Narratives and HVAC systems

Bjerregaard Jensen, Lotte M.; Bergeron, Emily

Published in:
IOP Conference Series: Earth and Environmental Science

DOI:
doi:10.1088/1755-1315/1085/1/012063

Publication date:
2022

Document Version:
Publisher's PDF, also known as Version of record

Narratives and HVAC systems – why universities demolish and refurbish buildings

Narratives and HVAC systems – why universities demolish and refurbish buildings

L B Jensen[1] and E Bergeron[2]

[1] Technical University of Denmark, Department of Civil Engineering, Brovej, Building 118 DK - 2800 Kgs. Lyngby, Denmark

[2] University of Kentucky, College of Design, 112 Pence Hall, Lexington, Kentucky 40506, USA

[1] lbj@byg.dtu.dk

Abstract. It has been a wide spread argument that existing buildings should be demolished to give way for more energy efficient ones (in terms of operation of buildings). However, from a Co2 emission perspective considered over a 50-year lifespan it will in most cases still be more sustainable to refurbish an existing building even though the HVAC system will be less efficient. The embodied energy in existing buildings holds a societal value due to a potential avoided CO2 emission, in the same way as buildings holds cultural heritage value, precious to a society. Recent research points to the fact that buildings with a good SAVE value are seldom demolished. In this paper Adaptive Reuse in American Universities is explored with a perspective to decision processes. At University Campi the percentage of buildings with good SAVE value is high, however buildings are still being demolished. Through two case studies a mapping of the decision process and thereby the arguments for adaptive reuse and refurbishment as well as demolition is demonstrated. Through 17 semi structured interviews the ideas and preferences amongst decision makers are exposed and discussed, revealing arguments for demolishing one listed building, while preservation another.

1. Introduction

University campuses often hold high quality ‘baukultur’, characteristic architecture designed by well-esteemed architects of different epochs. Many university campuses take pride in refurbishing and maintaining their architectural heritage and organizations like the Association for the Advancement of Sustainability in Higher Education (“AASHE”) and the American College and University Presidents' Climate Commitment group seek to encourage campuses to address climate change by integrating resilience into their curriculum and research as well as through campus operations – including building operations, maintenance, design, and construction. [1,2] Hundreds of colleges and universities in the United States have already built preservation into their facilities management strategies. New buildings, while often designed to meet “green” standards, are limited by economic and environmental considerations, requiring that higher education institutions take advantage of the opportunities presented by older, existing buildings, which provide not only architectural and historical significance, but also a crucial path to reducing greenhouse gas emissions. [3] Further, retrofitting existing buildings to meet current standards typically results in comparable performance to new “green” buildings without the

added expense and emissions outputs involved in construction. Any institution seeking to significantly reduce its carbon footprint will need to rely on retrofitting, renovation, and adaptive reuse. [4,5,6]

The construction sector is responsible for over 35% of the EU's total waste generation. Greenhouse gas emissions from material extraction, manufacturing of construction products, as well as construction and renovation of buildings are estimated at 5-12% of total national GHG emissions. [8] In the United States, GHG emissions associated with the manufacturing and construction of materials, renovation, and building disposal accounts for about 10% of total annual emissions. [9] In order to address the need to reduce GHG emission circular strategies (adaptive reuse, refurbishing existing buildings, and reuse of Second Life Components, preparing for future adaptations) are receiving increased attention. In short, what does it take to increase the amount of buildings that are transformed and refurbished?

University campuses, in many regards, provide the optimal context for adaptive reuse as described above. The University of Kentucky, the case study campus of this paper, has incorporated sustainability into a variety of planning activities. [7] In spite of this, the university still – as have many parallel universities – has made decisions on a regular basis, to demolish buildings. It is interesting to study why demolitions still take place at universities, in order to understand what should be addressed differently in a broader societal context if the aim is to reach a higher level of circularity in the built environment. The following case study considers two sites located on the campus of the University of Kentucky: a modernist 1960's complex by an internationally esteemed American architect and a 1917 tobacco warehouse. By focusing in depth on two building sites whose fates were determined at the same period, in the same place, and by the same decision-makers, a contribution to the knowledge of why buildings of architectural quality on university campuses are transformed or demolished is outlined. The primary research question is why it was determined that one building be demolished and another transformed.

2. Method

This case study examines two historic buildings on the University of Kentucky campus: the Kirwan-Blanding Residential Complex that was demolished in 2020 and the Reynolds Building, which has been selected for adaptive reuse as the future home the University's College of Design. The decision-making process and outcomes were evaluated utilizing a combination of semi-structured interviews with key stakeholders and an assessment based on the SAVE framework.

2.1. Case Study Sites

The case study sites include two historically significant sites located on the University of Kentucky campus in Lexington, Kentucky, USA. The first is the Kirwan-Blanding Residential Housing Complex and Dining Commons ("Kirwan-Blanding") formerly served as undergraduate student housing and dining commons at 750-770 Woodland Avenue, Lexington, Kentucky. [11] The site was designed by Edward Durell Stone, an early advocate of the International Style whose work included the Museum of Modern Art in New York City, the United States Embassy in New Delhi, India, the Keller Center at the University of Chicago, and the John F. Kennedy Center for the Performing Arts in Washington, DC. [13] Built in 1967, Kirwan-Blanding consisted of two 23-story towers, eight low-rise buildings and a dining-commons comprising over 500,000 gross square feet of space on 12.75 acres. [12]

Students lived in the Kirwan-Blanding residence halls until 2017; the towers had been vacant since 2016, though prior it did provide affordable housing for students [14,15] Initial plans for demolition were introduced in 2017 and approved in late 2019. The condition ratings were among the poorest on campus and demolition costs were far below the estimated $126 million to renovate. [16] To offset this cost, the university would have needed to charge students higher rates in Kirwan-Blanding than those assessed to students living in new residence halls. The facilities were "vacant and have reached the end of their useful life. Due to the deteriorating condition of these 11 buildings, use as housing and dining is no longer feasible. The property is strategically located for the University's needs and the University will regain approximately 12.75 acres of land in a desirable central campus location." [11] Demolition began in May 2020 and was completed by December.

The second site, the R. J. Reynolds Company Building ("Reynolds Building") at 662-676 South Broadway in Lexington, Kentucky, is a two-story, brick masonry building with heavy timber framing built in 1917 as a tobacco warehouse and re-drying plant. [3] While not designed by an architect of renown, the Reynolds Building has deep roots in the history and culture of the Bluegrass region and Lexington's role as a major tobacco market during the early twentieth century. The Reynolds Building has open interior volumes on all floors with wood columns and exposed trusses that create a visual rhythm. The building's timber posts show signs of use and age that reflect its uses and long history.

The University of Kentucky acquired the Reynolds Building in the 1960s, using the new acquisition as the university's art department. [18] The building was vacated a decade ago when the university's School of Art and Visual Studies relocated to a nearby adaptively reused historic tobacco warehouse. Leadership in the College of Design, seeking to find a space that would unify all its programs under one roof, began to survey options and in February 2019, the University of Kentucky Board of Trustees approved the design phase for the rehabilitation of the Reynolds Building as the future home for the College of Design. [19] The proposed adaptive reuse plans will take advantage of the structure's existing layout to allow for open floor plans and use the "repetitive structural grid" to create a space that lends itself to greater opportunities for collaboration and experimentation. [20]

2.2. Semi-structured Interviews

A review of the literature on adaptive reuse on American university campuses was made and planning documents from the University studied to aid in the creation of an interview guide. Respondents were asked questions relating to general ideas on sustainability and the built environment, qualities of the university campus and surrounding area, and criteria for making decisions regarding the treatment of existing buildings on campus. The interviews also included space for reflections on the circumstances and contextual aspects that were behind the decisions. Interviewees were selected from the decision-makers and stakeholders directly involved with the two case buildings. Semi-structured interviews took place online and were later transcribed and analyzed to identify patterns in the Kirwan-Blanding Residential Complex and Reynolds Building projects, commonalities in the reasoning behind their respective treatments, and the university's process behind selecting demolition versus adaptive reuse.

2.3. SAVE- Assessment

SAVE is short for Survey of Architectural Values in the Environment and denotes a method to identify the preservation values of buildings. [21, 22] The SAVE value of a building is assessed by specialists utilizing check-list templates, on a scale from 1-9 on five parameters: architectural value, cultural-historic value, environmental value, originality, and technical value. The five parameters are reduced to one preservation value, which we have divided into three groups: + 1-3: High preservation value + 4-6: Medium preservation value + 7-9: Low preservation value. More than 350,000 buildings have been assessed in SAVE in Denmark.

The two case buildings were not officially evaluated in a SAVE framework; however, the authors assessed the case buildings in the SAVE framework. Though built in different time periods, both would have a SAVE score between 3-4, though the argumentation for the scores would vary. The demolished modernist building was a major work of an internationally esteemed American architect of the period, representing the design-understanding of that epoch. The tectonics of the building, the composition and the landscaping formed a characteristic integrated architectural statement of that particular epoch, considered to hold qualities. The adapted building scored in other criteria, such as holder of local history (tobacco production), historic building technology (historic red brickwork, cast iron columns). Both buildings were in poor technical condition and had been unoccupied for 3-5 years.

3. Results

To give a quantitative perspective, an estimate of the climate footprint of a new building with the same area of m2 is demonstrated for each of the two buildings. The adapted building is 13500 m2 with a CO2-eq per m2 per year of 9,191. A similar functioning new structure (only materials) would have a

climate footprint of 124078 CO2-eq. The avoided CO2 emission by deciding to adapt is difficult to calculate precisely because the amount of removed material and environmental impact of new material is necessary to the calculation. The demolished 1960s modernist building had an estimated 50000-m2 common facilities in low-rise structures and dorm towers. Replacing the same amount of m2 would leave an estimated climate footprint of 459550 CO2-eq per m2 per year. The estimated cost per m2 of adapting the demolished building and the adapted building were close to the same number, though more expensive for the demolished building (based on the estimates provided by interviews as opposed to those officially reported) (34000000 USD/13500 m2 and 1250000/200000000 USD/50000 m2).

The results of the semi structured interviews could be presented in different ways; categorized according to the two case buildings, the pros and cons of demolition, the professions and roles of interviewees, etc. In the following, the results are grouped according to the main themes consistently raised by the interviewees: Programming, technical conditions, finances/ability to attract funding, ability to attract students, narratives (e.g., sustainability, 'local stories about the building', urban-context').

3.1. Technical condition

Quantitative arguments concerning technical condition and financial arguments were at the fore when the decision-makers outlined the backdrop for their decision. The Capital Construction Project Manager described the demolished residence hall complex as being in poor technical condition. The site had been predominantly unoccupied for 5 years, so (the dormitory rooms) were '*deteriorated*.' Simply bringing the building back to original conditions and adding new internal systems would have an estimated cost over 200 million USD. The Sustainability Coordinator for the University of Kentucky noted that '*it is a 10-15 million USD just to demolish the building'* and the Vice President for Facilities Management indicated that '*it would cost way more to refurbish it than to replace it'*. The adapted building was unoccupied for a similar period. One part of the 3-building complex was demolished to create a parking lot and another adjacent to adapted structure is in poor condition. [23] The local architect for the adaptive reuse project pointed to high ceiling height as a driver for the decision as it '*can accommodate modern systems, we want, air-condition etc.'* [24]

Both buildings faced poor technical conditions; however, the ceiling height in the adapted building project was in general high enough to accommodate present day HVAC systems. Only the low-rise part of the demolished residential complex shared that character. When asked if it was easier or more difficult to attract external funding from alumni or others for new construction or adaption-projects, all interviewees expressed that there was no general difference – some contributors preferred new building projects, other preferred to fund refurbishment or adaptation projects.

3.2. Economic sustainability

There are other aspects to the financial considerations than those related to technical conditions. American public universities, faced with decreasing state revenue, are increasingly withdrawing from building and operating student housing, instead turning to public-private partnership agreements where developers lease the land, build dormitories, and operate them. These residential halls provide amenities similar to or better than off-campus options. The university architect indicated '*We were struggling with housing in general; …. We could not see a way forward to replacing all the houses. Public Private Partnerships…we visited a company that had replaced a whole lot of the university of Alabama's houses…'We leased the land long-term, 35 years, it is all in favor of the university, it is a deal you can't refuse…we tore down the old halls and replaced them with new PPP housing projects. Ehen they looked at the 'K' Building* (now demolished building)*, the developer…* [Global Property Development Cooperation] *…what you find is that the partner is so well set on suites and that they have in the past buildings and operated, that they cannot see another solutions…''when you talk about the K Building it is black and white, the people that what to pull it down only see the negative and the people want to preserve only see the positive. But the real problem was that the developer really thought it was cheaper just to knock it down. They could make more money by taking it all down.'* [25] This was echoed by the Vice President for Facilities Management, who stated *'we have gotten out of the business of operating*

housing. Our economic model has just pivoted to not investing in housing halls. If we can find a private partner that can give a lease rate that we can accept, we would go that way.' [23] Several attempts to interview the Global Property Development Cooperation were made, but they declined.

Another view on economic sustainability is the affordability concerning student housing. Several interviewees questioned the assumption that students don't want to share bathrooms and share rooms. The Sustainability Coordinator for the case university indicated that *'The private partners says that no one will live in the existing (grad housing) facilities, they have market analysis that show that no one will want to live in that kind of facilities…they will double the rent…, is a catch 24 because people actually want to live there if the rent is low…'* [26] The local architect had a longer perspective*: 'We shouldn't design the new buildings to the whims of college students. But those new* (suites) *will also be changed one day*'. [24] The social sustainability side to economy (affordability and equity) did not weigh heavily in the decision-making process. The 1960s organization of dorms and common facilities did not match the business model of the PPP and it was assumed that students did not want to live there anymore.

3.3. The question of style

An essential part of the case university's economy is related to the ability to attract new students. The narrative of the historic campus is important. The Vice President for Facilities Management stated '*We were trying to achieve student satisfaction – good scores in survey. We really want students to do good there. And part of that is that is to restore the historic buildings – they define the core of the campus.*' [23] The 'historic' narrative was a driver for deciding on adapting the 'R' building. The local architect stated '*it could be a bias that 'R'-building feels more like 'Kentucky*' (than the demolished modernist building complex). [24] The historic industrial building as typology is appealing as an art academy and school of architecture expressed by two deans and a faculty member, each of whom expressed that '*The narrative of the industrial building for creativity... lots of space that did not feel precious… There is a tradition of an artist lofts studio, in industrial spaces, in the United States…Go into a space that is not for human use, maybe more on the industrial side...and reimagine it and reconfigure it.*' [27, 28, 29]

The narrative of architectural style of the demolished building also played a factor in the decision to demolish. The Capital Construction Project Manager Senior's noted the 1960's plan for campus: '*Urban renewal was the big thing then. Fortunately, we got away from that. History gives us comfort, it gives us scales, it gives us a place to be*'. [30] This is in keeping with how the Sustainability Officer characterized the good campus: *'Then we have the pastoral landscape, the red-brick buildings, that is more generic 'Higher-Ed' landscape*'. [26]

The Vice President for Philanthropy and University Relations explains the public opinion of the demolished modernist concrete complex: '*Many alumnae who had lived in the 'K' Complex were happy to see it go...it was not feasible or economical to reuse. It got to a point on tours* (for potentially coming students) *they would literally say: if I gotta to live here, I am not coming here… Some architects were concerned, 'S' has a number of buildings around the world, …it was a preoccupation that the style will be lost forever. We had many meetings, and tried to educate them that it would not be economically feasible. You can't please everybody…It had become an eyesore…*' [31] The Capital Construction Project Manager Senior however also saw qualities: *'I truly found more appreciation for it while being there under the demolition… I kept some artefacts – I thought we might use them on the redesign of the plaza'.* [30] A faculty member from an alternative Stone campus expressed an appreciation of the campus design: *'The great advantage of the Albany design is that in essence, every building that Stone did has the same external architecture. So, if you do an adaptive reuse, you can do it entirely internally, and you can change the name of the building. You can change some of the floor plan of the building. You can change the use of the building. But from the outside nobody would ever know. It's just the building looks a little bit cleaner and newer because you know they scrubbed up the concrete a bit when they did the adaptation'.* [32]

The image of the university's campus is weighed highly and is considered to have an impact on the general economy of the university. The appreciation of architectural heritage of different epochs is biased and not addressed in a systematic way. There is a sort of 'lovability'-factor or preferences that

also impacts the university's ability to extract funding from alumnae etc. At the university that was designed in its totality by Stone, a strategy for adaptation had evolved that explored the uniformity of the architectural volumes to be freely programmed for other purposes.

3.4. Sustainability

All interviewees were asked at length about sustainability. The sustainability strategies of the decision makers mainly focused on reducing impact from operation, not construction or adaptation. Interviewees did point to the attempt to reuse some of the demolished building on site for a sort of 'landfill' of the demolished building's basement. Asked about preparing buildings for adaptation, there is some focus on this: " (we focus on) *...Design for adaptability but not for disassembly. Modularity of the buildings' mechanical systems is the focus. We have not built a building where we thought about disassembling….what we would do when we were going to take it down*'. [26] Only one of the interviewees had focus on the embodied energy, and the avoided CO2 emission of adaptive reuse; the design architect of the adaptive reuse project: '*I think that one of the biggest things… is just the saving the embodied carbon of the building itself. So, this is really, reducing the amount of carbon spent on making materials, and it's the other two systems you mentioned, like the geothermal and the solar panels, is more about the operational carbon and reducing the energy use of operating the building. So as our systems become more and more efficient… it's important to start drilling down on this energy that is expended on materials… that's the thing that is so exciting about this project in terms of its contribution'*. [33]

Interviewees also frequently raised LEED guidelines and certification. The University Architect noted '*we still practice trying to get the highest LEED we can get. We generally do not spend money apart from doing the right thing. But if the certification costs extra money, we generally don't do that'.* While the AASHE STARS system is utilized at the case study university, this was not a driver. The Campus Sustainability Officer: '*I don't have a STARS priority. I don't play to the test; I play to my own strategic priorities. Movement on our STARS score is a positive side effect to achieve the strategic goals of (Case University). If you are counting the points, you are missing the point. Likewise with LEEDS*'. [26] Sustainability was also understood as green spaces, green roofs and social justice. The CSO elaborated, '*My perception of the metaphor of the 3-legged stool, has shifted – you have to turn the stool upside down. You have to have a justice and equity base in order. You can't engage folks in discussion of climate mitigation if people don't have rights and if they are experiencing systemic violence*'. [26]

While refurbishment and adaptive reuse are practiced, sustainability is not the primary narrative associated with this practice. Embodied energy and avoided CO2 emission is not drivers for reuse of existing buildings, however the adapted 'R' building has an explicit strategy concerning this, as a new sustainability narrative – though only expressed by the design architect.

3.5. Programming

Several interviewees referred to fitting new programs into existing buildings as being a barrier for adaptive reuse: '*It is easier to build new, you get the program, design it construct it. It is the challenge of the existing building as to how much you can get out of it… We are land space constraint; we have to be very judicious of how we use our space'*. [23] However, the University Architect also describes how they try to reprogram existing buildings: '*A university can be looked at as a developer, we have land, we have buildings…we are constantly taking buildings and looking at them in terms of renovation and matching them with what programs would fit into them'*. [26]

The demolished building ("K-building") complex was perceived as too difficult to house a new program, particularly the dormitory towers: '*Every room was built, every build in furniture designed…. The abatement aspects of it were extremes…would basically leave you with a shell …which is basically what you have with* (the adaptively reused building) *When you take out anything that isn't structural in the K-building… You couldn't fill it up with something meaningful'.* [30] The local architect echoed *'that building did not really lend itself to any kind of change'*. [24] The adapted building was deemed flexible in terms of reprogramming: *In the 'R' building they wanted to stack as much tobacco as possible*

– good ceiling height…. The bones of the 'R' building are *fantastic …It lends itself to a line of adaptive reuses. There is a lot of daylight, and in the design, we made use of that –The challenge is – the column grid is so tight.– these Bays are challenging to use-… it used to be perfect for manufacturing*'. [24]

When asked about opinions on the demolished building, the design architect for the adaptive reuse stated: '*the reasons why campuses are potentially different, and they also have more…they have lots of different programs that they can move around. It's not like an individual building owner who needs to decide the fate of one building…there's more flexibility... There's lots of programs needed within any campus, and so finding the right fit for the right building is a good approach'*. Universities have a unique position to reuse existing buildings because they can combine several buildings when reprogramming. Creatively exploring new programming of existing buildings is crucial to adaptive reuse.

4. Conclusion and discussion

If a larger number of buildings are to be adapted rather than demolished there are several areas that can be addressed. In the current paper it is evident that the embodied energy of the demolished building was not considered in the sustainability considerations of the university. Economy is the main driver for the decisions, however several less quantifiable indicators played a role for the decisions made, such as stylistic preferences and connotations attached to typologies. The narrative of the building, the 'lovability' of the building plays a role in the decision process. A broader feasibility study with qualitative indicators could expose the biases and preferences that actually are the backdrop of decisions and make them more explicit. The Case University weighs narratives such as place making and sustainability. These narratives were not interpreted as revealing of new uses. Sustainability and sense of place, local positive anecdotes and story-telling are drivers for adaptive reuse, and modernist buildings seem from the interviews to be on the edge of being included in this narrative. The business model of an external investor (Global property development cooperation) weighed high in the decision process as did their evaluation of the transformation potential. The question is whether universities can weigh affordability and thereby equity as high as the ability to attract students - by presenting a wider array of housing opportunities. It demands looking at the economy in a broader sense.

Universities can push and create agendas that are not based on market analysis. It is also manifest from the interviews that the narrative of a building and its architectural style impacts the length investors will go and imagination invested in reprogramming the building. The narrative of a university communicated through the expression of the campus to new students also drives decisions. This is obvious because tuition fees are essential. It is thus relevant to explore in depth what new future students truly are looking for and value, if a wider scope for more adaptive reuse is needed. Sustainability may play an increasing role. The economic obstacle towards deciding on adaptive reuse is clear. Europe is more apt for policies as drivers. However, if American building owners (such as universities) are exposed to a demand to document CO2 emission in relation to a CO2 taxation, a motivation for looking anew at existing buildings that in a first review look as not being suitable for adaptive reuse could occur. The economy behind adaptive reuse projects would most likely change if policies concerning emissions from construction material are addressed. Future adaptability is also, to a large degree, determined by the care that architect place in designing for narrowly-defined functions can form an obstacle for adaptive reuse.

References

[1] Murtagh A. Why college campuses are going green | best colleges | US news [Internet]. *US News & World Report*; 2019.
[2] AASHE. About stars [Internet]. The Sustainability Tracking, Assessment & Rating System. 2018.
[3] Vivian D, Hutzell L. Reynolds Building Historical Analysis and Inventory of Significant Features. Lexington, KY; 2019 1–17.
[4] Elefante C, Changing world, evolving value: A historic preservation roadmap toward 2050. *APT Bulletin: The J. of Preservation Tech*. 2017; **48** 2-3 9–12.
[5] King B, Strain L. 2018. Rebuild: What you build matters, what you don't build matters more. In: *New Carbon Architecture. Building to Cool the Planet* (Gabriola Island, CA: New Society

Publishers).
[6] Carroon J. 2010 *Sustainable Preservation: Greening Existing Buildings* (Hoboken: Wiley).
[7] Tedder S, editor. [Internet]. Sustainability Strategic Plan. University of Kentucky; 2018.
[8] European Commission. Buildings and construction [Internet]. Internal Market, Industry, Entrepreneurship and SMEs.
[9] Dept. of Energy. DOE announces $45 million in Carbon Storage Technologies for building materials [Internet]. Energy.gov. U.S. Department of Energy; 2021.
[10] UK Public Relations & Marketing, editor. About the University [Internet]. About the University | University of Kentucky – The Commonwealth's Flagship Institution. 2022
[11] University of Kentucky, Office of the President. Capital Construction Report. Lexington, KY: University of Kentucky; 2020.
[12] Childress R. UK's Lexington Kirwan-Blanding Towers Lose 1 floor per ... [Internet]. *Lexington Herald Leader*; 2020.
[13] Bluegrass Trust for Historic Preservation. The Kirwan Blanding Complex [Internet]. The Blue Grass Trust for Historic Preservation. 2020.
[14] Wright W. University of Kentucky plans to leave Kirwan and Blanding ... [Internet]. *Lexington Herald Leader*; 2015.
[15] Laytham E, Prather J. Iconic Kirwan-Blanding Towers, Complex Begin Demolition Next month [Internet]. *The Kentucky Kernel*. 2020.
[16] Blanton J. UK board makes first move toward demolition of Kirwan-Blanding Complex [Internet]. UKNow. University of Kentucky; 2017.
[17] Structural demolition [Internet]. Sunesis Environmental. 2021 [cited 2022Apr29]. Available from: https://sunesisenvironmental.com/structural-demolition/
[18] Kast M. UK receives $5M donation to renovate 'terribly stressed building.' Here's the plan [Internet]. *Lexington Herald Leader*; 2022. Available from: UK receives $5M donation to renovate 'terribly stressed building.'
[19] University of Kentucky College of Design . UK Board Approves Reynolds Building for College of Design – College of Design – 38°84° the power of place [Internet]. University of Kentucky College of Design. 2021.
[20] Wilson J. Studio gang to transform former Reynolds Building for college of design [Internet]. UKNow. University of Kentucky.
[21] Ministry of Culture, Denmark, SAVE - Kortlægning og registrering af bymiljøers og bygningers bevaringsværdi, Palaces and Culture Agency. 2011, Realdania, March 2015.
[22] Tennesen A. InterSAVE: International Survey of Architectural Values in the Environment [Internet]. Division of Town Preservation, editor. Copenhagen, Denmark: National Forest and Nature Agency.
[23] Jensen L, Bergeron E, Vosevich M. Interview with VP. for Facilities Management; CFO. 2021.
[24] Jensen L, Bergeron E, Haffermann, B. Interview with K Norman Berry Assoc. Arch. 2021.
[25] Jensen L, Bergeron E, Denny W. Interview with University Architect. 2021.
[26] Jensen L, Bergeron E, Tedder S. Interview with Sustainability Officer. 2021.
[27] Jensen L, Bergeron E, Vernon M. Interview with Dean of College of Design. 2021.
[28] Jensen L, Bergeron E, Strakovsky D. Interview with former occupant of R. 2021.
[29] Jensen L, Bergeron E, Tick M. Interview with former dean of SAVS. 2021.
[30] Jensen L, Bergeron E, Ingram K. Capital Construction Project Manager. 2021.
[31] Jensen L, Bergeron E, Harris T. Interim Vice President for Philanthropy and Alumni Engagement Vice President for University Relations. 2021.
[32] Jensen L, Bergeron E, Bromley R. Interview alternative E.D. Stone campus faculty. 2021.
[33] Jensen L, Bergeron E, Gang J. Interview with adaptive reuse design architect. 2021.