

NRES 285

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Illinois Climate Action Plan (iCAP) Sustainability Ambassadors

University Laboratory High School Assessment

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Executive Summary

We are a group of five students taking NRES 285: iCAP Sustainability Ambassadors, a field-work course dedicated to employing environmentally-friendly practices into our daily lives and into the structure of the buildings we frequent on campus, based on the iCAP 2020. After taking an exam at the beginning of the semester testing our knowledge of the iCAP document, which covers many categories similar to the ones seen in this analysis, we were given a building to focus on, University High, and eventually began our fieldwork in February. In the meantime, many presentations and guest speakers from campus and from off-campus were given to us to increase our knowledge of the career side of sustainability. In return, we give the following presentation of our collective work on the University High School.

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Acronyms and Definitions List

- NRES (Natural Resources and Environmental Sciences)
- F&S (Facilities and Services)
- University High (University Laboratory High School)
- BTU (British Thermal Units)
- kWh (Kilowatt Hours)
- kJ (Kilojoules)
- CO₂e (Carbon dioxide equivalents)
 - This means the number of metric tons of CO₂ emissions with the same atmospheric warming capability as one metric ton of another greenhouse gas, such as nitrous oxide, water vapor, or methane.
- Metric ton = 1000 kilograms, or 2204.62 pounds
- RSO: Registered Student Organization
- SSC (Student Sustainability Committee)
- iSEE (Institute for Sustainability, Energy, and Environment)

Introduction

Developing a strong, sustainable culture and practicing sustainability in our lives is important moving forward in the future as climate change becomes a more pressing issue. As our population continues to grow, we require more resources in order to survive; however, as we approach 2050, the risk of depleting non-renewable resources is much higher. Sustainability allows humans and the environment to coexist without rapidly depleting natural resources and conserving them for future generations. As students in NRES taking this course, we understand how vital it is to practice sustainability. Therefore, we want to emphasize the importance of establishing a sustainable culture to conserve natural resources and reduce our carbon footprint on the planet.

The building that we chose to assess is University Laboratory High School, also known as University High. The building was built in the 1890s, but it was not established as a school until September 12, 1921. University High has 53,113 gross square feet, almost all of which is used. There are about 360 students and 49 faculty members. At University High, there are 17 classrooms, 18 offices, and 13 departments. There are also three science labs for physics, biology, and chemistry.

In our assessment, we found that University High utilized a mix of different energy sources provided by the University of Illinois at Urbana-Champaign and that energy usage has noticeably increased. We also found that only some of the toilets in University High are low flow, while many are not. Ponding could be seen on sidewalks surrounding the building, and there was a garden plot that might have been a butterfly garden. Contamination could be found in almost every recycling bin at University High, and some students expressed concern about the amount of food waste generated. We observed that the majority of students are dropped off in the morning and picked up in the afternoon by car; although some students ride bikes or take the bus. During our assessment tour around the building, there were no obvious signs that promoted sustainability, but the recycling and trash bins had labels for bin contents. When asked about sustainability in a survey, the responses indicated that sustainability was not emphasized much.

Energy

For the energy evaluation portion of the audit, we sought to determine University High's total current energy use and identify cost-efficient ways in which the building could be retrofitted to help reduce the overall energy consumption of the building.

Currently, University High utilizes energy in the forms of electricity, chilled water, and natural gas. Of the 126,583.96 kg CO₂e, the majority (116,677.4 kg CO₂e) can be attributed to electricity use. In fiscal year 2021, University High reported 4 billion kJ of energy use: a 10.5% increase from the previous fiscal year. While there is a general downwards trend of energy consumption in the building, there is a notable increase thus far in fiscal year 2022 (see appendix: building checklist). At the moment, less than 1% of that energy is derived from on-site solar and

the rest is sourced from Abbott, the solar farm, offsite grid purchasing, and purchased renewable source allocation. Inside the school, it was noted that four rooms have LEDs and automatic light fixtures while the rest were noted to be utilizing traditional bulbs and manual on/off switches. The building includes two gas boilers located in the basement which power the radiators and approximately two or three of the rooms are connected to the chiller. It should be noted that on a normal day, the building AC/heating system is turned down at 5pm and then resumed at 6am. Likewise, the computers in the WAC Lab are set for the screens to turn off each evening, but they are not powered down.

Recommendations

It is suggested that the number of rooms with automatic on/off lights be increased over the next few years as possible. Currently, four rooms feature this technology and it would be a relatively simple upgrade that could be completed over the summer when students are not present. Likewise, it is recommended that the current lights continue to be upgraded to energy-efficient LED bulbs to help reduce overall energy consumption during the school year.

To improve the overall insulation of the building, we suggest focusing primarily on the wooden entry doors and the windows. We noticed that the windows already featured a covering that helped to reflect light and reduce the temperature (and thus cooling needs) of the building. Because this is already present, we suggest upgrading the windows themselves from the current single-pane design to a three-pane option. This would reflect 97% of incoming energy, part of which would heat the building. As an intermediary step, we suggest installing double-pane windows which would reflect 90% of incoming light energy. For the wooden doors, we suggest adding weather stripping to fill the current gaps that create an energy leak as well as a safety concern. This is a cost-effective and quick fix that will increase the insulation of the building and reduce energy waste. At the moment, a draft can be felt when standing in front of the doors. We were informed the gap worsens every year as the wood expands during the summer heat (and is then shaved down so the doors will close). This means that come wintertime, the gap is even larger than it was in the previous year. If the budget allows for it, we would take this a step further and suggest replacing all entry doors and opting for a better insulating material such as aluminum

As noted above, there are currently a few solar panels located on the property. We recommend that if the room were to be repaired that additional solar panels be considered during this time. If this route is taken, Scott Tess (srtess@urbanaininois.us) would be a valuable contact.

Waste

When evaluating University High for waste, our checklist findings mostly pertained to recycling and composting. University High was found to have over 30 recycling bins and over 40 trash bins in just the hallways and classrooms (excludes offices, library, and other miscellaneous

rooms). The recycling bins were found to be labeled with signage stating “paper only” and “bottles and cans.” A few of these labels were more detailed, further explaining what is able to be recycled in each type of bin, but these labels were not as common. Additionally, we know that there is a recycling bin paired with a trash bin in every classroom, which was great to hear. However, unfortunately, we found that there were no outdoor recycling bins. Regarding trash removal, we found that BSW empty the trash cans daily, their dumpster includes both trash and recycling bags, and their trash and recyclables are taken to the Waste Transfer Station every two weeks. Being aware of these checklist findings really helped us gauge where University High was at in terms of recycling and waste sustainability in general.

Although we found a lot of recycling bins with clear signage, there was still a notable amount of contamination in the recycling bins. There were plastic bags seen in paper recycling bins and paper seen in the bottles/cans recycling bins. Through the survey, we saw that students felt that they were sometimes confused by the recycling bins because some of them resembled trash can bins. University High has three distinct bin shapes, a black pentagon bin, a large square-shaped bin, and a rectangular bin. The hallway trash cans were almost always seen as the black pentagon bins, so when those same bins are used as recycling bins, they can confuse the two and cause contamination in the recycling bins. Moreover, students noted that there were differing numbers of each bin type in the hallways of each floor, having fewer paper bins, which students tend to use more than bottle/can bins. Nonetheless, University High has shown great promise in helping iCAP goals 5.2 and 5.2.1, aiming to reduce total campus trash waste and install appropriate waste collection infrastructure through the addition of more recycling bins.

Through our initial assessment of University High, we were informed that the building did not have a composting program but that it had been discussed and supported by students in the past. University High is unique in that they do not have a school lunch system on-site, but rather, they have an opt-in lunch program through the Hendrick House. Despite this, students still claimed that there was a prominent amount of food waste produced by the students. Through the survey, it was reiterated that students were on board with composting, our results showing that 64.4% of students supported starting a composting program at University High. This is inspiring news in terms of the success of a prospective composting program at University High.

Recommendations

Our recommendation to improve waste management at University High is to reach out to Shawn Patterson (spttrsn@illinois.edu) at the Waste Transfer Station to get information on how to acquire three-way recycling bins that are made from recycled milk jugs. These bins would help to better organize waste and recycling at University High and to decrease the confusion about bin type and contents. However, because these bins are expensive to acquire, in the transition toward these bins, we recommend applying clear and consistent labeling on current bins. Labels should include the type of bin (waste or recycling), and the contents of the bin (trash, bottles/cans, or paper). Additional labeling on recycling bins should include what types of

materials are recyclable (plastic soda/water bottles, aluminum cans, printer paper, etc.) and what types of materials are not recyclable in each bin (glass bottles, construction paper, plastic containers 3-7, etc.). We also recommend that the black bins should be reserved only for non-recyclable waste, the square bins should be reserved only for bottles and cans, and the rectangular bins should be reserved only for paper. Furthermore, we recommend that there should be a consistent number of each bin type on every floor to make it even easier for students to successfully recycle.

Because some students expressed that there is a moderate amount of food waste generated at University High, we recommend that students and faculty develop a composting program, which could potentially be funded by the Student Sustainability Committee (SSC) and in partnership with Vermiculture, a vermicomposting organization here on campus. In order to secure funding from the SSC, you would have to work through a student on campus as University High students cannot apply for the money. Jack Reicherts (jackhr2@illinois.edu) and our very own fellow iCAP ambassador Holly Hahn (hollyh2@illinois.edu) are great contacts for inquiries about SSC funding. Holly is also a great contact for Vermiculture as well, as she will be spearheading the club this next school year, but the official club email is vermiculture.uiuc@gmail.com. Additionally, Meredith Moore (mkm0078@illinois.edu), our campus Sustainability Programs Manager here on campus, is going to be another valuable resource for you as well, as she is very experienced in implementing composting on our campus.

However, because there are many students and faculty at University High, a lot more food waste might be generated than can be composted effectively. We recommend composting certain food types, such as fruits and vegetables, and the remaining food waste can be given to the Grind2Energy program which generates energy from the food waste. In order to receive more information about potentially participating in Grind2Energy, Thurman Etchison (etchisn@illinois.edu) is the primary contact for the project team. We truly believe that implementing composting would not only help students become more engaged in important sustainable activities, but it would also be a great opportunity for them to inspire a stronger sustainable culture at University High, which is our ultimate goal with this project.

Land and Water

The Land and Water analysis of University High begins with the outside property, and finishes with the inside profile of the building. Most of our observations and recommendations fell outside the school's walls and were involved with surrounding flower beds, trees on the entire block, and the movement of water.

One of the checklist questions that's hard to find its place in any particular category, but most related to Land and Water, is bird strikes. Another term for this is building collisions, and it is where a bird mistakes a reflective window for what it is reflecting, and instead collides, and typically dies. This same principle holds for birds migrating at night and seeing a well-lit

building, which disorients them and distracts them towards the light. It is a significant concern for birds of all species, causing a significant decline in populations, with an estimated 3 billion less birds in North America over the past fifty years.¹ At University High, there were no such spots observed, nor any dead birds seen. A campus bird strike window survey was conducted fall 2019-2020 that took into account buildings around campus with observed dead birds at the perimeter.² University High School was not on this list, so it appears to currently be good in this category, but others had dozens, and most notably, Beckham Institute had well-over 100 with its large unbroken window space.

On the University High block, bordered by Stoughton, Goodwin, Springfield, and Matthews, there were 22 trees observed. Only one of these trees had recently been planted—the rest had quite the height and girth to show their age. Trees were primarily around the building footprint or along Springfield. Around the building footprint, there were hardly any bushes or flowers, but along Springfield, a few feet east of the large parking lot, there lies the remnant of a butterfly garden with several native plants supporting flower-pollinating species. This garden was first learned of on the iCAP portal page for projects under University Laboratory High School—the last documentation with a map of the garden’s placement was from 2018.³ The project was completed and full of plants, according to University Landscape Architect Brent Lewis. This was entrusted to the student’s care for the future, but from our late-February observations, the garden appeared to be somewhat forgotten and neglected.

As for water, there is no irrigation on the whole plot of land, so the vast majority comes from precipitation. For the inside of the building profile, some of this water leaks through windows and the floors, with about six windows being cited, as well as the third and fourth floor landings at the windows and ceiling. For the outside of the building, rainwater is not collected in any noticeable way, but instead naturally pools and percolates where it wills. On impermeable surfaces, that is, concrete, asphalt, cement and other materials that do not allow water through, there are a few ponding spots, with a few small ones in the parking lot, one in the street of Goodwin at the eastern parking lot entrance, and a consistent sidewalk ponding on the middle of the southern side along Springfield. It is a low-lying spot, and on any occasion with rain or sleet or snow melt, this area can fill. Not to help the problem, there is a tire track along this sidewalk where the grass has been torn-up and the soil compacted so that drainage halts. On permeable spaces, namely the grass, there is one large bare spot to the west of the University Gym. While there was no water on the days this spot was observed, regardless, it is low, flat and is likely to fill up and become muddy, as nothing grows there right now. Along the parking lot, water flows down the slight incline in any way and erodes the grass a bit. The rainwater drain is not placed in

¹ [Building Collisions](#)

² https://alecluro.com/campus_bird_window_survey_page/

³ <https://icap.sustainability.illinois.edu/project/uni-high-butterfly-garden>

a way for water to flow there naturally, so anything not absorbed by grass or the drain will flow onto the sidewalk and into the street curbs and drains.

Besides leaks, the only topic of concern for water on the inside of the building is flow rates in restrooms. Flow rates refer to the volume of water that flows through a water fixture within a certain frame of time. Typically for restroom water fixtures, mostly toilets and urinals, these are measured in gallons per flush. A large amount of water can actually be wasted on flushes, as it takes far less water to move human waste than what is allotted in a typical flush. A certain flow rate range is known as “low flow,” referring to a smaller amount of water being used in a flush. Labeled on women’s toilets, the rate was shown to be 1.6 gallons per flush. This is considered to be within the low flow range, but that number is at the larger range and can be decreased absolutely. For men’s restrooms, a flow rate could not be found to be labeled, but a test was conducted by flushing a toilet and observing water volume flow and refill time—this test revealed that water was being wasted and that the toilet was not low flow.

The last topic to mention is water fountains and water bottle fillers. There are five fountains within the entire building, and a single sensor water bottle filler.

Recommendations

For bird strikes, if University High were to replace their windows and expand them beyond a surface area of 10 feet by 8 feet, it would be recommended to minimize and hopefully prevent building collisions and employ safer measures that would reduce the reflectiveness of the windows. Such measures can be taken note of in buildings around the world.⁴

For trees, it would be wonderful to have more planted!, preferably of a more unique species to promote campus tree diversity. UIUC holds a Tree Campus USA certification for such diversity, and there is such a certification available for K-12 schools as well.⁵ Trees are a long-term investment into carbon sequestration and air purification, and can serve as an opportunity to teach students also. For questions about Tree Campus USA at UIUC, contact Meredith Moore or Sinead Soltis from F&S. As for Tree Campus K-12, information was provided to us about this and an application for high schools⁶ from Mike Brunk (michael.brunk@illinois.gov) from the Illinois Department of Natural Resources and who specializes in urban and community forestry.

For the butterfly garden, it is a difficult task for students having interest in one project to pass it on to the next generation, as time at University High is just so short before students move-on. It is essential that new students can fill old roles so that the importance of past actions can be explained and that future work can be set in motion among good hands. Something else that may be even more crucial is teachers coming alongside and ensuring projects endure to new

⁴ [Architectural Bird-Fixes](#)

⁵ <https://www.arboday.org/programs/tree-campus-k-12/>

⁶ <https://applications.arboday.org/community/campusk12>

batches of students. While we do not know the current maintenance schedule for the butterfly garden, for anything more to happen, it is up to students of interest and groups of interest, like clubs, to come together, perhaps partnering with university RSOs, such as Red Bison (redbison.rso@gmail.com) or From the Ground Up (fromthegroundupuiuc@gmail.com), so that substantial action can be taken. Some future ideas are maybe to expand the garden or to add more native plantings. Please see water ponding recommendations.

For leaks, David Boehm from F&S provided an exhaustive list of leaks at University High.⁷ These are high priority items for safety and building structural integrity that involve both temporary and permanent fixes, the latter perhaps being what's needed these breaches in the building envelope for water to enter—new roofs and windows. As noted above, if a new roof were to be considered, a route of sustainability with incentives for another category, being energy, would be to add solar panels. Scott Tess (srtess@urbanainline.us) would be a good point of contact, as he deals with sustainability projects in Urbana, such as the landfill solar installation.

For water ponding issues, the first and foremost task is to level the lowest spot on the Springfield Avenue sidewalk with cement and to prohibit F&S from using small off-road or on-road vehicles used for landscaping to stop driving on the sidewalks. Tearing-up the grass is forgivable, but should be fixed for reasons more than just aesthetics. A quick solution to water conservation could be to aerate the entire lot in the hope that this could promote grass roots to develop deeper roots and for the soil to be less compacted. A better solution that could solve most everything is more plantings, particularly native plantings. These have quite deep roots extending much further than the few inches typical of Kentucky Bluegrass, a non-native species—invasive actually. Native roots can go so much as five feet in the Pale Purple Coneflower. This allows for a better and more stable soil profile from less nutrient leaching, more water absorption, and less runoff and erosion. This can minimize the potential for more bare spots to develop and for there to be less water flowing off the land and eroding dirt or collecting in low-lying areas. Something else, more labor and financially intensive though, could be to replace the parking lot and the sidewalks with permeable material for water to percolate and not pool.

For restroom water fixtures, we recommend that low flow implements be placed in the piping, such as restricting an aperture for less water to flow in a urinal, or entirely new urinals, toilets and even facets if necessary. Lower water flow rates start savings immediately, and show in the long-term. WaterSense is a certification for water appliances to ensure water conservation.

For water fountains, we recommend for more sensor bottle fillers be placed, or that fountains be converted to these. It's a way to promote students and staff to use reusable bottles and not plastic. We don't know if the use of plastic water bottles is an observed issue at University High, but regardless, promoting people to have bottles of water through this infrastructure making that available simultaneously helps with hydration and waste reduction.

⁷ [University High Leaks](#)

Transportation

The transportation section focused mainly on how students arrive and leave from school. Our checklist findings supported the fact that the vast majority of students travel by car. We found there to be no signs of goat paths and the sidewalks are all in good condition with the crosswalk from Grainger Library to the North Engineering Quad across Springfield Ave being the only cross-walk with audible cues. There are a few bike racks located at University High and are used seldom by students. The racks themselves are in fair condition and located in a reasonable area. University High did not express much interest in Veorides. Carpooling is not incentivized much and there isn't a close Zipcar location.

As our findings show, many students are dropped off via their parents' car. This can be largely due to that just being the simplest way a parent can get their child to school on time. Another factor that can support why students travel via car to school is COVID. Students in our survey said that they would feel more comfortable with taking public transport once this wave of COVID is over. The main concern when it comes to Verorides is having many bikes displaced around the building. This is likely since students are not interested in them.

Recommendations

The main thing transportation does towards the environment is release greenhouse gasses from vehicle emissions. In this case as parents wait outside for their kids in the drop off lane. Ways to decrease the amount of cars is to encourage different ways to travel to the school. One such way is riding a bike. While students have expressed concerns with distance and are not interested in Veorides, there are still students who are able to ride a bike to school. With this said most students will take a car to school so the focus should be around promoting less cars rather than alternative methods of travel. Carpooling should be encouraged and can help lower the amount of cars traveling to University High. At the beginning of the year parents can opt-in to a private directory allowing them to see who lives near them so they can set up carpooling dates for their kids.

Engagement

At University High there are multiple ways of promoting sustainability. Inside the building a PA system is used for daily announcements, while online they have a Twitter and Facebook page. They currently have around 300 students with 350-360 people in the building throughout the school week. The building and offices are not green certified. When it comes to changes at University High there is an administrative team that can bring up different matters to the Provost's office.

Recommendations

We recommend that offices in University High contact the Greener Campus Program through the iSEE for more information on how to get Green Certification. This would help offices in University High to implement sustainable practices in the workplace in easy ways, such as using smart plugs with smartphones, turning off office lights when not in use, or closing windows when the HVAC is on. During our assessment, we noticed that there was an empty bulletin board located near the landing on a set of stairs for which we would recommend to convert into a Sustainability Bulletin Board that could promote tangible and sustainable actions that students might want to incorporate into their daily lives, such as turning off lights, recycling, or reducing meat intake. Additionally, joining other social media platforms, such as Instagram, to actively promote sustainable practices could be effective in creating a sustainable culture at University High.

Education about sustainability is important, so we recommend that University High begins a sustainability workshop at the beginning of the school year or semester to touch base on how students can incorporate sustainable practices into their lives and at University High. Additionally, this workshop could include a tutorial on how to properly recycle so there is less contamination in the recycling bins. This would help increase awareness about sustainability practices at University High and help the university achieve its iCAP goals.

Student clubs could host sustainability events every month or semester that could focus on different sustainability topics. These events could also be partnered with University RSOs to increase student engagement. One event could be Uni Lights Out, which is similar to Illini Lights Out. In this event, students would turn off the lights in University High on a Friday night so that lights wouldn't be left on over the weekend. Recycling practices could be promoted more through hosting a "Recycle-Bee" in which students place certain everyday objects in the correct recycling or waste bins, including more difficult items such as food packaging or wax-covered cardboard. Gardening could be another way to engage student interest in native plantings and education on the importance of planting vegetation for butterflies and pollinators. Sustainability Trivia could be another way to test student knowledge while simultaneously teaching students about sustainability. Incentives could be provided to students that participate, such as t-shirts, stress balls, a small pizza party, or reusable water bottles.

Conclusion

Moving forward, we would like to emphasize a few recommendations that we believe should take higher priority. Replacing the doors and windows, ideally, as soon as possible are two of our biggest overall recommendations for energy. In the waste section, we would prioritize installing the three-way recycling bins and forming a composting plan as those would show the most immediate benefits in reducing University High's waste outputs. Moreover, in the land and water section, installing low flow and dual flush toilets would help reduce University High's water usage. Incentivising carpooling through a private opt-in program for parents takes priority

for transportation recommendations. Lastly, in engagement, we would love to see student clubs, even if they are not entirely environmentally focused, hosting fun, interactive sustainability events to engage the school community and teach them more about sustainability. Implementing these various recommendations at University High not only helps to reduce utility costs and reduce your carbon footprint, but it will increase the sustainability culture at University High, which is something that we would absolutely love to see.

Put simply, now more than ever, it is important to be conscious of the environmental consequences of our actions. Promoting sustainability in places such as University High by making sustainable switches not only in building infrastructure but in culture, can have far-reaching effects. Creating a space that recognizes the importance of sustainability and positive interactions with the environment is vital in working towards a greener campus, community, and world. University High has the power to spearhead these inspiring sustainable changes on our campus, and we would love nothing more than to see that happen.

Acknowledgements

Our class was led by the wonderful NRES faculty Eric Green and Meredith Moore! They increased our awareness of sustainability topics, showed us why we should care, and what we can do about it. They also arranged so much for the success of us students in this project.

Don Marrow was our facility liaison, so to him we give our utmost thanks. Through his communication with us, we were able to tour University High and have many of our questions answered for the exhaustive checklist items. As he has transitioned jobs to the School of Chemical Sciences, his position is replaced by Hannah Radnitzer.

Elizabeth Majerus, director and principal of University Laboratory High School, also is someone we'd like to thank for being supportive of our class efforts and change at University High.

David Boehm, Director of Building Maintenance and Grounds for F&S, provided the useful leak spreadsheet information for recommendations in land and water. Thank you for sharing this compiled information.

Brent Lewis, University Landscape Architect, provided information on the state of the Butterfly Garden at University High.

There were many visitors to our class, arranged by Eric and Meredith, who gave us presentations to increase our knowledge of various topics on campus. We give each of them our gratitude and thanks for their time, and they include the following:

Morgan White, Associate Director of F&S and Director of Sustainability at F&S, showed all aspects of what F&S is and how sustainability goals are actually implemented on campus, revealing such a larger background world going on,

Thurman Etchison, Food Service Administrator for campus housing, presenting on dining hall food,

Layne Knoche, working for the Cooperative Extension Service, showing his active involvement with the restoration of the Red Oak Rain Garden,

Scott Tess, Sustainability and Resilience Officer for the City of Urbana within Public works, presented on what he does in his job to promote and act sustainably in Urbana,

Ashlynn Stillwell, associate professor and Elaine F. and William J. Hall Excellence Faculty Scholar in Civil and Environmental Engineering, and one of the graduate students in her lab, Vica Otrubina, presented about their research studying human behavior and water consumption,

Sarthak Prasad, Sustainable Transportation Assistant at F&S and a member of the Transportation SWATeam, gave us a presentation about campus transportation and ways in which we could gauge the sustainability of University High's transportation systems,

Shawn Patterson, F&S Transportation Manager, not only gave a presentation, but was later requested for a tour of the campus Waste Transfer Station, where we gained a unique viewpoint on what really happens with garbage and recycling at UIUC,

Paul Foote, Energy Efficiency and Conservation Specialist for F&S gave a presentation on efficiency efforts around campus, and he also provided energy usage data needed to calculate the carbon footprint of University High.

Appendix

University Laboratory High School Building Assessment Checklist

Building Profile

When was this building constructed?

- 1890s. Building is 130 years-old. University High is 100 years-old

Is the building LEED Certified? If yes - what level?

- No

What is the total square footage? What is the usable square footage?

- 53,113 gross square footage

How many classrooms exist in the building?

- 17

How many office spaces exist in the building?

- 18 offices

How many labs exist in the building?

- 4 - physics, biology, chemistry, and computer lab

Do these labs have operational and running fume hoods that could be removed or turned off?

- Fume hoods used on an as-needed basis

How many and which departments occupy the building?

- 13 departments

Energy

What energy sources are provided to this building? What type(s) of energy does it consume?

- The types of energy consumed at University High are electricity, steam, chilled water, and natural gas
- University High directly receives <1% of electricity from on-site solar panels on gym (four 255 watt panels), with the rest coming from campus sources, such as Abbott, solar farms, offsite grid purchasing, and purchased renewable source allocation)

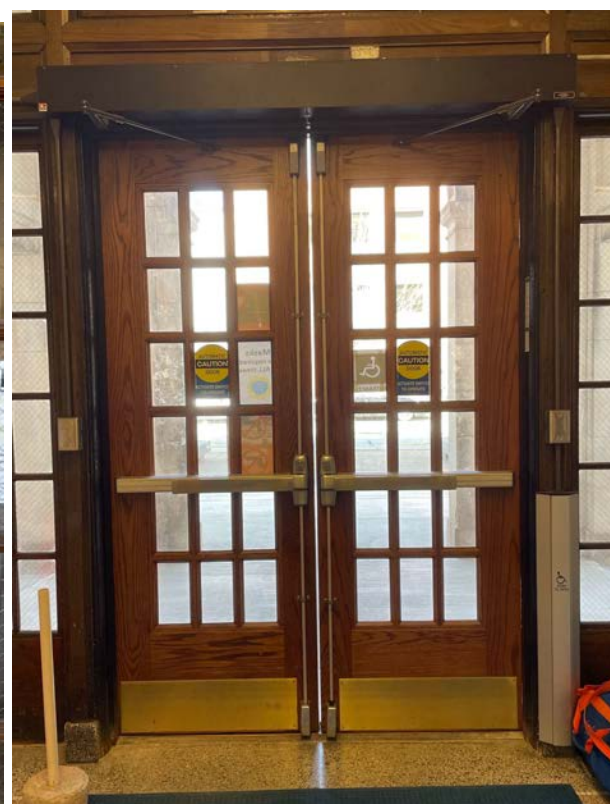
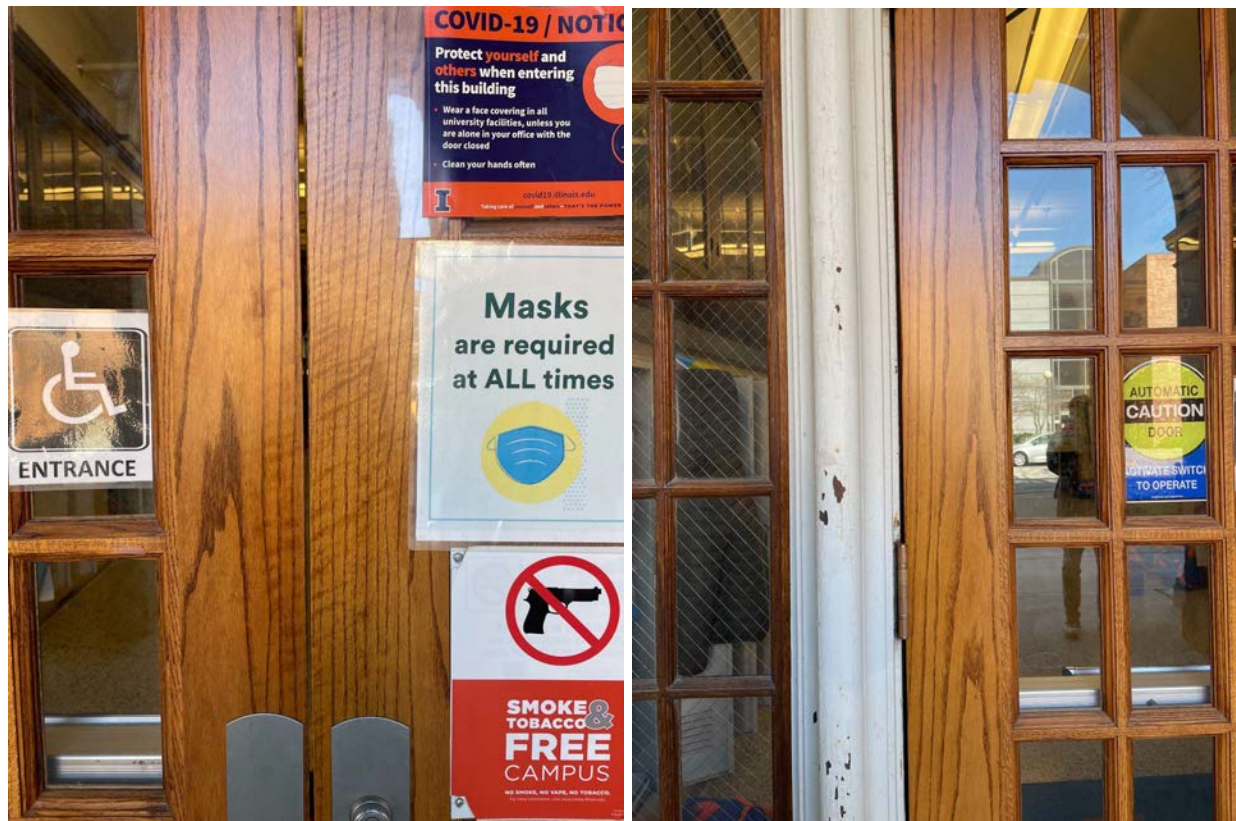
What heating/cooling systems are used within the building?

- 2-3 rooms hooked up to chiller
- 2 gas boilers in the basement that power the radiators



Are there door envelopes (doors, ceiling, floors or windows)? Do the doors have weather stripping? Can you feel wind through the door, and are there visible gaps to the open outside/ If so, how many and where? Indicate maintenance needs as well.

- Yes, there are doors, ceilings, floors, and windows in University High. No weather stripped doors. Wind can be felt through main and side doors leading outside due to wide gaps in between the doors when shut. Because the doors are wood, they swell in the summer, causing F&S to be at University High as much as once a week to shave some off parts of the doors so they can shut. In the winter, the wood shrinks so the gap between the doors gets larger. This is true for all their wooden entrance doors on the main floor.





Are there spaces in the building that are not being used or occupied?

- No

Are offices/labs being used as storage? What is the space supposed to be used for compared to how it is actually used?

- No

How is the building being operated at 2 AM as compared to 2 PM?

- Heat dials down at 5 pm and comes back on probably around 6 am

How many automatic light sensors are used in this building?

- 4 rooms have automatic sensors. All other lights are a manual switch



How many LEDs or fluorescents exist?

- Only 4 rooms have LEDs
- https://icap.sustainability.illinois.edu/project-updates/774?title=&body_value=&page=1

Has this building been retrocommissioned?

- No, but a large capital project is in the works for improvement, adding an entire new east wing with sustainable features (see Illinois Solar Decathlon and Inspired Illinois Retrofit (INSPI.R.) Aim)

What is the deferred maintenance information for this building? Was there a deferred maintenance project funded?

- <https://fs.illinois.edu/services/capital-programs/deferred-maintenance/project-list>
 - Took all costs of COVID renovations
 - Do they not have a budget for deferred maintenance?

What is the energy usage/emissions of this building?

- FY 21 total utility usage: 4,055 MMBTU (4,055 million British Thermal Units≈4055000223.43 kilojoules)
 - Increase of 10.5% from FY20
 - Ranked 144th out of 651 total buildings (354 on campus) in energy consumption
 - **126,583.96 kg CO₂** produced in FY 21 (based on data provided by Don and Paul Foote and using University Rotating Fund data)
 - **Steam:** 3028.38 pounds of steam X (42.76kg/1000lbs steam) = 129.49kg
 - **Chilled Water:** 245 MMBTU X (37.79kg/MMBTU) = 9258.55kg
 - **Natural Gas:** 98 therms (100,000 BTUs) X (5.291kg/therm) = 518.518kg
 - **Electricity:** 198,769 kilowatt hours X (0.587kg/kWh) = 116,677.4kg

Are there labs? Do they have fume hoods? Do they have freezers? Do the labs participate in the Freezer Challenge?

- No freezers. Yes, there are labs with fume hoods but they don't participate in the freezer challenge

Did the building (or department within) win an ECIP award?

- Yes, in 2019, installing shade, 2nd place

Are rooms with heating and cooling technology sufficiently insulated?

- No.

Is there a system to make sure computers not in use are powered off each night?

- The computers in the WAC Lab are set for the screens to turn off each evening, but they are not powered down

Is there a system to make sure lights not in use are powered off each night?

- Not on light, only one or two classrooms that have automatic lights
- Tell BSW to turn lights off when they leave



Is there abandoned equipment that could be unplugged?

- No
- A lot of unused printers, but most are unplugged
- Donate to campus surplus

Are there any space heaters in use in the building? Where?

- Around 3 stored in main office just used as needed when heat isn't working in certain rooms

Does University High purchase carbon credits?

- No

Are the windows of this building double-pane?

- No



Waste

How many recycling bins are in this building? Where are they located?

- 16 in the hallways, floors 1-3 (25 trash bins in the hallways)
- 16 black bins
- 6 square bins
- 4 rectangle bins



Are recycling bins in this building clearly labeled and have consistent information?

- They are labeled for what kind of recycling the bin is for (eg. bottles/cans or paper)

What is the schedule for trash bag removal?

- Trash is taken out to the dumpster by BSW daily. The dumpster is picked up twice per week. 1 container bin; the dumpster has both the recycling bags and trash bags in it. The dumpster gets taken to the waste transfer station.

Are there trash bins without a paired recycling receptacle? If so, where?

- If it ever occurs, it seems to only be in the hallways. In the classrooms, there is always a trash can paired with a recycling bin.

Is there special waste disposal at this building? I.e. battery recycling, a composter, plastic bags, masks, etc. (specific waste disposal for PPE in labs or dining)

- Composting was discussed and may be possible.

How many kitchenettes exist?

- 2 main kitchenettes.

Is there a dedicated outdoor dumpster for this facility, or is it shared with other buildings?

- One for just this building.

Does the building have a cardboard only or paper only dumpster? Or does it have paper-only (for example) blue collection totes in the loading dock area?

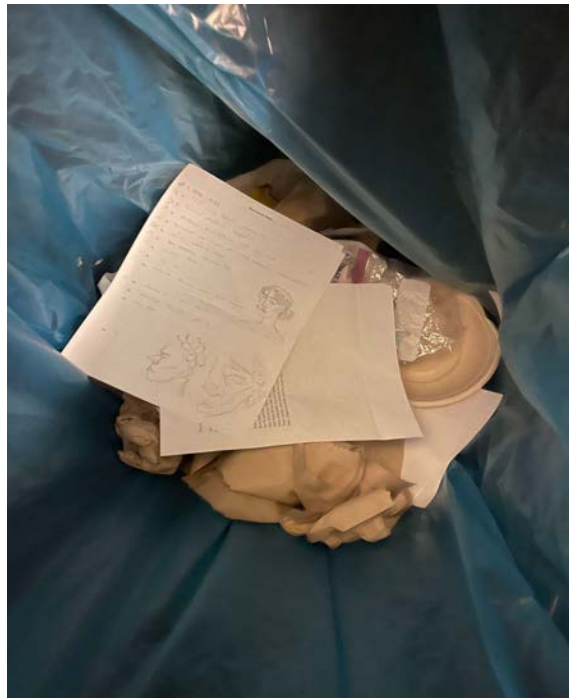
- Dumpster on site is purely trash and picked-up twice per week
- cogle@illinois.edu
 - BSW Supervisor

Are there outdoor recycling bins on the site?

- No

Is there contamination in recycling bins (non-recyclables in the bin)?

- Absolutely, yes.



- Left picture: contamination in a bottles/cans only recycling bin
- Right picture: contamination in paper only recycling bin

Is there a plan in place to evaluate the success of waste reduction programs in the building?

- No.

Do the bathrooms have paper towels or hand dryers?

- Paper towels

Does this building have a sizeable amount of food waste?

- Not really. Most students bring lunch, but about 75 are on the lunch program with Hendrick House.
 - They have reusable containers for this lunch program

Land & Water

Storm Drain Parking Lot Recommendation:

***Plantings along southeast parking lot border to take-on runoff rainwater**



Are there plantings within 500 ft of this building? Do they utilize native plants?

- Probably on what we think is the butterfly garden remnant on southern lawn facing Springfield (see <https://icap.sustainability.illinois.edu/project/uni-high-butterfly-garden>)
- Some trees and bushes
- Check again, maybe with Landscape Architect Brent Lewis



Does the facility manager do any landscape or external maintenance to the building?

- Not physically; Don puts in orders to F&S

How many of the water fixtures are low-flow? Include flush rates of urinals and toilets.

- Women's bathroom:
 - Some toilets automatically flush while others are manual
 - Toilets use 1.6 gallons of water per flush – considered **low flow!**
 - Sink





- Men's bathroom:
 - Flow rate was not found, but toilet flush test showed high volume of water used, and not considered low flow

How many WaterSense certified appliances does it have?

- None that we know of

Are there bare spots (in the grass) around the building?

- Yes, one highly noticeable one in between the school and Uni gym



- Another is at the north entrance to the slight west side, surrounding a drain



Are there spaces where vehicles are driving over the yard or at corners?

- The only noticed spot was at the location of ponding on the sidewalk

Are there any leaks or running water?

- Yes, in windows and in ceiling above stairs on 3rd and 4th floor landing
- About 6 different windows leak
- Leak in room 301?

Does the facility liaison communicate with F&S grounds?

- Yes, for trash receptacles & tables for students outside & planted trees & seed grass

Are the grounds irrigated? By hard infrastructure or by Grounds workers? How often and what volume?

- No

Does the site have green rainwater infrastructure?

- No

How many trees are on the site and could more be added? Could more trees be added specifically near windows that get a lot of sun to cut down on glare and energy usage?

- 22 trees on entire block

How many water bottle filler stations exist?

- 5 fountains—one modern bottle filler with sensor



- Regular water fountain without water bottle filler sensor

Is there a mechanism to collect rainwater?

- No.

Are there any existing permeable pavements?

- Gravel and pavers between sidewalk and street in some areas
- Otherwise, none

Are there areas around the building where water is pooling- either on the pavement or on the yard?

- Not seen yet in the yard, but highly likely, as there is a large muddy bare spot in a low lying flat area
- Small spots in asphalt parking lot

- Large pooling on south sidewalk facing Springfield
 - A vehicle tire track can be seen on the left side of these photos, taken at two separate points in time at the same spot



- Another at entrance to eastern entrance to parking lot



Are there large expanses of reflective windows where bird strikes may occur?

- 10ft x 8 ft window space
- Not likely at University High

Transportation

What are the related transportation plans for this site and when are they anticipated to occur?

- There are no plans, as far as Don was aware

What are the active transportation facilities (bike racks, locker system outside building?) for these buildings? Are there enough bike racks? Are there special facilities (such as covered bike rack or a long-board storage system)?

- Don doesn't like Veorides and he doesn't see students using them.

Have Veorides made a positive impact on bike ridership to the building?

- No

If a building has a bike rack, what condition are they in? Are there old/abandoned bikes locked to it?

- They are in fair condition. Are used by a few bikes.

How close is the bus stop and how often does the MTD serve nearest stop? Is there a bus shelter at the stop?

- Springfield and Harvey:
 - 10 Gold and 13 silver
- Goodwin and Main:
 - 22 Illini

- Wright and Stoughton:
 - 1 yellow, 2 red, 9 brown, 4 blue, 1 yellow hopper

Are all the sidewalks around the facility (~500 ft) accessible and in good condition? If there is a traffic signal at the site, does it have audible warnings for the visually impaired?

- The crosswalk from Grainger Library to the North Engineering Quad across Springfield Ave is the only audible way

Do the sidewalks around the facility (~500 ft) show signs that they are not wide enough or are not in the places where people usually walk? Are there “goat paths”?

- No goat paths or tire tracks observed

Are there programs that incentivize faculty and staff car pooling (more so without covid)? Is there a zipcar location close to the facility? If not, where is the closest one? Where do teachers park?

- Ask Mr. Murphy
- Zipcar: Goodwin-Green Apartments, Morrill Hall, Boneyard Creek (Couple Blocks West of Engineering Quad)
 - Basically, not that close to the school

Survey Results for Thursday, March 10th, morning transportation, courtesy of Holly Hahn:

2 bike

1 scooter

12 walk

231 dropped off

28 bus

Engagement

What are the building communication channels? (Communication departments, bulletin boards, list-servs, digital signage?)

- PA system, call button
- List-servs - faculty room locators
- All of the above, except digital signage.

On average, how many people are estimated to frequent the building each day?

- 350-360 people daily - this includes students, faculty, and staff
- ~300 students

How many offices within the building are “Certified Green”?

- No, but should ask if they would be interested in becoming one.

If not already, can the building (easily) get “Certified Green” overall?

- Unlikely.

Does the building have an engagement social media page? (Instagram, Twitter, Tik Tok)

- Facebook, Twitter,

How do things get changed at University High? Who has to approve? Who sends in the request?
Who do they send it to?

- Admin team 5 people (maintenance)
- Don would come up with plan and discuss with other admin
- Major changes would be taken to provost office

Student Survey Results (45 Responses)

Do you think that the signs on recycling bins are well-labeled (bin contents), easy to read, and effective?

Yes: 82.2%

No: 17.8%

Are you conscious of whether the material you are recycling can be recycled at University High?

Yes: 33.3%

No: 20%

Sometimes: 46.7%

Do you know what materials/objects University High recycles?

Yes: 33.3%

No: 66.7%

Does University High promote sustainability (recycling, energy efficiency, waste reduction, etc.)?

1 to 5 scale (1 is Well-Promoted, 5 is Not Promoted)

1: 2.2%

2: 15.6%

3: 24.4%

4: 42.2%

5: 15.6%

Generally speaking, do you think there is a lot of food waste generated at University High?

1 to 5 scale (1 is Lots of Waste, 5 is Very Little Waste)

1: 22.2%

2: 35.6%

3: 22.2%

4: 15.6%

5: 4.4%

Would you support if University High began a composting program?

Yes: 64.4%

No: 4.4%

Maybe: 31.1%

If yes, how committed would you be to participating in composting?

1 to 5 scale (1 is Very Committed, 5 is Not Interested)

1: 8.9%

2: 31.1%

3: 26.7%

4: 24.4%

5: 8.9%

Would you be comfortable taking the bus in the morning/after school

Yes: 28.9%

No: 40%

Maybe: 31.1%

Would you be comfortable biking to school in the morning/after school?

Yes: 20%

No: 53.3%

Maybe: 26.7%

What would you prioritize in sustainability topics (Waste/Zero Waste, Energy, Transportation, Land & Water) at University High?

Waste/Zero Waste: 31.1%

Energy: 46.7%

Transportation: 8.9%

Land & Water: 13.3%

How engaged are you in sustainable practices in your daily life?

1 to 5 scale (1 is Very Engaged, 5 is Not Very)

1: 2.2%

2: 22.2%

3: 28.9%

4: 40%

5: 6.7%

How much do you prioritize sustainability and creating a sustainable culture at University High?

1 to 5 scale (1 is High Priority, 5 is Low Priority)

1: 4.4%

2: 22.2%

3: 28.9%

4: 37.8%

5: 6.7%