	5	----
Energy and Atmosphere	11	3
Materials and Resources	7	2
Indoor Environment Quality	9	1
Innovation	5	1
Regional Priority	3	----
	58	9

**LEED SILVER  
TARGET**

**Sustainability Charrette's held prior to Schematic Design (12/18), in Design Development (3/20) and in Construction Documents (7/16)**

**Certification Level:** Currently, the project is registered online as a New Construction project using the LEED V 4.0 rating system. Certification levels are as follows:

- Certified: 40-49 points
- Silver: 50-59 points
- Gold: 60-79 points
- Platinum: 80+points

## Section 2 - Sustainability

### Parksmart Certification

- The School of Medicine will be pursuing the Parksmart standard and certification for the new parking garage, which is a component of the Neuroscience Research Building. At the end of July 2020, the anticipated points are 119, which is Parksmart Silver. Like LEED, Parksmart Silver will be a project stretch goal.
- The Parksmart standard outlines 48 approaches that an owner can employ to achieve certification and is organized into three major categories, with an added area for innovations.
- Similar to LEED, the Parksmart program offers a menu of options for enhancing the sustainability of a parking structure, allowing asset owners to select those initiatives that are most well suited for their operation. Points are assigned to specific measures based on the environmental impact, achievability in the new and existing structure, and relevance to the economics of the asset. A total of 248 points is available, with Parksmart achieved by meeting minimum thresholds for existing and new parking structures.

### Elements of Parksmart Certification

Component Category	Points Available	Able to Achieve – Yes	Under review – Maybe
Management	90	52	18
Programs	64	34	12
Technology and Structure	88	33	23
Innovation	6	0	1
<b>Total Points</b>	<b>248</b>	<b>119</b>	<b>54</b>

### Parksmart Award Levels/New Construction

Certification Level	Points
Bronze	110 – 134
Silver	135 – 159
Gold	160+

## Section 3 - Appendix 1 Sustainability Briefing Document

### Neuroscience Research Building Sustainability Briefing Document

July 2020

This narrative memorializes Neuroscience Research Building (NRB) design progress on sustainability elements made in the spring and early summer of 2020. The narrative constitutes an update to the WUSM presentation of March 31, 2020. The narrative is prepared as background material for a July 16, 2020 project sustainability meetings with stakeholders. Stakeholders will recognize that much of the recent progress ties directly to the valuable exploration of sustainability that occurred at the March meeting.

WUSM and the project design team have partnered since December 2018 to articulate sustainability goals and objectives and means of realizing them through project design. These support university goals for project LEED performance and greenhouse gas emissions reduction, WUSM's *2018-2025 Sustainable Operations Strategic Plan*, and sustainability specifics articulated in the NRB request for proposal. Early sustainability partnership efforts found their way to a June 2019 pre-design report. Here, sustainability was discussed with other project goals relating to excellence in research space, engagement, and collaboration of building occupants and urban design that effectively extends the boundaries of the campus to engage the surrounding neighborhood better. With the issuance of the project's schematic design package in November 2019, the important decision had been made to pursue the LEED v4 BD+C NC compliance path with LEED Silver as the minimum goal.

#### 1. Building energy performance<sup>1</sup>

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<sup>1</sup> AEI (Laura Halverson) to present outcome of most current energy models including baseline and proposed model comparisons.

The Washington University School of Medicine recognizes the need to provide environmental health and safety of people and animals without conflict with the energy consumption of the new research building. The mechanical and electrical systems and building envelope recognize and attend to this.

Through energy modeling, the project has calculated approximately 21% Energy savings. As utility rates vary by utility, the energy budget cost savings is nearly 11%. The project includes energy savings associated with the building systems selections, an improved building envelope, and the selection of energy-efficient laboratory equipment.

## **2. Energy savings bundle<sup>2</sup>**

The design team prepared updated the energy model to include two additional "bundles" of energy reduction strategies. The practical bundle includes less controversial items, while the aspirational may require additional discussions. AEI reviewed each opportunity and noted that some might require approval from Environmental Health and Safety. In the practical bundle, the DOAS + Chilled beams and waterside economizers add cost. Most of the remaining are control programming enhancements and add no or limited first cost to the project. While previously considered, chilled beams were included in this new modeling. The payback is lengthy and not justified. As explained by McCarthy: the cost of pipefitters in this market is among the highest in the country. WUSM also dismissed demand control ventilation (Aircuity) and stipulated a thermal comfort range that is more conservative than that in the energy model. Finally, campus experience generates concerns for other energy savings measures tested in the model:

- Users will be dissatisfied when they enter or return to their space, and the temperature has been automatically adjusted to an unoccupied mode.
- This project must be certain not to repeat the experience at BJCIH, where thermal comfort provided by the building systems underperforms adjacent to the curtain wall.

Finally, the campus experience generates concerns for other energy savings measures tested in the model. Specifically, WUSM has a concern about individuals being dissatisfied when they enter or return

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<sup>2</sup> AEI (Laura Halverson) to remind the group of what were the elements of the most recent addition (energy savings bundle) and present its influence on building energy performance.

<sup>3</sup> CannonDesign (Colin Hale) to outline building metering decisions, including LEED point value.

to their space, and the temperature has been automatically adjusted to an unoccupied mode. In response, the design team decided only to bring night-time setbacks to the project.

### **3. Building metering<sup>3</sup>**

Establishing the project's building metering strategy is a collaboration of the project's design team and WUSM Operations & Facilities Management staff. The project follows the International Energy Conservation Code 2018, ASHRAE 90.1-2016, LEED, and the WUSM requirements for utility metering and sub-metering. Also, the St. Louis city energy code specifies metering requirements. WUSM facilities staff requested metering in addition to the code and LEED prerequisites: cooling tower water makeup/blowdown and heat recovery chiller BTU meters (on the heating and chilled water sides of the machines). This information will be provided by software calculations within the building automation system, rather than through meters.

The project is tracking to satisfy the LEED EAc9 advanced metering credit and the WEc3 water metering credit. The metering plan will allow for diagnostics and monitoring to ensure the building systems are operating as intended.

### **4. Commissioning<sup>4</sup>**

The project is pursuing all six available commissioning credits for the USGBC LEED Energy and Atmosphere credit. The project commissioning plan includes the fundamental commissioning and verification prerequisite, enhanced and monitoring Based commissioning (4 points), and envelope commissioning (6 points). Ross & Baruzzini will provide enhanced and monitoring-based commissioning of the building's mechanical, electrical, plumbing, and renewable energy systems. Wiss, Janney, Elstner, and Associates, Inc. will provide envelope commissioning services. Ross & Baruzzini will upload all required LEED documentation at the end of the project. The two will coordinate to incorporate the building envelope documentation into the required LEED commissioning deliverables, including the commissioning plan, systems manual, checklists, and final report.

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<sup>4</sup> Ross & Baruzzini (Jeff Crawford) to report on commissioning decisions and Hellmuth + Bicknese (Ralph Bicknese) to speak to adequacy of this, including LEED point value.

The commissioning process will be used to meet the credit requirements as specified by LEED, which includes verifying that all energy-consuming systems in the building are operating efficiently and per the design requirements. The commissioning team will review the owner's project requirements and basis of design with the project's design documents to develop the testing criteria that will be used to review the operating performance of the building's systems. The commissioning team will verify that all building systems meet defined criteria through functional performance testing and systems testing as well as other various proactive measures, including mockups and pre-functional checks. All results from the commissioning process and building system operating criteria will be documented in a systems manual, a final commissioning report, current facility requirements and O&M plan, and an ongoing commissioning plan.

The monitoring based commissioning process will review the energy performance of the building through the first year of operation. We are defining all energy sources and energy end uses, providing an assessment of all energy and water consuming systems, and evaluating project systems' performance on energy usage and a functional basis. The commissioning team will create a method of monitoring energy through the building's energy meters, sub-meters, and control logic through the building automation system. Earning this LEED credit will require extensive coordination with representatives of the WUSM energy services group and the controls contractor to verify all required points are monitored correctly.

##### **5. Project consideration of climate change<sup>5</sup>**

Buildings with a 50+ year life cycle must be designed to accommodate gradual changes in the climate. Per the National Oceanographic and Administration, the number of extreme temperatures is designed with additional insulation, and most of the glazing limit solar heat gain. Additionally, the cooling and heat capacity of the air handling units are based on design temperatures that exceed the ASHRAE design standards. With the end of the anticipated life cycle for mechanical equipment, WUSM will take the opportunity to revisit climate and climate projections in selecting replacement equipment.

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<sup>5</sup> AEI and Perkins and Will (Laura Halverson and Bridget Lesniak) to present how climate change has been incorporated into design decisions and offer opinions as to adequacy of that element of the design.

## **6. Materials selection included embodied carbon in materials<sup>6</sup>**

Project materials selections are evaluated to meet needs for performance, durability, maintenance, cost, and environment. Establishing criteria for selection and exploration of materials options has been a partnership of the design team and owner as WUSM has an extensive and well-documented experience to establish its position relative to core concerns of durability and maintenance. The design team is lead to identifying materials for their sustainability attributes, with specific concern to those that would help the project earn LEED v4.1 requirements and credits. This exploration involves understanding product ingredients, their emissions, their life cycle impacts, and their risk of deteriorating the quality of indoor air. The project is following established industry material evaluation processes. The team's research of potential materials for the building's interior materials has yielded a good selection that would contribute to some of the MR and EQ LEED credits. Many products disclose their ingredients and offer environmental product disclosures.

Research has yielded options for some materials that are easy: they meet all criteria. One example is Interface® carpet was specified in the NRB basis of design. It is produced by an environmentally responsible company that has improved the embodied carbon of their product by a landfill to energy project and working with their fiber suppliers to continually reduce virgin content in the fibers used for carpet tile. However, with other materials selection needs, it is a challenge to identify a multitude of materials that can realize all project materials selection criteria.

## **7. Ultra-low temperature freezers<sup>7</sup>**

Ultra-low temperature (ULT) freezers, a staple of WUSM labs, are a target for regular replacement as older models use far more energy than ones that are newer to the market. The cost of replacement high-efficiency freezers is moderately more than older models, but the return on the investment is short given the improved energy performance. Further, the high-efficiency models offer other comparable attributes such as space efficiency and expected longevity of use. Washington University in the St. Louis policy is that every new ULT freezer purchases be limited to those with the high-

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<sup>6</sup> CannonDesign (Lynn Grossman and Michelle Rotherham) to present exploration of embodied carbon in materials and outcome re: design decision making.

<sup>7</sup> WUSM and CannonDesign (Melissa Rockwell-Hopkins and Lynn Grossman) to speak to number of ULT freezers that the building will host (on move-in date and in shelved space), assumed count of high efficiency freezers in both categories<sup>7</sup>, and energy savings value of this investment.

efficiency standards that it stipulates. In addition to the energy savings of these models, they use natural refrigerants.

The designated future occupants of the NRB have ULTs in their existing WUSM labs, only 11 of which meet university standards for efficiency. The remaining freezers range in efficiency, and some have exceeded the manufacturers' anticipated operational life for these models. Working with leadership (Quarterly Chair Meetings) and through the Green Lab program, this project will:

- Rationalize the number of ULT freezers in the NRB (limit supply)
- Motivate the trade-in of 30 older ULT freezers and continue this effort until 100 of the NRB ULT freezers are high-efficiency models
- Endeavor to develop a bulk purchase option to reduce the cost gap between the freezers that meet university standards and other models still available in the market

## **8. Landscape plan<sup>8</sup>**

The NRB landscape plan promotes sustainability, human health, and social interaction. The landscape design captures WUSM's landscape guidance, its landscape voice, and supports its maintenance strategies and objectives.

The design suggests a fresh and modern appearance that provides seasonal interest. The Duncan side is primarily in the shadow of the building with the most visibility from the main public lobby space. The plant selections are intended to be light and airy with a more casual layout and serve as a foundation for the glassy vertical structure. The pedestrian walks along Duncan are wide and simple, with lighting to reflect the Cortex District for safety and security. The Newstead landscape takes on a more traditional/uniform appearance allowing for a parkway strip between the road and sidewalk. The west-facing landscape will take into consideration plant material that will be more resilient to the harsher sun conditions.

Creating spaces to support an inside-and-outside use experience is critically valuable in this tight, urban environment. The terrace is the jewel of this expression. Its southwest exposure dictated a shaded, intensive approach to the terraced landscape. The roof terrace features:

- An intensive green roof

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<sup>8</sup> SWT Design (Ted Spaid) to update from last meeting.

- A combination of native and adaptive plants is selected for their vigor and ease of maintenance
- Trees selected to provide extensive shade
- Plant selections provide a four-season landscape
- Garden design and furnishings allow for flexible arrangements for events
- Drip Irrigation system with weather sensor monitoring control clocks
- High albedo pedestal pavers
- All lighting will be dark sky compliant
- USB and power outlets
- A variety of seating types for social interaction and collaboration
- Movable furnishings to be stackable
- Concealed root ball anchor system to protect trees from wind uplift

Sustainable practices are evident throughout the landscape design. At the street, these include:

- Solar orientation is a prime driver
- Plant selections provide a four-season landscape
- A combination of native and adaptive plants is selected for their vigor and ease of maintenance
- The landscape supports biodiversity
- Native flowering plants such as Liatris are selected to attract pollinator
- Seed producing plants such as Rudbeckia and Winterberry Holly is selected to attract birds
- Selected soil mixes will promote healthy root systems and good drainage
- The design doesn't include lawn areas
- Parkway strip along Newstead allows for trees to help shade and protect pedestrians
- The landscape along Duncan provides a buffer and garden for lobby area seating
- Most of the ground plane plantings will be sedges reducing the need for large mulch areas
- An extensive roof garden is located over the vivarium along the Duncan façade
- Irrigation will utilize low flow devices and weather sensor monitoring control clocks
- Use of spray heads will be limited to the fire lane
- Irrigation will be designed to turn off zones when plant establishment has been confirmed
- The maintenance plan will be provided to promote a healthy landscape and promote limited use of fertilizers and chemicals
- Local nurseries have been leveraged to grow and source available plant material

Details of the site design respond to the urban condition:

- The walkway along Duncan is a safe, walkable corridor through Cortex to the Medical Campus
- Shuttle drop-off is provided at the main northeast entrance with easy accessibility
- Social seating outside the northeast entrance is a waiting area for shuttle users and meeting place
- Bike facilities are provided in the garage and building, including guest bike parking on the west entrance
- Pedestrian and vehicular LED lighting is selected along with Duncan and is dark sky compliant

- High albedo paving is used
- The fire lane on the east side will be Grass Pave 2 system with Tollway Sedge infill to help with permeability and visual impact
- BMP Raingarden provided along Newstead curb line

## 9. Green Lab Program<sup>9</sup>

WUSM's Green Lab program aims to reduce the environmental footprint of campus lab space. It is a volunteer program that offers education and hands-on support for improved lab management. The program addresses energy use, water consumption, waste generation, chemical use, and handling. It features a forum that is educational and peer-to-peer engagement to share experiences and successes. WUSM has a goal to involve 80% of its labs in this program. Within the NRB, the Green Lab program has been directed to be positioned to make deliberate efforts during move-in to create a platform for broad involvement and appreciation of the advantages that the program offers lab managers.

## 10. Parking strategy<sup>10</sup>

WUSM studied details of the Parksmart program and decided both that its body of standards aligns with many of the university's existing parking strategies and that it contains many recommendations that represent viable enhancements to the existing parking management system. By contrast, the lack of existing demand for electric vehicle charging on-campus challenges the logic of investing in electric vehicle charging stations in the project's associated garage to qualify for LEED credit. Thus, WUSM decided that Parksmart investments were smarter long term investments due to the impact (benefit) to the operational and planned maintenance elements of the parking project and overall transportation program.

The Operations & Facilities Management Department organized a team of staff and consultants to quickly assess and recommend Parksmart strategies that are a good complement to existing WUSM practices, support the specific needs and attributes of the NRB project, and otherwise hold appeal.

These include:

- Smart pricing
- Rideshare incentives
- Discount structure for low-emitting, fuel-efficient, and alternative fuel vehicles
- Placemaking

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<sup>9</sup> WUSM (Jim Stueber) to update report from last meeting.

<sup>10</sup> WUSM (Melissa Rockwell-Hopkins) to report on decisions re: EV charging stations and pursuit of Parksmart.

- Easy access to mass transit
- Idling limits and reduction in payment systems
- Bicycle parking and sharing
- Existence of a transportation management entity
- An active recycling program
- Sustainable purchasing
- Proactive operational maintenance
- Building systems commissioning
- Use of regional materials and labor
- Fire suppression systems
- No/low VOC materials
- Well-designed HVAC system
- Water-efficient landscape
- Design for durability
- LEED rating of silver or higher

Collectively, these represent 229 potential points (119 "yes" points and 110 "maybe" points) with a maximum program allowance of 248 points. At this time, the project is in the bronze level with the real possibility of realizing silver (135-159 points) or even gold. Silver is currently our project goal.

#### **11. Project boundaries<sup>11</sup>**

The LEED project boundary includes the NRB and utility plant. While it excludes the parking garage because this building type is not eligible for LEED certification, the garage entrance, driveways, and security doors slip through the research building structure in a "hybrid" area. The bridge and link are outside of the project LEED boundary and are not included in the NRB energy model. The landscaped areas east and south of the parking garage are excluded because this work is affected by the parking garage.

#### **12. LEED checklist<sup>12</sup>**

At this writing, the project is in the range of LEED Silver, but close to LEED Gold. Its points:

- 1 for the integrative process
- 16 for location and transportation
- 10 for sustainable site
- 11 for water efficiency
- 33 for energy and atmosphere
- 13 for materials and resources

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<sup>11</sup> Hellmuth + Bicknese (Ralph Bicknese) to report on LEED strategy re: project boundaries.

<sup>12</sup> Hellmuth + Bicknese (Ralph Bicknese) to summarize.

- 16 for indoor environmental quality
- 5 for innovation
- 4 for regional priority

The current total is 58 points out of 110 possible points. The project includes another 10 LEED "likely yes" elements. Of note and interest for active consideration are:

- Reduced parking footprint - the unbundled parking credit
- Renewable energy production credit. WUSM can assign either the largest solar array on the TAB or all four unassigned WUSM solar arrays to this project. The first would generate 1 point. The larger array at TAB will contribute 1.38% to total energy cost savings. If all four unassigned WUSM arrays are assigned to this project, it will yield 2.31% energy cost savings based on the projects June 12, 2020, energy model. In both cases, this would earn 1 point under renewable energy production credit. However, this also adds to the overall building energy cost savings under the optimized energy performance credit. Adding the contribution from the larger array at TAB would equate to 11.8% percent energy cost savings (no change in points from the current proposed model). Using all available WUSM arrays would equate to 12.7% energy cost savings, resulting in a potential 4th EAc1 point.
- Innovation in design. There are many opportunities for innovation credits. The maximum allowed is 6 points, and we have targeted strategies for 5. The project has identified ten strategies as potentials for the remaining point and is in the process of determining which are the best candidates.

***The university is expecting to meet with the GBCI soon to verify some project LEED strategies.***

### **13. Building water use**

The project's fixtures selection was informed by best practices and represent better efficiency of water use than is otherwise found at the WUSM campus. The design represents a 33.65% savings from the baseline.

Washington University School of Medicine  
 4370 Duncan Research Facility  
**Senior Project Leadership at Construction Documents Development**  
 Updated September 9, 2020

Representative	Title	Company
Design Team		
James Walsh	Project Principal	Cannon Design
Mike Ness	Project Manager	Cannon Design
David Polzin	Design Principal	Cannon Design
Brian Hicks	Project Manager	Cannon Design
Trevor Calarco	Senior Vice President	Cannon Design
Joshua Medina	Lab Planner	Perkins + Will
Bryan Schabel	Design Principal	Perkins + Will
Bridget Lesniak	Management Principal	Perkins + Will
Ralph Bicknese	Principal	Hellmuth & Bicknese Architect
Willa Kuh	Director of Planning	Affiliated Engineers Inc
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Matt Sauer	Senior Project Manager	McCarthy
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Patrick Brinker	Senior Project Manager - Central Vivarium, Vertical Vivarium, NHP, DCM, MEP Systems	WUSM
Erika Wade	Equipment Planning - Senior Planner	WUSM
Alicia Hubert	Equipment Planning - Sustainability Coordinator	WUSM
Michelle Lewis	Project Communications & Support - Planner II	WUSM
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